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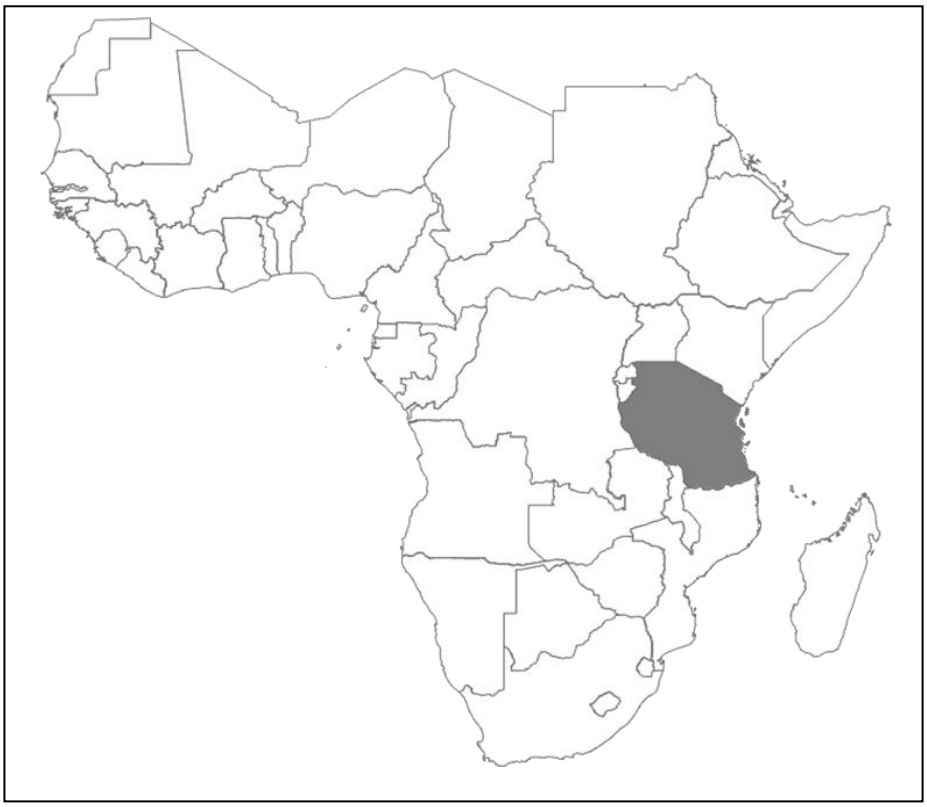
Staple food prices in Tanzania



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1 Introduction

Tanzania is a large country, covering 947 thousand square kilometers. Its main geographic features are a coastal plain in the west, northern highlands along the border with Kenya, southern highlands near the Zambian border, and the semi-arid central plains. The population is 42.5 million, 23% of which live in urban areas. Tanzania is larger and more populous than any of its neighbors in eastern and southern Africa with the exceptions of Ethiopia and South Africa.

Most of the Tanzania has a single rainy season, which occurs between December and April. The northern and northeaster edge of the country, however, has a bimodal rainfall pattern, with a shorter *vuli* rainy season from October to December and a longer *masika* rainy season from March to May. The southern highlands are considered the "breadbasket" of Tanzania, producing most of the marketed maize. The northern highlands is another high-potential zone, producing coffee, and horticultural products. The central and northwest zones are drier and less food secure, growing sorghum, tobacco, and cotton. The southwest of Tanzania produces cassava for domestic consumption and cashews for export.

2 Importance of staple foods in the diet

As shown in Table 1, maize and cassava are the most important staple foods in Tanzania. Per capita consumption of cassava (157 kg per capita) is twice that of maize (73 kg per capita). Because of its greater caloric density, however, maize is more important as a source of calories, contributing 33% of the total compared to 15% for cassava. In this regard, Tanzania is more dependent on maize than Uganda or Ethiopia but less so than Malawi or Zambia. Also important are rice, wheat, and sorghum, each representing 4-8% of the caloric intake.

Table 1. Importance of staple foods in diet of Tanzania

Commodity	Quantity consumed	Daily caloric intake	Share of caloric intake
	(kg/person/year)	(kcal/person/day)	(percent)
Maize	73	655	33
Cassava	157	298	15
Rice	16	154	8
Wheat	10	79	4
Sorghum	9	79	4
Other		730	35
Total		1,917	100

Source: FAO, 2009a.

The importance of each staple food differs according to location and income level. For example, rice and wheat consumption are more important in the diets of high-income consumers in urban areas, partly due to the fact that they are more expensive sources of calories than maize and cassava. In contrast, cassava and sorghum are more important in

among low-income households and in rural areas, particularly in their production zones where they are subsistence crops. Maize is in an intermediate position, being an important staple in both urban and rural areas.

3 Production and trade of main staple foods

The behavior of domestic food prices depends heavily on the degree of tradability of the commodity. For internationally traded commodities, we expect domestic prices to follow the world prices of the same commodity unless there are significant barriers to trade. If it is not international traded, then we would expect domestic prices to be largely determined by domestic supply and demand. For this reason, it is important to review the production and trade patterns of the main staple commodities as a background for understanding price patterns.

3.1 Maize

Maize production estimates vary significant from year to year and even between the two main sources of data: the National Bureau of Statistics and the Ministry of Food and Agriculture. Nonetheless, maize production is generally around 3-4 million metric tons per year. As shown in Table 2, maize production averaged 3.4 million tonnes over 2005-2007.

Maize is the most widely grown crop in Tanzania, produced by 4.5 million farm households representing about 82% of all Tanzanian farmers, according to the 2002-03 National Sample Census of Agriculture (NSCA). More than 90% of the farmers grow maize in Iringa, Ruvuma, and Rukwa in the southern highlands, Tabora, Kigoma, and Kagera in the west, and Manyara in the north. The regions with the largest total production, according to the NSCA, are Mbeya and Iringa, followed by Shinyanga, Ruvuma, Tanga, Rukwa, and Mwanza. Unlike paddy and sorghum, the production of which is concentrated in a handful of regions, maize production is geographically dispersed throughout the country.

