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Purpose and Potential for Commodity Exchanges in African Economies

Shahidur Rashid

Alex Winter-Nelson

Philip Garcia

Markets, Trade and Institutions Division

INTERNATIONAL FOOD POLICY RESEARCH INSTITUTE

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AUTHORS

Shahidur Rashid, International Food Policy Research Institute
Senior Research Fellow, Markets, Trade and Institutions Division
s.rashid@cgiar.org

Alex Winter-Nelson, University of Illinois at Urbana-Champaign
Professor, Department of Agricultural and Consumer Economics

Philip Garcia, University of Illinois at Urbana-Champaign
Director, Office for Futures and Options Research

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ABSTRACT

This paper reviews the purpose and potential of commodity exchanges in Africa. Drawing from the existing literature and using indicative empirics, it examines the conditions that enable successful exchanges, highlights the special challenges to setting up exchanges in Africa, and reviews alternatives to domestic exchanges. We argue that many critical preconditions for the successful establishment of commodity exchanges in Africa remain binding in the short to medium term. The development of commodity exchanges in the region is impeded by the relatively small size of domestic commodity markets, the weak physical and communication infrastructure, a lack of supportive legal and regulatory environments, and the likelihood of policy interventions, particularly in the staple cereals market. Meanwhile, the demand for a domestic commodity exchange for export crops may be limited due to the availability of well-established exchanges abroad and functioning auction floors. The paper highlights three points: (a) efforts to launch exchanges in Africa should realistically assess whether basic conditions for success can be met, (b) if the pre-conditions cannot be met, the use of existing exchanges abroad or the development of regional exchanges may be more feasible than the establishment of national commodity exchanges, and (c) the goals of risk management and reduced transaction costs might be achieved more effectively by improving market fundamentals through investments in transportation, information services, or other financial institutions.

Keywords: commodity exchanges, risk management, market development, Africa

1. INTRODUCTION

Organized commodity exchanges have a long history. Grain traders in Japan began experimenting with the idea in 1730, and the Chicago Board of Trade (CBOT) and the London Metal Exchange successfully launched their operations in 1864 and 1877, respectively. For more than a century, commodity exchanges remained largely confined to industrialized nations, but with market liberalization and increasingly affordable information technology, they mushroomed around the world after 1990.[1] By 2005, non-OECD countries accounted for more than 50 percent of the agricultural futures and options traded in the world. The majority of the world's functional commodity exchanges are now located outside of North America and Europe (UNCTAD 2007).

Growing interest in commodity exchanges on the part of governments, donors, and the private sector in developing countries reflect a drive to reduce transactions costs and a need for new commodity risk management tools. Improvements in the institutions serving commodity markets are especially important to African countries that remain heavily dependent on a small range of commodities for export revenues (see Table 1). Because international markets are volatile and domestic markets are thin and fragmented, risk management is critical for commodity-sector development in Africa. With the dismantling or weakening of marketing boards and the unsatisfactory performance of international commodity agreements (ICAs), governments and their development partners have increasingly looked to commodity exchanges as a means of managing risk in a liberalized market environment.

While many of the commodity exchanges introduced in Asia and Latin America in the 1990s seem to have taken root, the record in Africa is less encouraging. Five African countries launched agricultural commodity exchanges following market liberalization in the 1990s, but only South Africa succeeded in making its exchange sustainable. Despite initial signs of success, Zambia and Zimbabwe suspended their operations following unusual price hikes and subsequent government intervention. Although they continue to exist with donor and government support, the Kenyan Agricultural Commodity Exchange (KACE) and the Uganda Commodity Exchange (UCE), both launched in the late 1990s, have never been able to attract sizable trade volumes. Currently, their limited roles include providing price information in Kenya and regulating some warehouses on behalf of the government in Uganda.

Since 2004, more and more countries have launched exchanges. Notable examples include the African Commodity Exchange (ACE) in Malawi established in 2004, Nigeria's exchange established in 2006, a new Zambian exchange (ZAMACE) established in 2007, and the much-publicized Ethiopian Commodity Exchange (ECX) established in 2008. The role of ACE has so far been limited to providing price information and facilitating procurement for the World Food Program, while the Abuja Securities and Commodity Exchange (ASCE) began trading in maize and soybeans in 2006 on a very limited scale. The ECX, a government-owned exchange, initially focused on trading maize, wheat, and beans, but was unable to attract a significant volume of these commodities. Since December 2008, the ECX has turned its focus to export commodities, with the support of policies discouraging export through other arrangements.

Because commodity production and trade are the primary means of livelihood for millions of households, commodity sector development is essential for poverty alleviation and overall economic development. Faced with both price volatility and high marketing costs, many see commodity exchanges as an alternative way to manage risks and increase efficiency in a liberalized market environment (Gilbert 1996; Morgan 2001; Thurow and Kilman 2009). Despite the appeal of

[1] India and Argentina had early initiatives. In India, the government initially intervened to prevent speculation after the country's independence and eventually banned commodity exchanges in the mid-1950s. Argentina's La Bolsa de Comercio de Rosario was formed in 1884, and its Mercado Término de Buenos Aires was established in 1907. Despite periods of difficulty, these exchanges continue to operate and have been linked with established exchanges in industrialized countries.

exchanges, however, the specific conditions needed for commodity exchanges to thrive in Africa seem to be poorly understood in the development and policy communities. This paper undertakes three tasks: (a) a review of the purposes of agricultural commodity exchanges in an African context, (b) an assessment of the conditions that can make commodity exchange viable, and (c) an investigation of alternatives to domestic commodity exchanges when conditions indicate such exchanges may not be viable. Section 2 describes the purpose of commodity exchange, while Section 3 contains an assessment of the preconditions for establishing a successful exchange. Section 4 examines the alternatives to domestic exchanges, and the paper concludes with a summary and policy implications.

