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The effect of the National Food Reserve Agency on maize market prices in Tanzania

POLICY REPORT

MONITORING AND ANALYSING FOOD AND AGRICULTURAL POLICIES ◀ MAFAP

The effect of the National Food Reserve Agency on maize market prices in Tanzania

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Executive summary

Tanzania's National Food Reserve Agency (NFRA) has a mandate to guarantee national food security through procuring, reserving and recycling grain stocks—primarily maize—and doing so in a cost effective manner. The agency procures maize at set, annual pan-territorial maize prices based on estimated production costs, and distributes maize free of charge or at a discount to targeted vulnerable populations. Surplus stocks are sold in the market, often also at subsidized prices to millers, or at market-related prices to other state or non-state actors. The perception exists that these procurement and sales activities are distortive; hence, this study adopts a time-series econometric approach to modeling price dynamics in selected regional wholesale maize markets in Tanzania with a view to isolate the NFRA's impact on these markets. Results suggest the NFRA has had an insignificant impact on maize prices during 2010/11–2014/15 despite their pricing strategy and fairly significant presence in at least some regional markets. As such its activities only benefit a select number of maize suppliers, i.e., traders or farmers, or consumers, with limited spillover effects into markets more generally. With this in view, the NFRA should reconsider its strategy of offering a price premium for the maize it procures or selling maize at a discount, even though its mandate of providing subsidized or free maize to vulnerable people is not in question. Current storage capacity expansion plans are also not consistent with the NFRA's food security mandate.

1. Introduction

Government interventions in staple grain markets is an important albeit closely scrutinized element of food security policies in Eastern and Southern African countries (see Jayne, 2012). Tanzania is no different, with government engaging regularly in the maize market through trade policy measures, input policies, and direct procurement and disbursement through its grain reserve agency. Since maize is a key food security crop in Tanzania produced by the majority of smallholders (USAID, 2010) it is understandable that government feels mandated to intervene so as to ensure sufficient availability of maize at affordable prices.

As such, most of the prominent maize market interventions in Tanzania have been justified or designed with explicit food security objectives in mind. These include: the National Agricultural Input Voucher Scheme (NAIVS), first implemented in 2007/08 to boost maize production, which at its height reached two million farmers and supplied 57 percent of fertilizer in the country (Msolla, 2016); frequent maize exports bans, particularly during 2006–2012, typically introduced when domestic maize prices were high and removed again when prices were low (Baffes *et al*., 015); and the procurement and disbursement of primarily maize through its National Food Reserve Agency (NFRA), established in 2008 to replace the Strategic Grain Reserve (SGR), and with a mandate to guarantee food security in Tanzania (NFRA 2016b).

Since its inception NAIVS faced serious implementation challenges, while the sustainability of the program was widely questioned because many beneficiaries stopped using fertilizer upon graduation from the program (World Bank, 2014). This, coupled with budgetary constraints, led to it being severely downscaled in 2014/15, while all indications are that the program will now be abolished entirely (Cameron *et al.*, 2016). The government's policy of introducing and lifting export bans also received harsh criticism from development partners and farmers' representatives, eventually leading to the Prime Minister's commitment in 2012 to discontinue the practice (Diao and Kennedy, 2016). The consequence of these recent policy reforms is that the NFRA is now the Tanzanian government's main vehicle for intervening in the maize market with the objective of improving food security outcomes.

The NFRA's proposed mission statement in its new Strategic Plan 2016/17–2020/21 is, similar to its previous one, "*to ensure availability of food in times of shortage by procuring, reserving and recycling strategic stock in an efficient manner*" (NFRA, 2016b:28). A fixed procurement price is calculated each year prior to the harvest in June on the basis of production cost estimates. Theoretically these are determined separately for different regions, but in practice prices are very similar across regions, making the procurement price, in effect, a pan-territorial one. Procurement typically takes place between July and December, and grain is stored in NFRA warehouses, from where it is distributed to those facing food shortages or food emergencies, typically between November and April, or sold to the private sector, parastatals or non-governmental institutions. Importantly, the NFRA's mandate does not officially provide for a price stabilization role. Price stabilization was in fact an objective of the NFRA's predecessor, the SGR; however, the SGR was never effective in this regard, ostensibly due to budget constraints. This, alongside a policy of liberalizing the food market in Tanzania led to a decision to not include price stabilization as an explicit policy objective of the NFRA (Stryker, 2015).