Table 2. Production and trade of food staples in Tanzania

Commodity	Production (1000 tonnes)	Imports (1000 tonnes)	Exports (1000 tonnes)	Imports as a share of apparent consumption (percent)	Exports as a share of production (percent)
Maize	3,405	116	70	3.4%	2.1%
Cassava	6,099	0	1	0.0%	0.0%
Rice	817	71	10	8.1%	1.3%
Wheat	96	643	31	90.9%	32.4%
Sorghum	780	1	1	0.0%	0.1%

Source: FAO, 2009b and c.
Note: Apparent consumption is production plus imports minus exports and non-food uses. The data refer to the average of 2005-2007.

Smallholders produce virtually all the maize (98%) grown in Tanzania[2]. The average farm in Tanzania has about 2.4 hectares (ha), of which 1.9 ha is cultivated in any one year. Among those that grow maize, the average area allocated to the crop is about 0.8 ha (NBS, 2006).

In contrast, Tanzania trade in maize is modest: over 2005-2007, maize imports averaged 116 thousand tons, or 3% of apparent consumption (see Table 2). Imports are largely from neighboring countries, with regional imports accounting for 42% of all registered imports over the last five years. Emergency food relief imports make up the majority of the remainder. Food aid is imported for the camps for Rwandan and Burundian refugee in the Kagera region (RATES 2003).

Over 2005-2007, maize exports averaged 70 thousand tons, representing just 2% of maize production (see Table 2). Tanzania exports maize to Zambia and Malawi to the south and to Kenya in the north. The maize trade is often seasonal, with imports occurring in the months leading up to the main harvest (March, April, and May) and exports occurring during the harvest months (June, July, and August). This trade serves to stabilize the price of maize in Dar es Salaam (Kopicki, 2005).

3.2 Cassava

In recent years, cassava production has been around 6.0 million tons of fresh root (see Table 2). According to FAO statistics, cassava production has grown more than 20% since the beginning of the decade, although accurate production statistics for cassava are difficult to obtain because of its irregular harvesting pattern.

The 2002-03 National Sample Census of Agriculture indicated that 24% of Tanzanian farmers grow cassava. Production is concentrated in the southeast and in western Tanzania. The proportion of farmers growing cassava is highest in Mtwara (74%) and over 50% in Kigoma, Mara, Ruvuma, and Lindi.

According to the NSCA, about 31% of the cassava is marketed, the rest being retained for home consumption. Most farmers market only a small proportion of their output, but the average is skewed upward by a relatively small number of medium and large-scale farmers who sell a larger percentage of their harvest. In Mtwara, the region in the southeast corner of Tanzania that is most dependent on cassava, only 17% of the output is marketed. One reason for the small proportion of marketed surplus is that the fresh root is highly perishable.

There is virtually no international trade in cassava, according to FAO statistics (see Table 2). Even studies of cross-border trade, which identify movement of maize, rice, and other food commodities, do not report trade in cassava.

3.3 Rice

In Tanzania, per capita consumption of rice is roughly 16 kilograms, contributing 8% of the caloric intake among the Tanzanian population (see Table 1). This makes rice the third most important source of calories in Tanzania after maize (33% of caloric intake) and cassava (15%). Rice is used almost entirely for human consumption. Rice is a preferred grain in the sense that as income rises, consumers shift from sorghum and maize toward rice and wheat

[2] According to the National Sample Census of Agriculture, maize was grown on about 600 large-scale farms on 25 thousand hectares, production 54 thousand tons. This implies that the average maize area of a large-scale farm was about 46 hectares and the average yield was 2.1 tons/ha.

products. As a result of steady economic growth in Tanzania over the past seven years, per capita rice consumption has increased, stimulating both increased domestic production and rising rice imports.

Rice production is currently about 1.2 thousand tons of paddy, or 800 thousand tons of milled rice[3]. Production has increased from about 450 thousand tons of milled rice in 2000. Rice is grown by 16% of Tanzanian farmers. About half of the production is concentrated in the regions of Morogoro, Shinyanga, and Mwanza. Virtually all rice (99%) is grown by smallholders in Tanzania, although some of them are part of large-scale rice irrigation schemes that were formerly state-managed farms[4] (NBS, 2006).

Rice is more commercialized than other staple food crops. According to the 2002-03 National Agricultural Sample Census, 42% of rice production is marketed, compared to 28% of maize and just 18% of sorghum. It is important to note, however, that averages can be misleading because larger rice growers account for the bulk of sales. The NSCA survey of small-scale farmers found that just 13% of rice farmers sold any rice (NBS, 2006: 231).

Tanzania is both an importer and an exporter of rice. Tanzanian rice imports averaged 71 thousand tons over 2005-2007 (see Table 2), mostly from Asia. This represents about 8% of apparent domestic consumption. Rice exports over this period were about 10 thousand tons, mostly to Kenya, Zambia, and other countries in the region. Imported rice is considered inferior to local rice by Tanzanian consumers and thus sells at a discount compared to domestic rice.

As recently as 2000, Tanzania imported 15% of its domestic requirements. With rising local production, this percentage has fallen to 11% over the period 2005-2007. This means that domestic prices are less subject to volatility in world prices, but more vulnerable to variation in domestic production.

3.4 Wheat

Over the last three years for which data are available, wheat production in Tanzania has averaged 96 thousand metric tons. Wheat is grown in the northern highlands (Arusha and Kilimanjaro) on a large-scale basis and in the southern highlands (Mbeya, Iringa, and Rukwa) by small- and medium-scale farmers (Kilima, 2006). According to the 2002-03 National Agricultural Sample Census, fewer than 1% of the farmers in Tanzania grow wheat. Wheat is grown almost exclusively as a commercial crop: 97% of the output is marketed.

Wheat imports averaged 643 thousand tons per year over 2005-2007, representing 91% of the apparent wheat consumption in the country. There are also small volumes of wheat and flour exports through cross-border trade, particularly with countries to the west.