2. THE PURPOSE OF COMMODITY EXCHANGES

The purposes served by a commodities exchange depend in part on the nature of the specific contracts that are traded. By simply centralizing trade in a certain commodity, an exchange can facilitate title transfer, market transparency, and price discovery. Transaction costs are reduced because coordination through a centralized exchange can reduce costs associated with identifying market outlets, physically inspecting product quality, and finding buyers or sellers.

By reducing transactions costs and enhancing the flow of information, an exchange can improve returns to market agents while reducing short-term price variability and spatial price dispersion. Such contracts offer little capacity to address inter-annual price uncertainty, but more sophisticated contracts allowing exchange in futures can enable further risk management. Such futures contracts, however, require a highly developed institution and cannot maintain spot within desired bounds.

It is possible to organize an exchange around an auction floor in which physical goods are traded. In Africa, many such auction floors dealing in export commodities have operated for many decades. These auctions floors lower search costs for participants and may reduce market thinness and consequent price volatility, but they also impose costs for transportation and warehousing and offer little or no services for price risk management or financing. Recent efforts by developing commodity exchanges have attempted to move beyond auction floors to trade in fungible contracts that can be used as price-hedging devices.

The simplest contract that can be traded is probably a warehouse receipt. Trade in warehouse receipts implies immediate title transfer for a specific quality and quantity of a commodity at a location specified on the receipt. While exchange in warehouse receipts can lower transfer costs in a marketing system and may facilitate financial transactions, it does little to help agents manage risk based on price variability that is rooted in the fundamentals of supply and demand. By contrast, by trading contracts for future delivery, commodity exchanges can help strengthen market liquidity, improve price discovery, and facilitate price risk management (Leuthold et al. 1989). An exchange can improve liquidity because a futures contract is a fungible financial instrument which buyers and sellers are willing to hold and exchange. While futures contracts effectively remove price level risk, they do not eliminate risk altogether. Rather, they replace price risk with basis risk, where the basis is the difference between the spot market and futures market prices. Unanticipated shifts in the basis can result in gains or losses, and the degree of basis risk can strongly influence the effectiveness of the exchange in risk management.

Providing the services of a commodity exchange is expensive. The costs include physical investments in operational space, warehousing, and communications, as well as the operational costs involved in screening participants and enforcing contracts. Moreover, an exchange typically must provide clearinghouse services which allow for the buying and selling of the commodities traded at the stated prices with limited fear of default for participants. These services expose the exchange to both working capital costs and risk. For an exchange to succeed independently, its services must be sufficiently valued by users so that they are willing to pay fees to cover these costs.

Futures markets historically evolved through private sector initiatives to address the deficiencies and high costs in spot markets. This raises an important question: if moving from spot markets to centralized commodity exchanges leads to economic improvement, why haven't commodity futures exchanges emerged universally? In some countries, government intervention has stifled commodity exchanges, but in other cases, exchanges fail to emerge because local conditions do not make their activities privately profitable. Market failures, including inadequacies in physical infrastructure, asymmetry in information, and inadequate legal and financial institutions, can all impede the formation of futures exchanges. From an institutional perspective, evolution of a system of trading can require growth in the volume of activity to spread the fixed costs of a new exchange. In

the presence of an inadequate market scale or pronounced market failures, a commodity exchange is likely to fail. Such failures can impose long-run costs on society, as resources will have been drawn away from productive uses and traders will be disillusioned (Leuthold 1994). In some cases, governments can intervene to create conditions that support the development of a commodity exchange, but deficiencies may be structural and thus beyond the influence of government in the short term.

3. CONDITIONS ENABLING THE DEVELOPMENT OF A COMMODITY EXCHANGE

A functional commodity exchange must attract a sufficient volume of trade to enable the benefits of lowered costs of search, screen, and price discovery to emerge while simultaneously spreading the costs of its services over a sufficient base of users. One can identify three broad categories of conditions that enable robust commodities exchange development. First, the commodities to be traded on the exchange must have certain physical and market features. Without such standardized commodities, an exchange can quickly become irrelevant. Second, given appropriate commodities, the contracts traded in the exchange must be suited to the economic conditions. Failure to correctly specify contracts will make an exchange unattractive to potential users. Finally, given appropriate commodity and contract features, an exchange needs to be supported by a facilitating market and a supportive market and policy environment.

3.1. Commodity Specific Conditions

3.1.1. Continuously Produced or Storable Commodities

A contract can only be traded on a commodity exchange if both buyers and sellers are reasonably certain about the availability of the specified commodity at a particular date and location. Early futures markets developed exclusively for storable commodities such as cereals, coffee, cotton, and metals. With advancements in refrigeration, many commodities such as orange juice concentrate and pork bellies that were previously un-storable are now able to be traded in futures exchanges. Perishable goods that are continuously produced may also be traded regardless of their storability. Continuously produced commodities can be traded in a futures market provided sufficient information is available to ensure market transparency (Black 1986). New production technologies have tended to expand the production seasons for many products, allowing more scope for futures trade.

Since most discussion of exchanges in Africa focuses on cereals, the need for continuous availability means that countries need to assess warehouse capacity. One indicator of the feasibility of establishing an exchange is therefore the cost of improving warehouse capacity to a minimum standard. Information regarding the time required to establish a warehouse in various countries is presented in Table 1. Comparison of these numbers with OECD countries, which require 14 procedures and 150 days to complete a warehouse, suggests that establishing warehouses is not particularly difficult in the African context. However, given weak physical infrastructure, connecting warehouses to each other and to central collection points might prove challenging. Increased warehouse capacity could become costly even when per unit costs are reasonable if the scale of deficiencies is large. While some African countries report underused capacity in warehousing, much of the existing warehouse capacity may be situated according to the priorities of defunct parastatal marketing boards, which could be inconsistent with the needs of a market-based system.