The NFRA has not escaped close scrutiny of their activities or even blame for distorting markets, creating disincentives to produce maize, or contributing to market uncertainty and price instability (Barreiro-Hurle, 2012; Stryker, 2015). Of course, government grain reserves are by nature distortionary—they are designed to intervene in markets where the private sector chooses not to participate or fails to achieve equitable outcomes (Murphy, 2009)—but since market distortions are associated with efficiency losses, consensus is that government grain reserve activities should ideally be kept to a minimum. Nevertheless, the NFRA has gone against advice and has set ambitious targets for expanding its presence in the maize market through rapid storage capacity expansion (NFRA, 2014) to levels considered by some to be in excess of what is required to fulfil its food security mandate (Stryker, 2015). The NFRA price setting mechanism also frequently sets procurement prices above the prevailing market price (NFRA, 2016b), which is considered to be distortionary.

As claims of distortionary effects of NFRA activities in Tanzania have been largely anecdotal, this study sets out to empirically examine the impact of the NFRA on wholesale market prices. Methodologically our approach is similar to studies by Jayne *et al.* (2008) in Kenya and Mason and Myers (2012) in Zambia. Broadly, the approach involves time-series econometrics in which the relationship between wholesale market prices and NFRA buying or selling prices in surplus or

deficit maize production zones is modelled with a view to simulate a counterfactual wholesale market price under a hypothetical situation where the NFRA transacts at the prevailing market price. However, unlike the aforementioned previous applications, our analysis explicitly models procurement quantities; it accounts for the fact that Tanzanian and Kenyan maize prices are co-integrated; and it utilizes a trigonometric function to control for seasonality. To our knowledge this is the first study of its kind in Tanzania, utilizing NFRA procurement and disbursement data that until now has not been released publically. It further comes at a time when the NFRA is launching a new Strategic Plan 2016/17–2020/21 (NFRA, 2016b), and as such could contribute to future planning.

The remainder of the paper is structured as follows: section 2 provides the economic and policy context, focusing on the features of the maize market, current NFRA mandate and activities, and future NFRA storage capacity expansion plans. Section 3 presents the methods and data, while section 4 presents the results and analysis. Finally, section 5 draws brief conclusions and highlights several policy recommendations.