As mentioned above, wheat and bread are a relatively expensive source of calories compared to other staple foods. As a result, per capita consumption of wheat products is much higher in urban areas, particularly among high-income households, than in rural areas.

[3] Rice production statistics are generally quoted in terms of paddy, unmilled rice. One ton of paddy is equivalent to 0.65 tons of milled rice.

[4] According to the National Sample Census of Agriculture, rice was grown on 194 large-scale farms on 5,439 hectares, production 11,453 tons. This implies that the average rice area of a large-scale farm was about 28 hectares and the average yield was 2.1 tons/ha.

3.5 Sorghum

Sorghum production has averaged around 780 thousand tons in recent years. According to the 2002-03 National Agricultural Sample Census, 12% of the farmers in Tanzania grow sorghum. More than 40% of the farmers in Lindi (in the southeast) and Singida and Mara (in the northwest) grow sorghum. These are semi-arid regions of the country that experience periodic droughts, giving a relative advantage to drought-tolerant crops such as sorghum.

Farmers grow sorghum primarily for home consumption. The results of the 2002-03 NSCA indicate that just 17% of sorghum output is marketed, and FAO statistics suggest that international trade in sorghum is practically non-existent.

Sorghum is used mainly for direct human consumption and in the brewing of traditional beers. It is considered an "inferior" food in the sense that per capita consumption is higher in rural areas and among low-income households.

4 Staple food price patterns

In this section, we describe the trends and spatial patterns in staple food prices in Tanzania. The discussion is concentrated on maize and rice, for which price data are easily available. Although cassava is an important staple food crop in Tanzania, price data are less available.

4.1 Relationship between domestic and international food prices

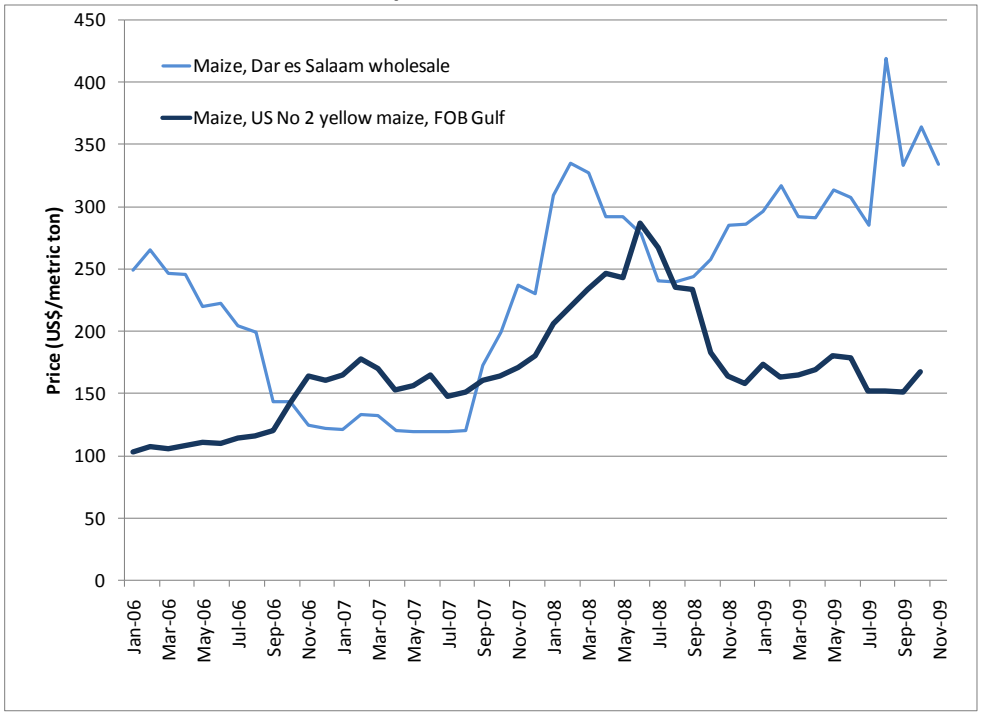
In this section, we discuss the transmission of changes in international food prices to domestic markets in Tanzania. Delgado, Minot, and Tiongco (2005) examine the relationship between international and domestic prices of maize, rice, and cassava using monthly data from 44 Tanzanian markets over the period 1983-98. The analysis estimates real domestic retail prices of the three commodities as a function of international prices for maize, rice, and wheat[5]; the exchange rate; local and national production of the crop in the most recent harvest; seasonal dummy variables; and a time trend. Separate regressions are run for markets with good and poor access to Dar es Salaam, the main port. The results indicate that rice prices in all local markets are connected to the international rice price with a 20-40% transmission, though local prices are also influenced by the size of the local harvest. In contrast, cassava prices in all local markets are not connected to the international prices of rice, wheat, and maize, but are connected to local cassava production. Maize is in an intermediate position, its prices being influenced by the size of the harvest in all markets and by international prices only in the well-connected markets.

The recent trends in the wholesale price of maize in Dar es Salaam during the global food crisis of 2007-08 are shown in Table 3. The graph reveals that maize prices increased during the crisis, but it is not clear that the crisis caused this increase. During 2006, the wholesale price of maize in Dar es Salaam was falling while the international price was rising. In September 2007, the domestic price began to rise sharply, well before international prices began to increase. Then domestic maize prices started falling in March 2008, while international prices continued to rise. Finally, domestic prices rebounded and started rising in September 2008 during a time when international prices were falling sharply. In recent months, wholesale prices in Dar es Salaam have been more than double the international price.

[5] There is no international market price for cassava.