Table 1. Procedures and time to construct warehouse and start businesses

	Constructing Warehouses		Starting a Business	
Countries	Number of Procedures	Time (number of days)	Number of Procedures	Time (number of days)
Ethiopia	12.0	128.0	6.7	20.2
Ghana	18.0	220.0	10.7	59.3
Kenya	10.0	137.2	12.3	43.8
Malawi	21.0	213.0	10.0	37.7
Nigeria	19.6	370.8	8.8	37.7
Zambia	17.0	254.0	6.0	29.0
India	37.0	195.0	12.0	48.0
OECD	15.0	162.0	6.1	16.0

Source: www.DoingBusiness.org.
Note: The numbers are averages of 2005-10 reports.

3.1.2. Product Homogeneity within a System of Grades and Standards

Samples of the same commodity can differ in terms of moisture content, impurities, safety standards, and many other features. For a commodity to be tradable in a futures market, it must be subject to grades and standards that account for relevant attributes. With workable standards, futures contracts can identify specific characteristics and allow for standardized discounts when contract specifications are not met at delivery. Many African countries have grades and standards for major export commodities, as well as functioning auction markets for these commodities. For cereals, formal grades and standards are less common, and countries may need to develop or improve their systems of grades and standards before setting up cereal exchanges. In this regard, South Africa sets an example with the most developed system of grades and standards for cereals and by far the most active exchange in sub-Saharan Africa.

3.1.3. Large and Active Spot Market

A commodity is only likely to be traded effectively on an exchange if a large spot market, in terms of value and number of market participants, already exists. More value in the existing market implies more interest by participants, which increases the likelihood of successful trade in any kind of contract and the likely added value of the centralized exchange. Moreover, a large volume of trade is needed to generate sufficient commissions to cover the costs of running the commodities exchange. A large number of market participants also reduces the probability of collusion and market manipulation, increasing the expected value of the exchange. Finally, an active spot market provides information about traders' preferences and priorities which can be used to craft contracts and inform bids in the exchange.

The existing literature does not identify a minimum volume or scale of economic activity required for a commodity exchange to succeed. However, the low level of agricultural value added in most African countries compared with countries with active exchanges suggests that the scale of trade in Africa is likely to be an issue. In 2005, agricultural value added in India and South Africa, where exchanges are active, was US$145.8 and US$7.3 billion, respectively. By comparison, for the 45 countries for which data are available, the value of agricultural GDP is less than a US$1 billion in 27 countries (60 percent), between $1–2 billion in 8 countries, between $2–4 billion in 5 countries, and only over $4 billion in the remaining five countries.

Even in countries in which total agricultural value added is high (for example, Ethiopia), the value of marketed production, which is critical for a commodities exchange, may be low and poorly documented. Export and import values can be used to indicate the volume of market activity. Table 2 presents data on agricultural trade for African countries that have initiated commodity exchanges.[2] It is clear that South Africa's sector is far larger than that of the other countries. The leading agricultural commodity exchange had an annual value of under US$300 million in most countries and only exceeded $500 million in South Africa. Moreover, South Africa's largest export commodity by value had an export share of only 16 percent, reflecting the presence of many other commodities of similar scale. In contrast, most other African countries rely on one or two dominant commodities.

Table 2. Indicators of agricultural market sizes in selected African countries in 2005

Indicators	Ethiopia	Kenya	Malawi	Uganda	Zambia	South Africa
Total agricultural exports (Million US$)	380	1296	392	359	202	3421
Share of leading export commodities (%)	51	35	66	34	38	16
Value of leading export commodity (Million US$)	198	454	258	122	76	535
Value of agricultural imports (Million US$)	422	483	58	281	97.2	2650
Share of leading import commodities (%)	43	17.7	20	26	24	7.6
Value of leading import commodities (Million US$)	181	87	12	73	23	201

Source: *FAOStat* of the Food and Agricultural Organization (FAO).

South Africa's exchange (SAFEX) provides an indication of the level of trade in a successful market. SAFEX regularly trades over 100,000 futures contracts in white maize monthly. On April 20, 2007 (a normal day), the value of trade for white maize with a May delivery reached US$8.5 million, and the value of all contracts in white maize was valued at over $85.2 million. The value of the contracts in all commodities traded on April 20, 2007 was worth $125 million.[3]

While a single day of trade activity in South Africa is valued at over US$100 million, ZAMACE reported a total of US$18.3 million in traded value between October 2007 and April 2010. Similarly, between April and December 2008, ECX traded only 935 tons of maize, 90 tons of wheat, and 570 tons of beans, with a total value of $794,000. By comparison, South Africa's SAFEX traded 600,000 tons of maize in the month of July 2010 alone. At a commission rate of 0.2 percent, the ECX generated gross revenue of $1,588 in its first nine months, amounting to $144 per month. Unable to make ECX viable through trade in primary cereals, the government of Ethiopia suspended the active coffee auction floor and directed traders to use the new exchange starting in January 2009. When coffee traders declined to export through ECX, the government confiscated stocks and channeled them through the exchange. These developments reflect the difficulties small economies may have in trying to use centralized commodities exchanges to reduce transactions costs.

[2] See Table 2 in the Appendix for further details on trade volumes and concentration.

3 Data from SAFEX statement of daily trading volume statistics can be found at the following website: http://www.safex.co.za/ap/market_data_volume_stats.asp.