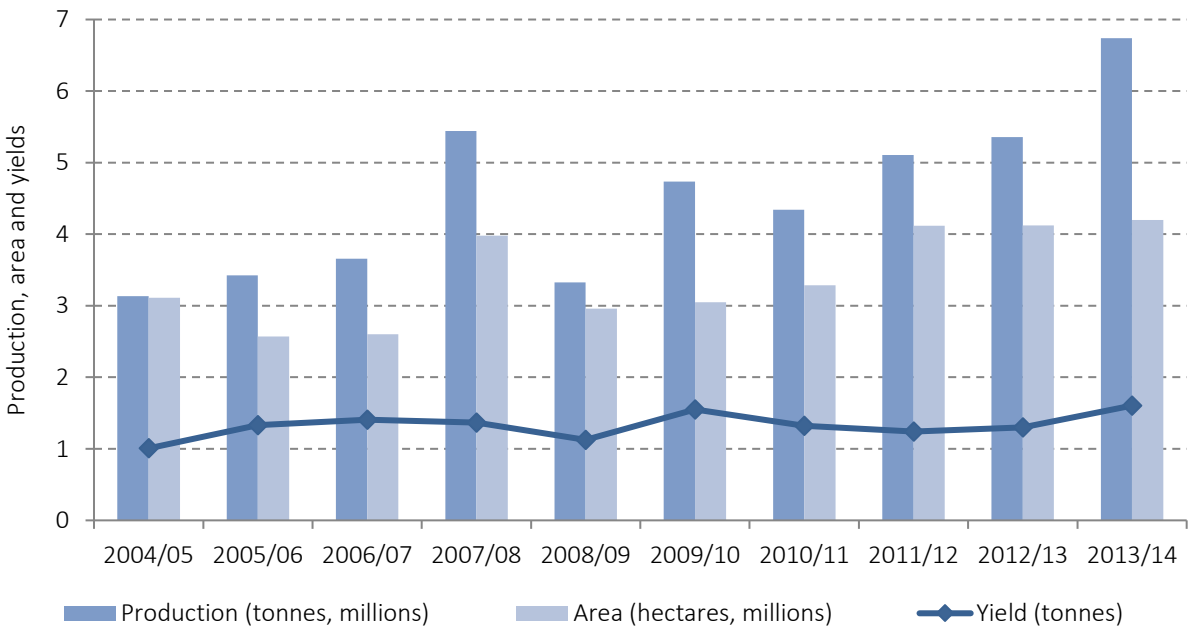
2. Economic and policy context

2.1. The Tanzanian maize market

Maize is a dominant staple food crop in Tanzania. Grown by around two-thirds of smallholder farmers, maize covers 45 percent of arable land and generates around half of cash income in rural areas (USAID, 2010). As a food crop it contributes 42 percent of calories available to the average household, and this share rises to 47 percent among poor households (Pauw and Thurlow, 2011). Within this context the prioritization of maize under the Tanzania Agriculture and Food Security Investment Plan 2010–2020 (TAFSIP) is understandable (URT, 2011).

TAFSIP sets ambitious expansion targets for priority crops. Even prior to the implementation of TAFSIP, maize was already a strong performer, with production expanding by 50 percent during 2005–2010. Since then production has increased further from around 4.7 to 6.7 tonnes in 2014 (FAOSTAT 2016) (see Figure 1). However, with virtually no yield improvement over this period—yields remained at or below 1.6 tonnes per hectare, well below what the IFDC (2012) considers to be potential maize yield of 5.1 tonnes per hectare—output growth was driven largely by land expansion.

Figure 1. Maize production, area planted and yield performance, 2004/05-2013/14



Source: FAOSTAT, 2016.

Even more disconcerting about the lack of maize productivity growth is that it came about during a period in which the government, since 2007/08, supported between 700,000 and two million farmers annually through NAIVS, a program that provides maize seed and fertilizer sufficient for cultivating 0.4 hectares of land at roughly half the price of commercial inputs (Msolla, 2016; World Bank, 2014). By 2010/11 NAIVS supplied around 57 percent of all fertilizer in Tanzania (263 000 tonnes), but with average fertilizer use at only around eight kg per hectare (AGRA, 2015)—far less than the African Union's Abuja Declaration commitment of raising fertilizer use to 50 kg per hectare—it is evident that the profitability of fertilizer use and/or the incentives to raise fertilizer intensity in maize production is lacking in Tanzania.

Unpredictable markets are often blamed for the dominance of subsistence-oriented farming in Sub-Saharan Africa (Fafchamps, 1992). Market thinness, lack of information, and poor infrastructure can all contribute to such market unpredictability; however, it is also frequently linked to discretionary government interventions in the form of trade policies (e.g., trade restrictions or tariffs) that are not easily anticipated, or extensive engagement through marketing boards or strategic grain reserves. In this regard, Chapoto and Jayne (2009) show that countries that have adopted less interventionist staple grain market policies (e.g., Mozambique, Uganda and Kenya) experienced higher agricultural growth and lower price volatility compared to those countries with highly discretionary and unpredictable market policies

(e.g., Zambia, Malawi, Ethiopia, and Tanzania). When prices depart from normal seasonal price patterns it imparts risks to private seasonal storage and hence food security. Thus, even though government market interventions are well-meaning and designed to address food security concerns, they may ultimately be self-defeating if they are not implemented in a predictable and transparent manner.