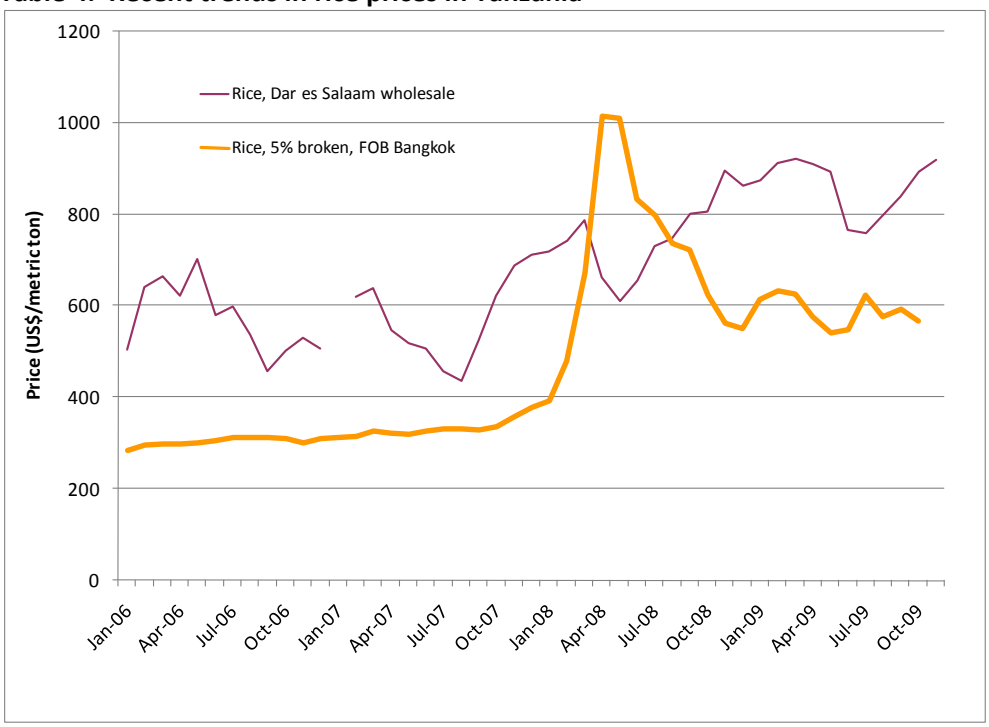
Recent trends in domestic and international rice prices show a similar pattern. The wholesale price of rice in Dar es Salaam started rising in August 2007, several months before the international price began to rise. Then, in April 2008, when the international price was still rising towards its peak, the domestic price dropped sharply. Since May 2008, the international price has fallen about 40% from its peak, while the domestic price rose from US$ 600 per ton to over US$ 800 per ton.

Table 3. Recent trends in maize prices in Tanzania



Source: GIEWS (2009) and IMF (2009).

Table 4. Recent trends in rice prices in Tanzania



Source: GIEWS (2009) and IMF (2009).

4.2 Relationship among domestic food prices

What is the relationship of staple food prices in different markets within Tanzania? The wholesale price of maize (converted to US dollars) in different locations in Tanzania is shown in Figure 1, along with the US No 2 yellow maize price and the South African SAFEX price of white maize. It is clear from this graph that the domestic maize prices tend to move together, as indicated by the rise in late 2003 and late 2005. These movements do not appear to be related to changes in the international price of maize in the US and South Africa. Rather, they are apparently the result of poor maize harvests in 2003 and 2005, when output fell 42% and 33% compared to the previous year.

The relationship among domestic prices reveals that the maize prices in Songea and Mbeya are consistently among the lowest in Tanzania (see Figure 1 and Figure 2). In fact, the prices in these two regions are regularly below the Gulf of Mexico FOB price of US maize. It is not surprising that these two markets have the lowest prices in Tanzania: Songea (in Ruvuma region) and Mbeya, in the southern highlands, are two of the most important maize surplus zones in Tanzania. And the fact that the maize prices in the southern highlands are similar to US maize prices and lower than South African maize prices helps to explain the negligible levels of maize imports.

At an intermediate level are maize prices in Dar es Salaam, Arusha, and Singida. Dar es Salaam is the largest city in Tanzania, while Arusha and Singida are maize-deficit regions in the north of the country. The highest maize prices are found in Mtwara, a maize-deficit region in the extreme southeast corner of the country. Although Mtwara is relatively close to Songea, the road connection is not good, leading to a large marketing margin between the two cities. The average gap between maize prices in Songea and Dar es Salaam is about US$ 50 per metric ton.

Figure 2 shows the seasonality of maize prices. They are lowest in the June-August period because this is when the main harvest occurs. Because of different rainfall patterns, the harvest in the south occurs earlier (June-July) than in the north (July-August). This is reflected in the earlier dip in maize prices in Mbeya and Songea (in the south) than in Arusha (in the north).

The proportional seasonality is much higher in the two surplus regions than in most of the deficit regions. More specifically, the ratio of the highest-to-lowest monthly price is more than 1.6 in Songea and Mbeya, but less than 1.3 in Dar es Salaam and the other deficit regions in the north. This is because the northern deficit regions receive rice from various regions with different harvest schedules, thus muting the seasonality of prices.

The wholesale prices of rice in different markets are shown in Figure 3, while the monthly averages are shown in Figure 4. The domestic wholesale price of rice in all markets is significantly higher than the international price of rice (Thai Super A1 broken rice). This helps to explain the fact that Tanzania is a regular importer of rice. As in the case of maize, the lowest rice prices are found in Songea, a rice surplus zone, followed by Singida, located near the production zones of Mwanza and Shinyanga. Dar es Salaam and the other rice-deficit markets have higher rice prices. The average gap between rice prices in Songea and Dar es Salaam is almost US$ 100 per metric ton.

The seasonality of rice prices is lower than that of maize prices. The highest-to-lowest monthly price ratio varies between 1.23 in Dar es Salaam and 1.33 in Mtwara. This is presumably related to the fact that rice storage involves smaller losses than maize storage.

The domestic prices of sorghum and the US price are shown in Figure 5, while the monthly average sorghum prices are presented in Figure 6. The lowest prices are in Singida, a semi-arid region in central Tanzania where sorghum is an important staple crop. In contrast, the highest sorghum prices are in Dar es Salaam, where the average sorghum price is about US$ 90 per metric ton higher. The seasonality of sorghum is intermediate, less extreme than maize but more pronounced than for rice.