3.1.4. Variable Spot Market Prices

Since one purpose of a futures market is to manage price risk, cash market price instability is a basic requirement for a commodity futures exchange. Where prices are regulated or markets are monopolistic, futures contracts are unlikely to attract buyers. Regulated cash markets made commodities exchanges irrelevant in most African countries for most major commodities during much of the post-colonial period. Price variability in Africa's grains markets has increased following liberalization, but variability that does not emerge from well-functioning competitive markets may not support an exchange. Prices can vary significantly across space due to inadequate infrastructure or information asymmetry, both of which are important sources of market failures. Erratic price behavior that is inconsistent with observable transaction costs could undermine a commodity exchange by making basis risk unacceptably high and complicating efforts to craft acceptable contracts. Given competitive but high cost cash markets, an effective price information system to support more predictable price relationships in the cash markets could be required before a commodities exchange can thrive.

Contract-Specific Conditions

An exchange can only operate if it offers contracts that are attractive to market participants. Even in developed countries with mature commodity exchanges, most futures contracts fail because they do not attract sufficient market participants. For instance, in the US from 1975 to the early 1990s, only about one-third of more than 340 contracts approved by the Commodity Futures Trading Commission succeeded (Garcia and Leuthold 2004). A well-established exchange with a core of widely traded contracts can absorb unsuccessful ones. However, if a nascent exchange fails to offer attractive contracts, it is unlikely to continue to operate.

3.2.1. Attracting Market Participants

Viable futures contracts must be attractive to brokers, hedgers, and speculators in order to draw adequate volume.[4] A large spot market generally means a sufficient number of brokers, hedgers, and speculators, but contract features can either discourage or encourage participation. Each of these types of traders is useful in creating sufficient activity to support a commodities exchange. Three contract features are key:

1. A close relationship of contract terms with cash market trade
2. Small basis risks
3. Appropriate contract size

If a futures contract does not have a clear analogue in the cash market, the basis will be difficult to calculate and a futures contract will lose value for hedging. Therefore, the futures contract should be defined consistently with the spot market. Moreover, factors that affect the basis and its variability must be considered when specifying the contract. If interest rates, warehousing costs, and transportation costs are unpredictable, it may be difficult to specify a contract that will attract both buyers and sellers. Finally, the size and quality of standardized contracts must be appropriate for traders, making it fungible and usable as collateral in the banking system. Even if the contract is not integrated into the financial markets directly, its size and specifications must be consistent with the capacities and objectives of the traders.

[4] Warehouse receipts will be of interest to brokers but not speculators since they are not interested in accepting delivery risk. Markets for warehouse receipts will tend to be less liquid than those for futures contracts.

3.2.2. Preventing Manipulations and Balancing Interests

For a futures contract to be successful, it must not favor some market participants over others. Gray (1966) concluded that contracts that favored either buyers or sellers, enabling one side to squeeze the other, either failed or had to be revised to make them successful. Constraints to developing balanced contracts for African markets that are attractive to potential users are not well understood. In general, contracts that allow more flexibility by specifying premiums or discounts based on quality, location, and other factors assist in balancing interests and preventing manipulations. Specifying appropriate discounts is only possible with reference to information from reliable cash markets with consistent transactions costs. Empirical studies in the US markets by Black (1986) and Bronsen and Fofana (2001) found that an active cash market is the primary condition for the success of a new contract. An active market facilitates the definition of contract terms that are balanced and provides clear assessment of basis risk.

Bollman, Garcia, and Thompson (2003) provide a rare detailed case study of the collapse of a specific contract. Their analysis of the di-ammonium phosphate (DAP) futures contract in the Chicago Board of Trade indicated that the contract ultimately failed because the cash and futures markets were not sufficiently well linked, making it a poor hedging tool that offered no additional risk management support. This case study demonstrates the difficulty of providing a functional, balanced contract even when the infrastructural, macroeconomic, and institutional environment is hospitable. In the absence of active cash markets and reliable information regarding those markets, it may be difficult to develop an attractive contract to trade on an African commodity exchange.

Economic and Policy Environment

Commodity exchanges have historically developed under private initiatives, but they require supportive public policies. The main benefits of an exchange can be achieved only if a country has adequate infrastructure, efficient flow of information, a sound macroeconomic and financial environment, stable rule of law, and effective contract enforcement. Additionally, public policy must support commodity exchange development by refraining from controlling commodity markets and by allowing producer organizations and other entities to emerge as intermediaries between farmers and exchanges.

3.3.1. Physical Infrastructure

Communications and transportation infrastructure is critical to a functioning exchange. First, trade at a futures exchange requires a communications network that can provide traders with spot market information in order to estimate the basis. A commodity exchange also needs to be supported by a reliable system for transportation and distribution, so that delivery location can be credibly specified in the contract. Moreover, transaction costs must be stable enough for traders to evaluate the spread between the spot and futures contract prices.

Infrastructure must not only support the exchange, but it must also link various spot markets if the exchange is to function successfully. Ideally, the physical and communications infrastructure will ensure information regarding product quality, quantity, form, and price in all relevant markets is available across various spot markets. In the absence of this information, price discovery in the spot markets may be erratic and price risk will not be manageable in a futures exchange. Available data suggest that the lack of physical infrastructure may be a constraining factor in many African countries. Countries with successful exchanges have far more developed communications and/or transportation infrastructure than countries with less successful exchanges (Table 3). Public investment in both transportation and information infrastructure may be needed for the development of a successful commodity exchange in countries where such infrastructure does not currently exist.