With respect to maize in Tanzania, Barreiro-Hurle (2012) finds that nominal rates of protection (NRPs) for maize at farm gate are generally negative over the period 2005/06–2010/11, signifying disincentives to farmers to produce maize. The author ascribes this to distortive NFRA procurement and disbursement activities as well as uncertain trade policies. Indeed, Tanzania's past policy of restricting maize exports attracted considerable attention. During 2006–2012 export bans on maize were introduced and lifted no less than ten times (Stryker, 2015). Bans were introduced when maize prices were high and removed when prices were low, and were associated with rapid maize price declines once implemented, and especially during the harvest season (Baffes *et al.*, 2015). Eventually, by 2012 government, agreed to discontinue the use of maize export bans based on analysis undertaken at the time and later published by Diao and Kennedy (2016), which showed that export bans were generally regressive and inconsistent with Tanzania's longer-term development goals. The effect of this policy shift was immediately evident: whereas the average maize trade deficit was 30 000 tonnes during 2006–2011, Tanzania became a net-exporter of maize thereafter, exporting on average 90 000 tonnes of maize per annum during 2012–2015 (UN Comtrade, 2016).

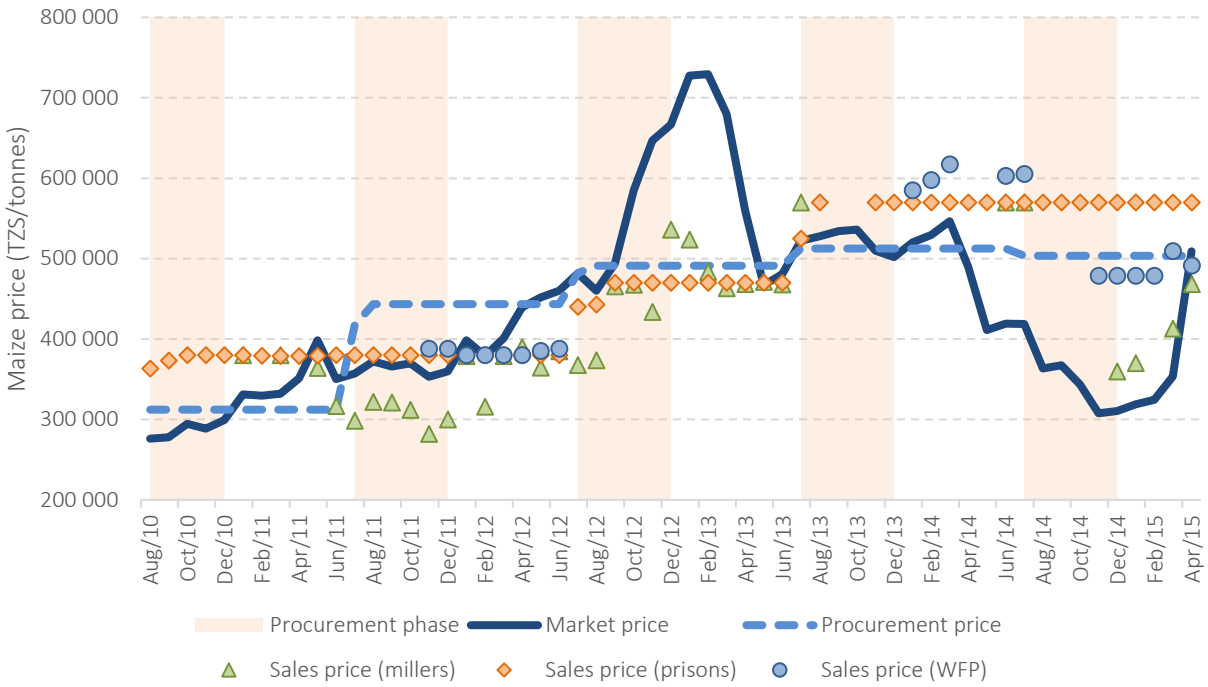
As far as NFRA activities are concerned, Barreiro-Hurle (2012) argues that during years in which Tanzania was a net maize importer (e.g. 2006, 2008 and 2010), farmers were unable to benefit from the protection afforded by import tariffs on private imports because these years frequently coincided with significant imports and/or stock releases at discounted prices by the NFRA. Excessive trade and transport costs further prevented farmers and rural traders from effectively competing with imported maize. The NFRA has also drawn critique from elsewhere; for example, Stryker (2015) argues that the NFRA has been under pressure to offer above-market procurement prices and to sell below market price, which has disrupted the market and created uncertainty.

