Summary of The Financing of Maize Production and Price Risks in Tanzania

Lack of agricultural credit facilities hampers the development of an efficient commercial agricultural sector. Market-based risk management instruments can facilitate access to agricultural credit at better terms as they increase the creditworthiness of farmers and other agents of the agricultural sector. The purpose of this study is to explore public–private partnerships that might help deepen the financial sector’s ability to prepare for financial products that strengthen agricultural lending. In discussing these issues, the study uses the maize sector in Tanzania as an example.

Tanzania’s agricultural sector, which contributes the majority of gross domestic product (GDP), has not experienced the accelerated productivity and growth levels seen in other sectors. In Tanzania, crop production accounts for only 10 percent of commercial banks’ total loan portfolios. The maize sector, one of the country’s major staple foods, is particularly exposed to this credit shortage. Lack of credit prevents producers from accessing seasonal loans for inputs and prevents traders from investing in more efficient handling, storage, and trading operations. The consequences of lack of credit are cyclical. Endemic problems of the maize sector include inadequate and insufficient input use and thus low yields resulting in high cost of maize production, post-harvest losses due to poor storage facilities, weak farmers’ organizations, higher transaction costs due to poor infrastructure facilities, weak market information flow, erratic weather, and instabilities in maize quality.

Commodity Risk Management

The framework for the management of production and price risks in agriculture relies on quantitative risk assessment techniques. In the case of agricultural products, sophisticated catastrophic risk-modeling techniques can be adapted to slow the onset of disasters such as drought and can be used to design agricultural insurance products.

Domestic market integration and regional market integration are analyzed using spatial co-integration techniques. Domestic integration often serves as an overall indicator of the performance of the market, assessing its efficiency and evaluating how regions are efficiently linked and integrated. Therefore, the degree of spatial integration has important implications for price risk management. Likewise, the design of price risk management instruments may depend on the extent to which spatially separate markets are integrated. If, for example, spatially distinct markets are well integrated with a central market or an exchange market, then price risk management instruments, such as futures and options contracts, could efficiently allow producers and processors to hedge against price volatility.

Commodity Risk Assessment Using the Example of Maize

Key findings of the maize sector analysis indicate structural problems that impede the development of an efficient commercial market, including an integrated domestic market structure that has little regional integration and inadequate institutional capacity to facilitate risk management and increased financing. Lessons learned from these findings can be applied to other areas of agriculture.

Market Structure

Examining price fluctuation can indicate market integration across the country. There exists a relatively high level of integration in the maize market that allows responsive market prices following changes in supply and demand.

The data in Figure 1 are consistent with a strong degree of long-term integration, although they also demonstrate that the adjustment process may take time. Figure 1 also shows the impact of a price shock, which leads to a convergence of prices after several months (about 9 months). The relatively high level of integration is most likely due to a cluster of traders who dominate the highest level of the trading chain. However, the Tanzanian
domestic maize markets are not integrated with the South African Futures Exchange (SAFEX) market. Regional co-integration tests provide no support for the existence of a long-term co-integrating relationship between domestic maize markets and SAFEX. Hence, SAFEX’s price-hedging contracts for maize are of limited utility for maize chain actors.

**Constraints to Access to Credit**

Commercial banks view the maize business as risky and therefore limit the size of their loans for maize operations. This reluctance to lend is mainly the result of production risks, which may include the following:

- **Price volatility (around a seasonal pattern) has a negative impact for farmers.** Farmers typically lack marketing mechanisms that would give them the ability to sell at any other time except just after harvest. Small-scale rural traders do not consider this a serious concern because there is very little time between the purchase from farmers and sale to larger aggregators. Large traders, who have access to storage and financing facilities, use the seasonal pattern to make profits. However, a review of the literature and a series of interviews with bankers and chain actors reveal that pricing does not appear to be the most pressing problem because issues of access to storage (at the farmer level) and credit facilities (at the farmer and trader levels) need to be addressed first. If access to storage and credit facilities increases, actors in the trading chain would have the opportunity to sell forward or buy and hold in anticipation of a future sale. This type of trading behavior may create a demand for price-hedging instruments such as forwards or futures.

- **Maize production hampers access to agricultural lending.** Production is exposed to yield variability, ranging from 1.4 to 1.9 metric tons per hectares in the major growing districts of Tanzania, partly due to low input use. As a result, farmers have to rely on “favorable” weather to make profits. Because maize yields are sensitive to rainfall deficiency, maize is almost exclusively grown in rain-fed areas. Weather conditions are more stable in the “big four” districts, where average seasonal rainfall deviations are less than 13 percent, but the type of drought that occurs on average once every twenty years could cause rainfall deviations up to 86 percent. Drought is a widespread event that can affect several districts at the same time. The 2003 drought in Tanzania, for example, severely hit 15 out of 25 districts, with average annual yield losses of higher than 20 percent in some districts. Figure 2 illustrates the loss exceedance curve, showing the impact of drought on production losses for the Arusha district in Tanzania relative to the Iringa district in Uganda. The data indicate that Arusha is prone to higher risk than Iringa, no matter the frequency of the adverse event. For example, an event that might occur once every ten years (10 percent frequency) would cause a 30 percent yield loss in Iringa but a 60 percent yield loss in Arusha.