Table 3. Indicators of communications and transportation infrastructure

Countries	Road density (km/km sq land area)	Percent of paved roads	Ground line & Mobile phone subscribers per 1,000 people	Internet users per 1000 people
Ethiopia	0.03	13	8	2
Ghana	0.21	18	93	17
Kenya	0.11	12	85	45
Malawi	0.3	19	25	3
Nigeria	0.21	31	79	14
Zambia	0.12	22	34	20
Uganda	0.35	13	44	8
South Africa	0.3	20	473	78
India	1.29	63	85	32

Source: Compiled from the World Development Indicator (WDI) of the World Bank.
Note: Data are for 2006 or later years.

3.3.2. Legal and Regulatory Infrastructure

A commodity exchange must be supported by appropriate legal infrastructure, particularly

1. a system of grades and standards,
2. a credible system of contract enforcement, and
3. governance in spot markets.

In most African cereals markets, a system of grades and standards is not likely to evolve without government involvement. However, the real challenge in African markets will not be the development of grades but the enforcement of contracts that use those goods. The legal system must ensure contract enforcement and a regulatory system must ensure that warehouses do not issue multiple receipts for a single lot. For futures contracts, participants must have confidence that contracts will be recognized by the legal system and that contract obligations will be enforced.

Information on enforcing contracts in selected countries is presented in Table 4. India and the OECD are included here for comparison with conditions in African countries. These data reveal wide variations in conditions across African countries as compared with OECD countries, where contract enforcement requires an average of 22 procedures over 351 days, costing 11.2 percent of the debt to be recovered. In terms of the number of procedures, most African countries in the sample are similar to the OECD. Malawi stands out as having a high number of procedures, but it is not as high as India. South Africa, India, Ethiopia, and Ghana stand out for the length of time resolution requires. As for total cost, however, South Africa is quite low, almost at the OECD average. Ghana also has relatively low costs, while costs in Malawi appear to make efforts at contract enforcement futile. The wide dispersion of costs among African countries and the favorable comparison of many of them with India, where exchanges are successfully functioning, suggest that some African countries may have enforcement abilities that are sufficient to support an exchange. In this respect, the comparison of Ethiopia and South Africa is encouraging for the new exchange in Ethiopia.

Table 4. Indicators of contract enforcement capacity

	Indicators		
Countries	Number of procedures	Days to process	Cost as a percent of debt recovered
Ethiopia	30	690	14.8
Ghana	22	730	12.7
Kenya	25	360	41.3
Malawi	40	337	136.5
Zambia	21	404	28.7
Uganda	19	484	35.2
South Africa	26	600	11.5
India	56	1,420	35.7
OECD countries	22	351	11.20

Source: DoingBusiness.org.
Note: Data are for 2007 or most recent years.

3.3.3. Macroeconomic Stability

A commodity exchange, particularly a futures trade, cannot develop and be sustained in the absence of sound policies for monetary management and foreign trade. In particular, macroeconomic policy needs to maintain stable and reasonably undistorted real interest rates, exchange rates, and inflation rates. Hyperinflation and dramatic macroeconomic failures made Zimbabwe's exchange untenable. Ethiopia's experience demonstrates the more subtle role of macroeconomic policies on a commodity exchange. Once the government of Ethiopia dismantled the coffee auction floor and required Ethiopian coffee to be exported through the ECX, traders opted to hold the commodity rather than sell it. One explanation for this behavior is that the Ethiopian Birr was highly overvalued and a devaluation of 20–30 percent was rumored to be eminent. Under the circumstances, holding stocks until after the anticipated devaluation was economically rational; however, similar behavior among other exporters may have depressed exports broadly, exacerbating a balance-of-payment crisis. The exchange crisis, a product of macroeconomic policy, likely contributed to the government's decision to confiscate 17,000 tons of coffee from 80 exporters and channel it through the ECX.[5] State coercion was apparently needed to overcome the constraints on the exchange implied by a small market size and macro policy distortions. In any case, the Ethiopian experience demonstrates the relevance of a sound macroeconomic environment and stable exchange rates in developing and sustaining an exchange.

3.3.4. Commercial and Financial Sectors Development

A commodity exchange relies on a developed financial system. For an exchange to operate successfully, there must be an adequate number of potential hedgers and speculators in the economy. These individuals must understand risk-taking and trading and must have financial capacity. Moreover, the exchange itself must have access to a clearinghouse with sufficient capital to serve as a guarantor of all transactions. These requirements imply a generally well-functioning financial sector.

Available indicators suggest that financial sectors in most countries in Africa are either shallow or constrained by repressive regulations. Table 5 presents indicators for the same set of countries examined in Table 4. Low or negative real interest rates indicate repressed financial systems in all countries except South Africa and India. Furthermore, South Africa and India have considerably

[5] The story was reported by BBC and is available at http://news.bbc.co.uk/2/hi/7964146.stm

lower spreads between deposit and lending rates, suggesting more efficient and liquid financial markets. The stock of credit in these economies is consistent with the real interest rate data, with low volumes of domestic credit relative to GDP in countries with repressed interest rates. Under these circumstances, it is likely to be difficult to finance the activities of an exchange.