2.2. NFRA mandate, activities and strategic plan

The NFRA was established as an executive agency of the Ministry of Agriculture Livestock and Fisheries (MALF) under the Executive Agency Act No. 30 of 1997. Its mandate is to ensure availability of food in times of shortage by procuring, reserving and recycling food stocks in an efficient manner (NFRA, 2016b). MALF is responsible for determining a policy framework within which NFRA operates and the financial resources required to fulfil its obligations. The NFRA manages 33 warehouses with a combined storage capacity of 241 000 tonnes. Geographically it operates across seven zones of the country: the Arusha zone in the northern region; the Shinyanga zone in the north-eastern lake region; the Dodoma zone in the central region; the Kipawa zone in the coastal region (also often referred to as the Dar es Salaam zone); and the Makambako, Sumbawanga and Songea zones, all located in the southern highlands of the country.

Unlike its predecessor, the SGR, the NFRA's mandate does not officially include a price stabilization role. However, through its pricing, procurement and disbursement activities, the NFRA has the potential to reduce seasonal variation in prices. On the procurement side, the NFRA sets an annual procurement price prior to the harvest based on estimated costs of producing maize. When buying from farmers, NFRA withholds a two percent ad valorem tax, while actual payment may be delayed. However, at the time the transaction is concluded the net price received by farmers still tends to exceed—by design—the prevailing market price (NFRA, 2016b). Figure 2 shows that during most the procurement phases from July to December each year (shaded sections) the procurement price was above the national average market price. The exceptions were the 2012 and 2013 procurement seasons when market prices rose to historically high levels. In several other seasons the market price rises above the procurement price, but typically only after December when procurement has been concluded. The implication, however, is that if farmers or traders are paid very late they may at times be better off selling directly to the market on a cash-on-delivery basis.

Figure 2. Wholesale market prices and NFRA procurement and sell prices, 2010/11–2014/15



Source: NFRA, 2016a; MALF, 2016.

Closer inspection reveals that the buy premiums, calculated as the buy price minus the prevailing market price, are significantly positive in the Songea and Sumbanwanga zones (30–40 percent) for most of the period under study. These are two important surplus-producing maize areas where the NFRA is particularly active as a buyer. Market prices in surplus areas tend to be somewhat lower than the national average, especially during the harvest season, which explains the positive premium. In contrast, premiums in Arusha and Dodoma are negative (–10 percent) over the period as a whole, even if quite volatile over time. These are deficit maize producing areas where prices tend to be higher than the national average and what is effectively a pan-territorial NFRA procurement price. This highlights the importance of distinguishing between NFRA impacts in surplus and deficit zones in our analysis.

The implication of the NFRA's price setting mechanism is that the agency should, in theory, be able to exert upward pressure on post-harvest farm gate prices, at least in surplus-producing areas. This impact is strengthened by the fact that around 80 percent of the NFRA's annual procurement is typically concluded in the months of August, September and October each year, i.e., relatively early in the marketing season when the bulk of the harvest is marketed and prices are suppressed. However, the NFRA's impact on the market also depends on its market presence (or market share). Details of NFRA's market share are shown in Table 1. The NFRA's market share displayed below is expressed as a percentage of marketed production. We assume that around two-fifths of the maize crop is marketed and the balance is retained for home consumption.