Figure 1. Maize prices in different Tanzanian markets

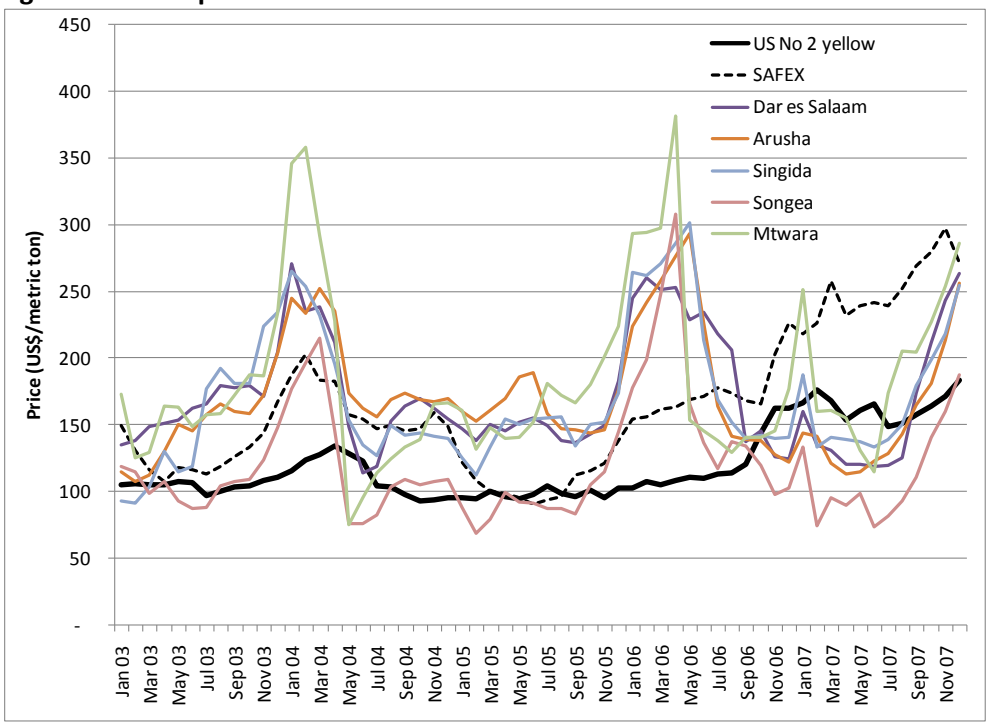


Figure 2. Average monthly maize prices in different markets

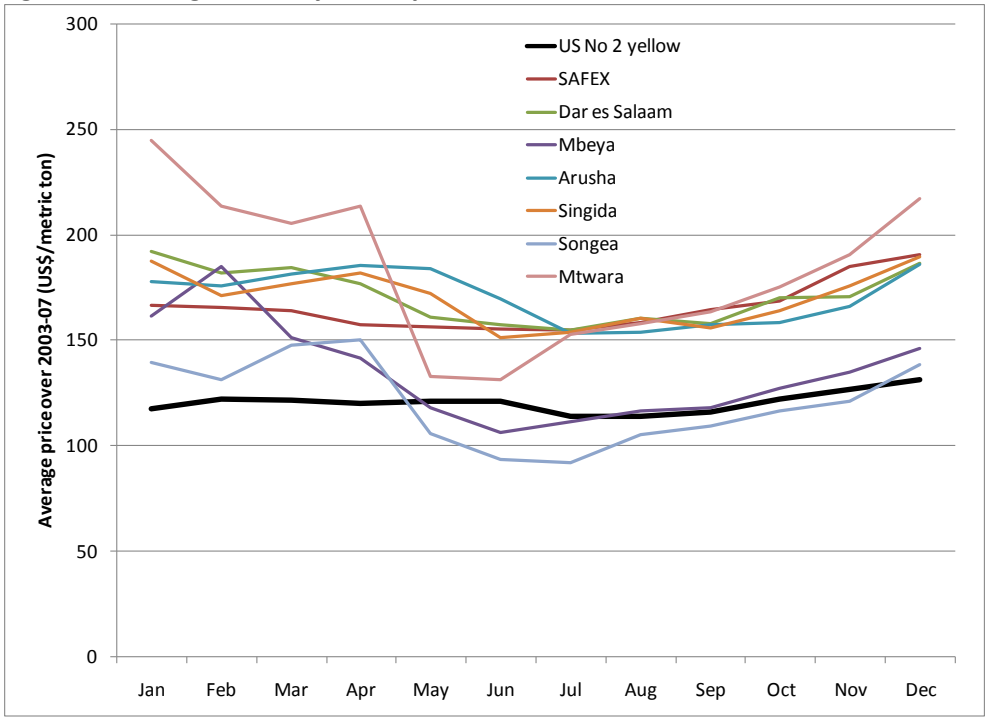


Figure 3. Rice prices in different Tanzanian markets

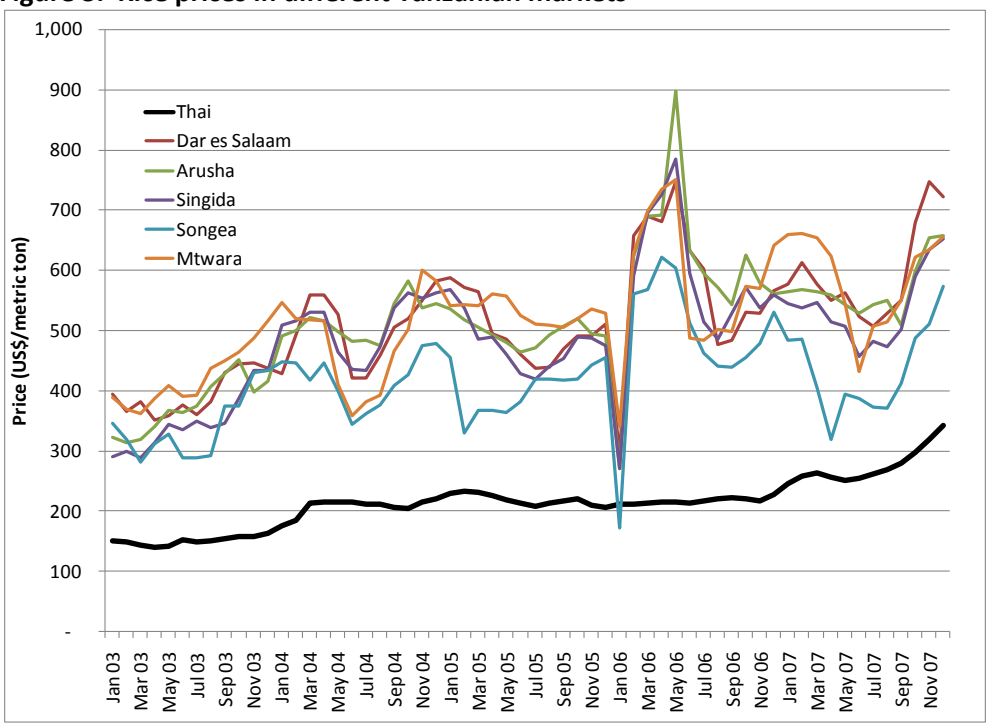


Figure 4. Average monthly rice prices in different Tanzanian markets

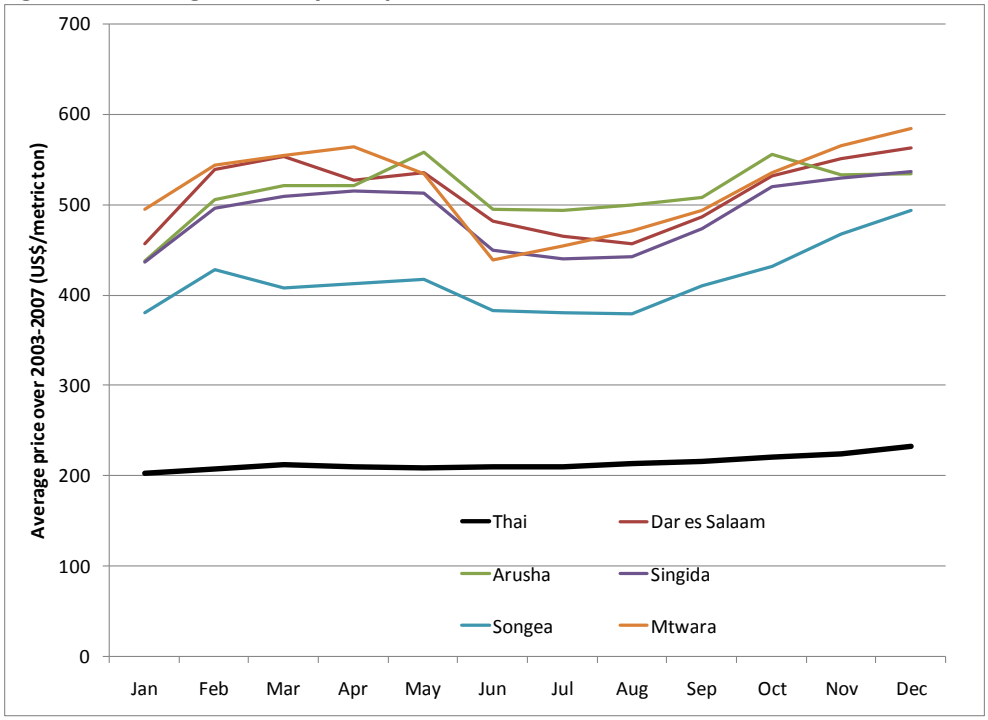


Figure 5. Sorghum prices in different Tanzanian markets

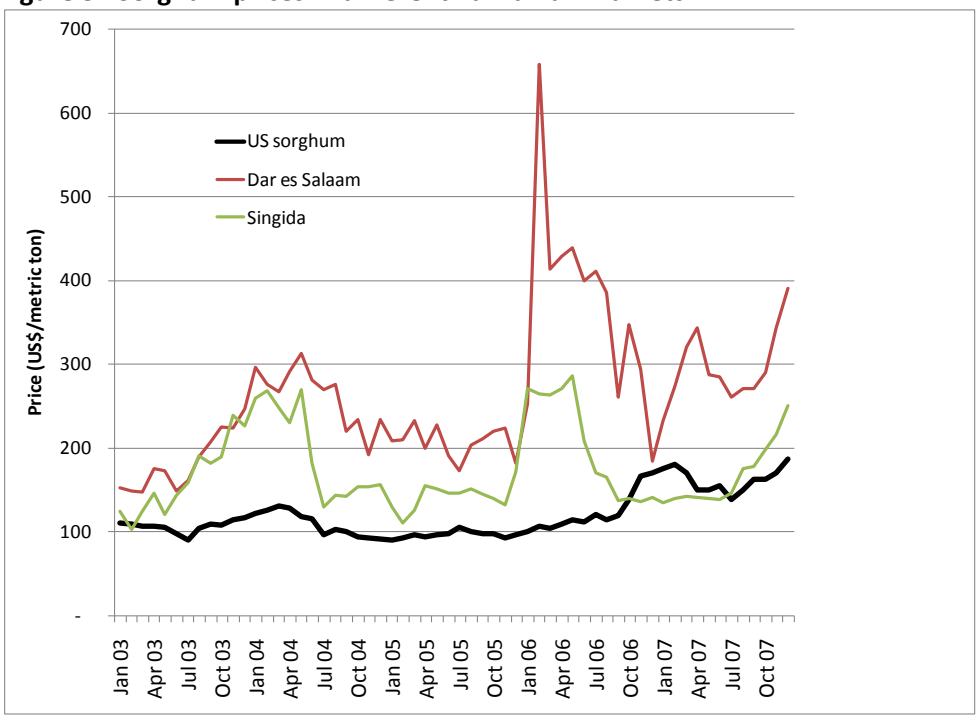
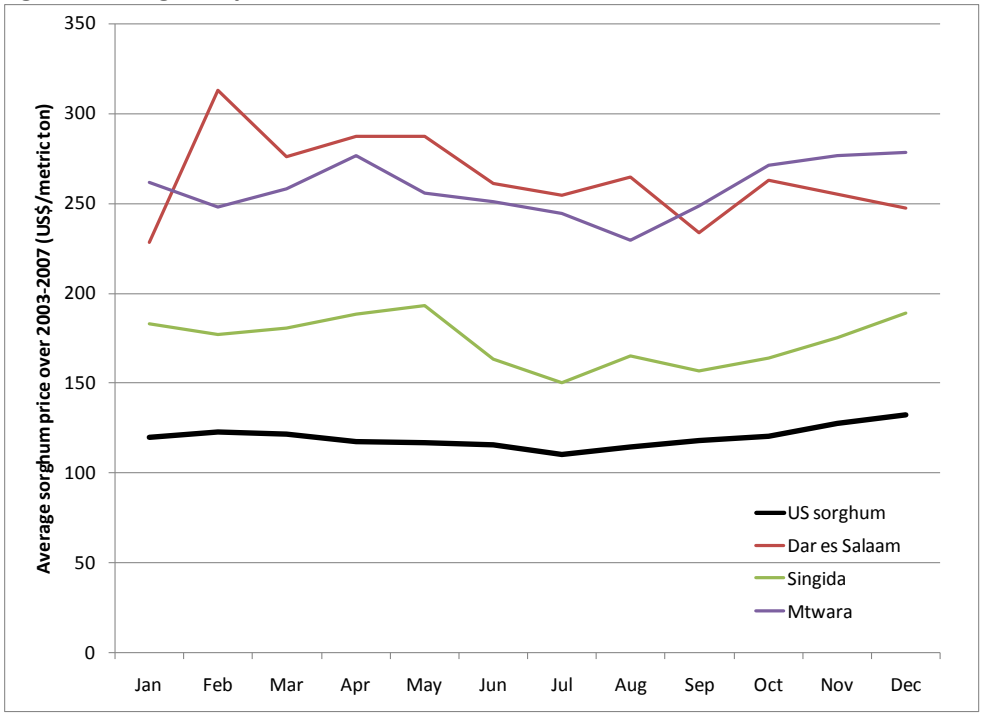


Figure 6. Sorghum prices in different Tanzanian markets



Three recent studies have carried out statistical analyses of the relationship among prices in different Tanzanian markets. Gjolberg et al (2004) studied the movement of the prices of maize, beans, and rice over 1992-2002 between Dar es Salaam and Morogoro, a rice surplus region about 200 km west of the city. Over this period, the price of rice was consistently higher in Dar es Salaam than in Morogoro, with the average difference being about 4000 Tsh/100 kg or 14% of the Morogoro rice price. In contrast, the average difference in maize prices was 1700 Tsh/100 kg or 20% of the Morogoro maize price. Interviews with traders revealed that the average cost of transportation between the two cities was around 1000 Tsh/100 kg. Time-series regression analysis indicates that large price differences persist over several months. The authors conclude that price differences between Dar es Salaam and Morogoro are larger than can be explained by marketing costs, indicating inefficiencies in marketing. Furthermore, rice markets appear to be less efficient than maize markets, perhaps because of the smaller volumes being traded.