Table 5. Indicators of financial market development

Indicators	Ethiopia	Ghana	Kenya	Malawi	Nigeria	Zambia	South Africa	India
Real interest rate deposits (%)	-8.1	- 4.3	-4.74	-3.89	-2.62	-6.03	2.56	
Real interest rate lending (%)	-4.6	--	2.33	15.31	3.91	8.35	6.99	6.24
Real interest rate spread (%)	3.5	--	7.07	19.21	6.53	14.38	4.43	
Financial information infrastructure index	--	--	3.5	--	1.0	1.5	6.0	5.5
Net Domestic Credit (% GDP)	52.9	25.05	38.82	16.78	9.00	22.28	84.31	60.91
Domestic credit provided by banking sector (% of GDP)	57.8	30.49	41.12	22.38	9.01	22.3	84.37	60.91
Domestic credit to private sector (% of GDP)	25.3	13.08	27.03	10.52	14.93	7.56	146.81	41.11
Inflation rate (% change Consumer Price Index (CPI))	11.60	15.12	10.31	15.41	13.51	18.32	3.4	4.25

Source: Data derived from World Development Indicators (WDI) of the World Bank.
Note: All indicators are based on 2007 or later years.
Real interest rates are calculated using the consumer price index. Financial information infrastructure index is based on 10 factors, of which 6 cover the scope, quality, and availability of credit reporting data (in private and public registries) and the existence of a basic legal framework for credit reporting. The other 4 factors cover the availability of public registry data for collateral (fixed and moveable) and corporate registries and court records. The index is from 0 to 10, with higher values indicating greater financial infrastructure.

A final measure of the strength and development of the financial sector is the financial information infrastructure index, which reflects the scope, quality, and availability of credit reporting, the legal framework for reporting, and the availability of relevant court records and registries. This index is scaled from 1 to 10, with 10 indicating the maximum availability of financial information.

Table 5 reveals that countries with functioning exchanges have a far greater financial information infrastructure than those with failed exchanges. In terms of financial information infrastructure, conditions in Ethiopia appear inhospitable to the new exchange.

3.3.5. Political Tolerance to Cereal Price Movements

Because they dominate agricultural production in most African countries, cereal crops are the likely target for commodity exchanges in the region. At the same time, food crops are inevitably a politically sensitive topic in low income countries and are susceptible to unpredictable policy intervention. The likelihood of intervention adds another layer of risk which can limit the success of an exchange and its contracts.

Most African countries have intervened in cereal markets to stabilize prices, especially when sudden price spikes have threatened consumer welfare. Even before the food price spikes of 2007 and 2008, food price shocks had stimulated controls that undermined commodity exchanges in Africa. Zambia successfully launched a commodity exchange in the mid-1990s, following agricultural market liberalization; however, faced with what it considered to be intolerable food price increases in the late 1990s, the Zambian government intervened in maize markets, rendering the exchange superfluous (UNCTAD 2007). Given the political sensitivity of food prices, other developing countries, including India and Indonesia, exclude important cereals from their commodity exchanges.

Commodity exchanges cannot guarantee that prices will remain within the range that is politically acceptable. Analyses of historical data suggest that futures prices are slightly less variable than spot prices (Tomek and Gray 1970). Extending this idea further, Gilbert (1996) argues that although commodity futures can help market participants and the producing governments to manage risks associated with variability over an annual time horizon, this should not be equated with price stabilization. If prices spike, governments will tend to intervene; if the intervention is large, it can shatter confidence in the market-based system and reduce the likelihood of a successful exchange.

3.3.6. Farm Size and Production Organizations

In most African countries, agriculture is dominated by smallholders. Jayne et al (2006) report that median farm sizes are less than two hectares in Ethiopia, Kenya, Rwanda, Mozambique, and Zambia. It is well recognized that smallholders do not access commodity futures markets directly. They may lack know-how, have insufficient collateral for margins, and have difficulty monitoring prices (Larson et al. 1998). Even large-scale producers in the US rarely use futures contracts directly. Surveys commonly indicate that only 5–10 percent of US producers use futures contracts. Nonetheless, US farmers benefit from futures trading because they sell to local elevator operators who offer pricing contracts that are based on futures contracts and their prices. In turn, the purchasers take positions in futures to manage their operations.

In most African countries, additional institutional mechanisms are needed to link smallholders to centralized exchanges. Producers' organizations could be used to complete product assembly and conduct transactions. Such organizations would also have an important role in communicating grades and standards which must be met. In the absence of such institutional innovations, a centralized agricultural commodity exchange is not likely to develop in a smallholder-dominated country and is unlikely to serve smallholders if it does develop in an African context.

4. ALTERNATIVES TO DOMESTIC COMMODITY EXCHANGES

Many African markets may lack sufficient market size and supportive policy and infrastructural environments to support domestic commodity exchanges in the near future. Given feasibility and cost, African countries may seek to rely on existing exchanges in other countries or to coordinate with neighbors to establish regional exchanges.

4.1. Use of Offshore Commodity Exchanges

If establishing a domestic commodity exchange is questionable, offshore exchanges can provide some benefits. A well-established offshore exchange may provide hedging opportunities, high liquidity, and better integration with world markets. Use of an offshore commodity exchange implies risks of exchange rate movements which can alter local currency prices aside from movement in commodity prices. This risk can be mitigated by trading and hedging in foreign currency.

The second risk associated with use of an offshore exchange is added basis risk. Offshore traders face a potentially large basis risk when there is a long distance to the delivery location in the contract. The basis may be volatile when the product is graded domestically using different specifications from those used in the exchange. In this case, deliveries are likely to be subject to unanticipated discounts due to quality characteristics. Basis risk will also be large if the local spot markets are subject to price fluctuations that are not transmitted to or from the offshore exchange. For cereal crops in Africa, the basis risks associated with use of an offshore exchange are likely to be prohibitive because local prices vary widely with local conditions and because local varieties and grades differ from those used abroad.[6]

Aside from basis risk and exchange rate risk, use of offshore exchanges could be limited by contract specifications in terms of size or other features that are not appropriate for the local context. If, for example, minimum contract sizes were beyond the capacity of local institutions, an offshore exchange would not serve most potential participants. Similarly, offshore exchanges may not be accessible because brokers in those exchanges may be reluctant to work with new (risky) clients from developing countries (Morgan 2001). A solution to these problems, suggested by Mohan (2007), could involve established exchanges integrating producer countries by establishing branch exchanges trading in commodities that are also traded at the central exchange.