Table 1. Annual NFRA buying and selling activities (in tonnes), 2010/11–2014/15

		2010/11	2011/12	2012/13	2013/14	2014/15	Five-year average
Arusha (–)	NFRA procurement	16 767	1 252	316	34 882	37 952	18 234
	Production	109 310	86 800	88 250	165 891	195 532	129 157
	% marketed production	*38.3*	*3.6*	*0.9*	*52.6*	*48.5*	*35.3*
	NFRA sales	6 665	3 344	5 579	5 380	39 328	12 059
Dodoma (–)	NFRA procurement	15 222	1 401	3 714	24 350	36 546	16 247
	Production	62 570	70 930	84 920	138 469	116 943	94 766
	% marketed production	*60.8*	*4.9*	*10.9*	*44.0*	*78.1*	*42.9*
	NFRA sales	6 934	4 314	2 419	9 837	26 429	9 987
Dar es Salaam (–)	NFRA procurement	-	-	12 099	5 405	17 139	11 548
	Production	970	3060	660	2 369	1 642	1 740
	% marketed production	-	-	-	-	-	-
	NFRA sales	20 772	20 298	5 588	1 518	18 981	13 431
Makambako (+)	NFRA procurement	39 070	18 573	13 243	40 817	65 024	35 345
	Production	359 150	639 440	368 330	666 303	765 079	559 660
	% marketed production	*27.2*	*7.3*	*9.0*	*15.3*	*21.2*	*15.8*
	NFRA sales	140	26 315	8 289	3 453	43 519	16 343
Shinyanga (+)	NFRA procurement	5 104	1 307	-	6 262	7 651	5 081
	Production	267 738	334 030	330 960	539 204	329 275	360 241
	% marketed production	*4.8*	*1.0*	*-*	*2.9*	*5.8*	*3.5*
	NFRA sales	4 811	14 348	4 467	2 233	5 816	6 335
Songea (+)	NFRA procurement	48 264	52 269	26 863	57 552	76 453	52 280
	Production	225 470	423 090	527 310	452 457	427 827	411 231
	% marketed production	*53.5*	*30.9*	*12.7*	*31.8*	*44.7*	*31.8*
	NFRA sales	65	62 510	10 889	20	4 602	15 617
Sumbawanga (+)	NFRA procurement	56 725	51 044	7 346	50 117	64 745	45 995
	Production	330 830	523 800	345 490	538 868	425 681	432 934
	% marketed production	*42.9*	*24.4*	*5.3*	*23.3*	*38.0*	*26.6*
	NFRA sales	1 170	1 724	8 650	-	8 740	5 071
National	NFRA procurement	181 152	125 846	63 581	219 385	305 510	179 095
	Production	1 356 038	2 081 150	1 745 920	2 503 561	2 261 979	1 989 730
	% marketed production	*33.4*	*15.1*	*9.1*	*21.9*	*33.8*	*22.5*
	NFRA sales	40 557	132 853	45 881	22 441	147 415	77 829

Source: NFRA, 2016a; MALF, 2016.

Notes: Procurement, production and sales volumes are shown in tonnes. Distributions of food are not accounted for in sales figures. The NFRA share of the market is expressed as a percentage of the marketed production, assumed to be two-fifths of the production volume. This is a gross simplification, as evidently, the calculation can be improved with better information about actual marketed production share by region. The positive and negative signs below zone names indicate whether a market is a surplus (+) or deficit (–) maize producing area.

The three largest maize producing regions over the period 2010/11–2014/15 are Makambako, Sumbawanga and Songea, and these are also the regions where NFRA procurement levels are highest in absolute terms. In relative terms, however, NFRA's market presence varies from a 15.8 percent market share in Makambako to 31.8 percent in Songea. Even though Shinyanga is a relatively large producing area, NFRA's presence in that market is minimal. Absolute procurement levels are also relatively small in Arusha, Dodoma and Dar es Salaam, owing to the fact these are deficit maize producing areas. However, market shares in Arusha (35.3 percent) and Dodoma (42.9 percent) are the largest of all zones. We are unable to calculate the market share in Dar es Salaam since procurement levels far exceed production in that district, mainly because traders procure maize elsewhere and deliver it in Dar es Salaam, a major consumer center. This highlights a challenge, more generally, of analyzing NFRA impacts at a regional level when maize is freely traded across regional borders. At national level, NFRA procured on average around ten percent of the annual maize crop, which corresponds to 22.5 percent of the marketed produce.