- **Commercial risk in the maize sector is high because government responses to food surpluses/deficits are unpredictable.** This uncertainty makes cross-border trade difficult for traders and impacts farmers, because price signals can get distorted by changes in demand.

![Figure 1. Dynamic Simulation of Price Responses, Dar es Salaam Impulse Response](image1)

![Figure 2. Simulated Yield Losses, Loss Exceedance Curve, Comparing Iringa and Arusha Districts](image2)
from year to year. In Tanzania, the large traders are well capitalized and do not have problems finding commercial trade financing. In Uganda, however, traders are not well-capitalized, and trade financing, particularly for cross-border transactions, is a serious problem.

- An inadequate framework facilitating credit to agricultural businesses exacerbates these inherent risks. The resulting constraints include scattered low population density and small average loans, which increase the transaction costs of mediation and thus impede formal financial institutions from becoming commercially viable. The core infrastructural problem is that domestic insurance markets are underdeveloped and do not offer agricultural insurance products. The non-life insurance penetration rate in 2003 was equal to 0.51 percent of GDP. A feasibility study was conducted in 1980s, but the recommendations were not implemented. Furthermore, there has been no support from regional integration because domestic maize markets are not integrated with the South African exchange market. Hence, SAFEX maize price-hedging contracts have been of limited utility in the past.

Managing Risks in Agriculture: A Market-Based Approach

There is a clear distinction between social-based mechanisms and market-based instruments of risk financing. Past approaches by governments based on all-peril crop insurance have proved to be financially unsustainable without heavy subsidies. However, as described in the maize sector example, risk-financing instruments are effective if prerequisites are met in the agricultural sectors: for example, well-organized markets, large production volume commercially traded, significant production and price variability, and credit-financed investments. This section describes this new framework, first decomposing agribusiness demand to identify those who demand risk-mitigation products and then examining the current state of supply and ways that may facilitate growth in the supply side.

The demand for agriculture insurance mainly comes from farmers with a profitable business but a low asset base rather than from subsistence farmers. Commercial farmers are likely to take investment loans to increase the productivity of their business, but the loan repayments reduce their profit margins and thus increase their credit risk. Insurance can therefore be used as some sort of collateral credit-restorative. Agricultural insurance is only one of many options. Once cost-effective risk-mitigation measures are implemented, the remaining risk can be financed by an optimal combination of self-retention, savings/credit, and insurance.

Financing Maize Production and Price Risks with Market-Based Instruments: Policy Implications

Short-term actions needed at the micro level include the following:

- **Public support of small-scale operations.** This allows farmers to receive a portion of the eventual payment for the product at time of deposit into a warehouse, to improve storage, and to support access to volume enhancing mechanisms and dissemination of market and price information.

- **Lending and crop viability.** Catastrophic-risk-modeling techniques allow lenders to analyze the viability of the crop portfolio and price it accordingly. Thus, these farmers may borrow on better terms, eventually increasing the productivity of agriculture.

- **Blending rural finance with agricultural insurance.** The use of innovative instruments such as contingent credit will encourage banks in agricultural lending and reduce borrowing costs because producers would be more creditworthy.

Short-term actions needed at the macro level include increased regional trade integration that could be achieved by:

- **Taking an active role in activities supportive of regional trade integration, including adoption of regional standards on quality under the East African Community (EAC) and the Common Market for Eastern and Southern Africa (COMESA), and enforcement of regional standards for informal and formal trade; and**

- **Monitoring the progress of the UN Food and Agriculture Organization (FAO)/UN Conference on Trade and Development (UNCTAD) proposal for a food import financing facility and evaluate how that facility might be used to strengthen regional trade.**

Medium-term actions needed at the macro level include a country agricultural risk management program and strategy based on providing an effective economic and legal framework that can create incentives for farmers to engage in risk management strategies. This program may propose a
social safety net of catastrophic insurance coverage offered by the government and commercial base coverage offered by the private insurance industry. A National Agricultural Insurance Pool could facilitate, through public–private dialogue, the development of market-based insurance products, protecting participating insurers against excessive agricultural losses and limiting fiscal exposure. Government actions supporting this effort include:

- Efficient agricultural data management systems to construct a comprehensive database and secure future data measurements from abuse;
- Regulatory and supervisory framework based on stability-fostering rules while ensuring market efficiency, to make sure that insurers have financial resources and that they treat clients in an equitable manner;
- Technical expertise in designing, pricing, and underwriting the contracts; and
- Information and education campaigns to reduce the widespread lack of insurance culture among farmers.

Finally, to support the creation of a tradable East African maize contract, the government should make improvements to standardize maize trade, establish quality and grades that are widely accepted, and evaluators, develop accurate and reliable price dissemination programs, improve infrastructure, and create the conditions for expansion of formal regional trade.

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