The problems associated with basis risk are less likely to emerge for an African country's export commodities than for cereals. Since domestic consumption of export commodities like cocoa and coffee is low, the domestic conditions reflect international markets. Moreover, systems of grades and standards used in international exchanges for these tropical commodities reflect the varieties and qualities produced in Africa. For export crops, Mohan (2007) provides estimates of the low costs to using offshore exchanges for coffee. Indeed, for tropical commodities that are already traded on existing exchanges, domestic exchanges may be unable to draw participants who have the option to use an established offshore exchange. The presence of an accessible offshore exchange may make a domestic exchange redundant and non-viable.

4.2. Development of Regional Commodity Exchanges

Offshore exchanges may be useful for Africa's export commodities, but they are unlikely to serve cereal crops. Meanwhile, the development of domestic exchanges for these commodities will often be inhibited by the size of the markets and by unsupportive policies and regulatory environments. Deficiencies in physical infrastructure are also substantial but can be corrected with public investments

[6] Local price fluctuations can be large in African countries with liberalized trade regimes because high transportation costs imply a very wide disparity between import and export prices.

that are justified on multiple other grounds. An alternative to an offshore exchange would be the creation of common markets among several countries, which would increase market size while imposing regulatory consistency and thus make commodity exchanges more likely to succeed. Within a common market, a commodity exchange would also enjoy increased access to cereals grown in a wider climatic range, extending the harvest period and smoothing prices. In order to support a regional exchange, countries would have to harmonize trade and exchange rate policies, set up agreeable rules for grades and standards and for contract enforcement, and promote regional macroeconomic stability. In the absence of such enabling policies and enforceable rules, a sustainable regional commodity exchange is not likely to develop.

5. SUMMARY AND IMPLICATIONS

Following market liberalization, the establishment of commodity exchanges has been considered to be a potential market-based mechanism for commodity price risk management. While such initiatives have been successful in some emerging countries, they have frequently failed or had limited success in Africa. This paper reviews the purpose of, conditions for, and challenges to establishing commodity exchanges in Africa. Despite their potential usefulness, commodity exchanges' success in Africa depends on conditions which are absent in many African contexts. As summarized in Table 6, for African economies the binding constraints to successful commodity exchanges appear to be small market size, compounded by weak infrastructure and underdeveloped financial sectors, as well as a lack of supportive legal and regulatory frameworks.

Table 6. Key enabling conditions, their prevalence, and government policy in Africa

Enabling Condition for Commodity Exchange	Prevalence of Condition in African Economies	Government policy influences in changing the conditions in the Short Run
Sufficient market scale and activity	For primary cereal crop and dominant export crop only	Very limited
Absence of contracts for same commodity in offshore exchange (non-redundancy)	Does not hold for dominant export crops	Very limited
Freedom of cash market from political interference	Cannot be usually assured for primary cereal crop	Limited, given political sensitivity of food prices
Integrated and active cash markets	Mixed	Can be affected through investment in infrastructure and appropriate regulation
Credible contract enforcement , useful grades and standards, and consistent regulation	Mixed	Potentially high, with credible governance

Source: Authors' compilation.

Evidence in the literature clearly indicates that the risks of failure are very high if an exchange is launched in a thin market. While a critical minimum is not clearly defined, market sizes in most African countries appear to be small compared with the countries that have active commodity exchanges. Under-developed financial markets may also make it difficult for hedgers and speculators to actively participate in these exchanges. Within African countries, cereal crops have the largest markets; however, cereal prices remain politically sensitive and are likely targets for government control or other interventions, especially during periods of rapid food price inflation. Commodities that are likely to draw a sufficient scale of trade to ensure needed liquidity in a commodity exchange are likely to be the very goods that are subject to political interference or that can be traded effectively on existing exchanges abroad. Even when a government is committed to allowing an exchange to function without price controls or interference, a track record of policy reversals and scape-goating private traders for market abnormalities could still inhibit an exchange.

The development of regional exchanges could offer price risk management tools for cereal crops but will require a long-term commitment and is dependent on successful regional integration. A

common market could provide the necessary ingredients for a successful exchange (increased volume, more market participants, higher liquidity, uniform grades and standards, and lower basis risks), but Africa's record in regional integration is mixed. Recent successes in Common Markets for Eastern and Southern Africa (COMESA) offer some hope.

A basic condition for a commodity exchange is a smoothly functioning cash market that can be used to estimate the basis when making trades and can also be used to set the specifics of contracts. Development and improvement of cash markets thus serves commodity exchanges. The enabling conditions for development of commodity exchanges are also fundamental to market development. Good physical infrastructure reduces transaction costs and promotes trade; a successful market information system can address information asymmetry; establishing warehouse receipts can mitigate liquidity constraints for farmers and traders; well-designed farmers' organizations can facilitate product aggregation and smallholders' linkage to the market. These investments are now increasingly feasible and could generate large social benefits, irrespective of whether they are part of the establishment of commodity exchanges.