Van Campenhout (2007) analyzes the relationship between maize prices in Iringa (in the southern highlands) and six other markets in Tanzania using weekly price data over the period 1989-2000. He uses a threshold auto-regressive (TAR) model which allows pairs of prices to be linked only when the difference between them exceeds a threshold. This threshold, presumably a measure of the full cost of transporting maize between the two markets, is estimated using a iterative search process.

The study finds that the threshold is 2-11% of the mean of the two prices, depending on the market pair being analyzed. Generally, the markets that are close to each other, such as Iringa and Mbeya, have a small threshold, while those that are farther, such as Iringa and Dar es Salaam, have a larger threshold. The study measures the half-life of the adjustment process, that is, the number of weeks it takes for half of the full adjustment to take place.

Across the six pairs of markets analyzed, the half-life of adjustment was between 4 and 12 weeks.

The study also presents an alternative model that includes time-trends to test changes in the threshold and the speed of adjustment. This analysis shows that the speed of adjustment has decreased over the 11-year period, the decline being statistically significant in four of the six market pairs. In addition, the threshold decreased 8-55%, implying a reduction in marketing costs between markets and a closer link between maize prices in different cities.

Kilima et al (2008) studies changes in the variability of maize prices using monthly maize wholesale price data from seven regions of Tanzania over the period 1983 to 1998. They find that market liberalization increased both the level and the variability in maize prices. In addition, they find that maize price volatility is significantly lower in "developed" areas (defined as larger towns and cities), near national borders, and in maize deficit zones. Developed areas and deficit zones presumably have lower price volatility because they are supplied by multiple production zones, thus muting the effects of supply fluctuation in any one of them. Maize volatility in border areas may be lower because of the opportunity for cross-border trade to absorb surpluses and cushion deficits.

5 Food policy

Tanzanian food policy is characterized by relatively low level of intervention in agricultural markets. Over the period 1986-1995, Tanzania dismantled a centralized system of government control over agricultural production, processing, and marketing. Over 1986-89, private trade in food crops was deregulated. Controls on internal movement of food was abolished in 1987, and pan-territorial prices were eliminated in 1989. In the early 1990s, input markets were liberalized, including legalization of private fertilizer importation and distribution, the phased elimination of fertilizer subsidies, and decontrol of input prices. During this time, the role of state marketing boards in the management and marketing of traditional export crops was also scaled back. At the same time, macroeconomic reforms led to a decline in the rate of inflation and the adoption of a market-based exchange rate, which provided improved incentives for exporters.

However, the government remains involved in staple food markets in a number of ways. Here, we focus our attention on three of these: maize exports, rice import tariffs, and the strategy grain reserve. Each is discussed below.