APPENDIX: SUPPLEMENTARY TABLES

Table A.1. Share of three leading commodities in total exports in low income countries

Country	Average 1990- 1992	Average 1997- 1999	Average 1990-1999	Three leading commodities in 1997-1999
African Countries (27)		Percentage		
Botswana	78.80	73.20	94.59	Diamonds sorted, bovine meat, hides and skins
Niger	95.70	93.70	94.00	Uranium, live animals, tobacco
Gabon	93.17	93.22	91.81	Fuels, wood non-coniferous, manganese ore
Congo	94.49	85.83	91.17	Fuels, wood non-coniferous, sugar, total
Dem. Rep. of the Congo (ex Zaire)	86.60	86.25	88.88	Diamonds sorted, coffee green roast, wood non-coniferous
Nigeria	94.98	78.16	86.94	Fuels, cocoa + products, natural rubber
Comoros	94.43	65.48	86.75	Vanilla, essential oils nes, cloves, whole+stems
Burundi	86.32	88.91	86.57	Coffee green+roast, tea, sugar, total
Equatorial Guinea	62.46	89.06	83.88	Fuels, wood non-coniferous, cocoa + products
Guinea-Bissau	81.60	75.24	81.96	Nuts, fishery commodities, cotton lint
Sao Tome and Principe	78.49	92.11	81.32	Cocoa + products, fishery commodities, coffee green+roast
Ethiopia		79.42	80.28	Coffee green+roast, hides and skins, sesame seed
Angola	96.26	71.00	79.88	Fuels, diamonds sorted, coffee green+roast
Malawi	86.50	70.96	76.52	Tobacco, tea, sugar,total
Central African Republic	64.52	73.15	70.00	Diamonds sorted, wood non-coniferous, cotton lint
Uganda	65.76	65.94	68.37	Coffee green+roast, fishery commodities, crude materials (incl. Flowers)
Zambia	77.22	49.61	67.83	Refined copper, sugar, total, cotton lint
Togo	66.10	61.75	65.69	Nat. Ca phosphate, cotton lint, coffee green+roast
Rwanda	85.60	69.62	64.99	Coffee green+roast, tea, hides and skins
Cameroon	74.27	44.10	62.15	Fuels, wood non-coniferous, cocoa + products
Chad	68.04	52.44	61.64	Cotton lint, live animals, crude materials (incl. flowers)
Guinea	61.64	59.92	61.59	Bauxite, alumina (al oxide, hydroxide), fishery commodities
Ghana	69.18	61.88	60.83	Cocoa + products, diamonds sorted, gold (unwrought non monetary)
Mali	73.28	45.13	58.15	Cotton lint, live animals, oil of groundnuts
Côte d'Ivoire	50.66	60.00	55.99	Cocoa + products, fuels , coffee green roast
Somalia	56.11	41.20	50.88	Live animals, bananas, fishery commodities
Namibia	28.68	72.06	50.87	Diamonds sorted, fishery commodities, live animals

Source: Compiled from UNCTAD 2003 Commodity Yearbook based on World Bank classification of low income countries.

Table A.2. Commodity dependence in international trade for six African countries

Countries/Item	1979-81	1989-91	2000-04
Ethiopia			
Total export (MLN US$)	290	312	506
Agricultural export (MLN US$)	270	279	332
Total import (MLN US$)	403	834	1852
Agricultural import (MLN US$)	49	208	323
Percent share of major exports in agriculture (coffee, sesame seed, hides and skins, dry-slated sheep)	71	77	66
Percent share of major imports in agriculture (wheat, vegetable oil, maize flour)	33	42	62
Kenya			
Total export (MLN US$)	1237	1089	2173
Agricultural export (MLN US$)	668	666	1044
Total import (MLN US$)	2106	2113	3705
Agricultural import (MLN US$)	153	191	472
Percent share of major exports in agriculture (tea, crude organic material, coffee)	72	76	72
Percent share of major imports in agriculture (palm oil, wheat, rice)	34	58	47
Malawi			
Total export (MLN US$)	260	387	450
Agricultural export (MLN US$)	232	362	410
Total import (MLN US$)	396	597	677
Agricultural import (MLN US$)	33	78	66
Percent share of major exports in agriculture (tobacco leaves, sugar, tea)	84	91	90
Percent share of major imports in agriculture (wheat flour, food preparations, maize flour)	9	14	20
South Africa			
Total export (MLN US$)	21581	23084	34143
Agricultural export (MLN US$)	2157	1904	2629
Total import (MLN US$)	16029	17194	35182
Agricultural import (MLN US$)	752	990	1755
Percent share of major exports in agriculture (wine, oranges, grapes)	8	9	26
Percent share of major imports in agriculture (rice, wheat, oil of palm)	11	14	17

Table A.2. Continued

Uganda			
Total export (MLN US$)	344	228	563
Agricultural export (MLN US$)	341	207	226
Total import (MLN US$)	322	611	1497
Agricultural import (MLN US$)	36	31	171
Percent share of major exports in agriculture (coffee, cotton, tobacco leaves)	98	85	54
Percent share of major imports in agriculture (wheat, oil of palm, maize)	13	17	39
Zambia			
Total export (MLN US$)	1249	1338	1145
Agricultural export (MLN US$)	9	24	123
Total import (MLN US$)	974	909	1174
Agricultural import (MLN US$)	102	47	114
Percent share of major exports in agriculture (cotton, sugar, tobacco)	81	31	54
Percent share of major imports in agriculture (maize, oil of palm, wheat)	59	40	27
Zimbabwe			
Total export (MLN US$)	1293	1630	2592
Agricultural export (MLN US$)	487	670	833
Total import (MLN US$)	1182	1882	1809
Agricultural import (MLN US$)	40	56	233
Percent share of major exports in agriculture (tobacco leaves, cotton, sugar)	70	73	84
Percent share of major imports in agriculture (maize, flour of maize, tobacco leaves)	25	6	32

Source: World Development Indicator (WDI).

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2033 K Street, NW
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Fax: +1-202-467-4439
Email: ifpri@cgiar.org

IFPRI ADDIS ABABA

P. O. Box 5689
Addis Ababa, Ethiopia
Tel.: +251 11 6463215
Fax: +251 11 6462927
Email: ifpri-addisababa@cgiar.org

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CG Block, NASC Complex, PUSA
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