5.1 Maize export bans

Although exports of almost all agricultural commodities are liberalized, maize exports continue to be subject to occasional export bans. The main maize surplus region in Tanzania is the southern highlands, including the regions of Mbeya, Iringa, Rukwa, and Ruvuma. Because the southern highlands borders on northern Zambia and Mozambique, which are maize deficit zones, there is a strong economic incentive for maize exports, particularly during June and July when the southern highlands harvest takes place. Government policy is to allow the export of maize only when all regions of the country can be declared to be food secure. In practice, however, there is almost always a problem of food security in some part of the country, particularly in the semi-arid central region. Thus, in practice, maize exports are banned on an almost continual basis. The effect of this policy is to make the prices of maize in the southern highlands lower and more volatile than they would

otherwise be. As discussed above, maize prices in Songea and Mbeya are lower and more volatile than in other parts of Tanzania. At the same time, the export ban presumably keeps the price of maize lower in deficit regions that it would otherwise be.

The continued sensitivity of the issue was highlighted at a recent workshop in Tanzania in which researchers from the International Institute for Tropical Agriculture (IITA) and a German research center argued that removing the maize export ban would improve the livelihoods of southern maize farmers without harming Tanzanian consumers. A government representative said that export bans would be necessary until Tanzania becomes self-sufficient in maize (Kanyabwoya, 2009).

5.2 Rice import tariffs

As a member of the East African Community, Tanzania is obliged to adopt the external tariff structure adopted by the Community. Under the EAC tariff structure, the tariff rates are set at 0%, 10%, and 25%, except those commodities deemed "sensitive." The EAC declared rice to be a sensitive commodity and implemented a 75% tariff on rice imported from outside the Community. However, this policy created friction between Kenya and Pakistan. Kenya has a very small domestic rice industry and relies to a large degree on rice imports, particularly from Pakistan. Thus, when Kenya announced the new rice tariff, Pakistan threatened to retaliate and slowed the processing of Kenyan tea exports to Pakistan. Pakistan has considerable leverage because it buys 24% of Kenyan tea exports (Wandera, 2005). In late 2006, Kenya was forced to revert to the original import tariff of 35%, and Tanzania did the same.

This highlights the sensitive nature of rice import tariffs, involving a debate between proponents of trade liberalization and consumer interests on the one hand and advocates of rice farmer interests on the other. It is worth noting that a higher tariff benefits Tanzanian rice farmers in two ways. First, it creates increased demand for local rice among Tanzanian consumers by reducing rice imports. Second, it expands the market for Tanzanian rice in Kenya, since the rice production capacity of Kenya is much smaller than that of Tanzania. In other words, the rice tariff taxes Tanzanian and Kenyan rice consumers and benefits primarily Tanzanian rice growers.

5.3 Strategic grain reserves

Tanzania formed a strategic grain reserve in the 1970s following the food crises of 1971-74. It was originally managed by the National Milling Corporation (NMC), a state enterprise that was given a monopoly on the procurement, processing, and distribution of staple food crops. With the liberalization of grain trade in the late 1980s, the NMC was forced to compete with private millers and trader, eventually losing 95% of its market share. In 1991, the Strategic Grain Reserve was established as a separate entity. The objectives of the SGR are to advise the government on food security policy, supply food for emergency assistance, and stabilize staple grain prices. The SGR engages in procurement and distribution operations through seven depots, three in surplus zones in the southern highlands and four in deficit zones (Dar es Salaam, Arusha, Dodoma, and Shinyanga). The capacity of the SGR is 150 thousand tons, but in practice the quantities in storage have generally been in the range of 50-80 thousand tons (Mndogo, nd).

The SGR has not been successful in stabilizing grain prices. The volume of purchases and sales in a given year is generally less than 50 thousand tons, which is negligible compared to

the volume of Tanzanian grain production (5 million tons) or even marketed surplus (roughly 1.25 million tons). In addition, the SGR suffers from bureaucratic procedures, political interference, under-utilization of capacity, and chronic operating deficits due to pricing policies that do not allow cost recovery. On the other hand, the global food crisis has increased the political support for tools to manage staple food price volatility.

6 Summary and conclusions

The main staple foods in Tanzania are maize (33% of caloric intake) and cassava (13%), with rice, sorghum, and wheat playing smaller roles. Rice and wheat are preferred staples, being disproportionately important in urban areas and among high-income households.

Tanzania is essentially self-sufficient in maize, although there are occasional cross-border exports from the main surplus zone in the southern highlands to northern Zambia and Malawi. There is little or no trade in cassava and sorghum. On the other hand, the country relies on imports for 8% of its rice and 91% of its wheat requirements.

Over the last five years, there does not appear to be a very close connection between world prices and domestic markets for maize, sorghum, and rice. This is not surprising in the case of maize and sorghum, since there is little international trade, but it is somewhat surprising in the case of rice. One hypothesis is that administrative procedures required for rice imports make it difficult for importers to take advantage of arbitrage opportunities.

On the other hand, food prices in different markets of Tanzania do appear to move together in response to weather-related supply shocks. Price seasonality is what would be expected given the harvest schedule, though there is considerable variation from year to year. Price differences between markets also follow expectations, with the surplus regions having the lowest prices and deficit regions having the highest prices. There is some evidence that spatial margins declined over the reform period, presumably due to improved competition, though food price volatility may have increased. A more in-depth analysis would be required to test whether the spatial margins and seasonal differences correspond to marketing and storage costs, respectively.

Food policy in Tanzania is largely liberalized, with most of the state enterprises and cooperatives created in the 1960s and 1970s dismantled or reduced in size and mandate. The country does maintain a strategic grain reserve, but the annual transactions are small relative to the volumes of grains marketed. One significant intervention in staple food markets is the frequent bans on maize exports, significantly limiting the ability of maize surpluses in the southern highlands from being exported to deficit zones in northern Malawi and Zambia. Another important intervention is a large voucher scheme recently launched, which will provide subsidized fertilizer and seed to a significant share of Tanzanian farmers.

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