The primary mandate of the NFRA is to provide food to vulnerable populations. Each year vulnerability assessments are conducted and people from all districts in the country are classified as either food secure or acutely or moderately food insecure. The acutely insecure receive free food, while the moderately insecure can access maize at a heavily subsidized price of TZS 50 per kg. This is only a fraction of the market price, which in 2014/15, for example, averaged TZS 360 per kg. Although disbursement volumes vary somewhat over time, the NFRA, through instruction of the Prime Minister's Office (PMO), has allocated, on average, 6 200 tonnes to acutely insecure free of charge and 41 000 tonnes to moderately insecure people at TZS 50 per kg over the period 2010/11-2014/15 (NFRA 2016a). These activities are likely to have a dampening effect on market prices.

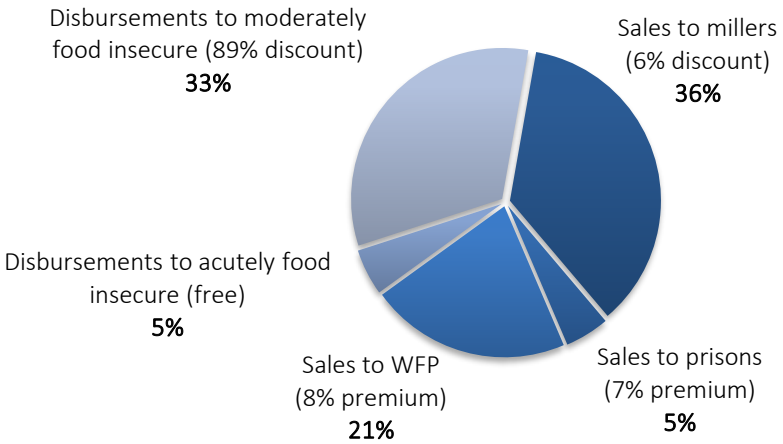
Although the NFRA operational model is not based on cost-recovery—its activities are considered food security activities and therefore funded from national budgetary allocations—at least some internal revenue is generated through sales. As shown in Table 1, although sales volumes vary substantially from one year to the next, average annual sales have amounted to around 78 000 tonnes during 2010/11–2014/15 (NFRA, 2016a). Figure 2 above shows the timing and price at which these sales take place. About eight percent of sales (on average 5 900 tonnes per annum) have been to prisons that procure maize almost throughout the year, and typically at market prices. A further 34 percent of sales (around 26 800 tonnes) have been to the WFP, who tend to pay similar prices to the prisons at an eight percent premium, on average. Although WFP procures infrequently, i.e., typically during the so-called lean season, their procurement volumes are relatively high when they do enter the market.

The remaining 58 percent of sales (around 45 000 tonnes) has been to millers. The NFRA regards this disbursement activity as an important avenue for providing food at affordable prices, and as is the case with free or subsidized food distributions to vulnerable people, these sales have the potential to reduce market prices. Formally, the process involves identifying regions and districts where prices are high and identifying private millers who will be appointed to procure, mill and distribute maize. Contracts between NFRA and millers specify procurement quantities and regulate their flour retail prices (NFRA, 2016b). As shown in Figure 2, with the exception of 2014/15, the selling price for millers was generally below the national average market price, equating to a discount of around 6 percent over 2010/11–2014/15, and reaching 14 and 19 percent during 2011/12 and 2012/13, respectively (NFRA, 2016a).

In summary, the NFRA can potentially influence the market through two channels. The first is through its price setting and procurement activities. Four-fifths of annual procurement is concluded over August, September and October when prices tend to be suppressed, and procurement prices tend to be above market prices, at least in surplus zones. The NFRA's presence in the market, estimated at around 22.5 percent of marketed production nationally and up to 40 percent in some regions (Table 1), is also not insignificant. Ultimately their impact and ability to raise post-harvest farm gate prices depends on the interplay between the procurement price, the prevailing local market price at the time of the transaction, and the procurement level relative to maize supply and demand dynamics in a particular market.

The second channel is its food aid disbursement and sales activities. Figure 3 provides a summary of activities during 2010/11–2014/15. Taking into account the volume and price discount of transactions, we conclude that the main channels of impact for lowering prices are likely to be sales to millers and the distribution of free or highly subsidized food to food insecure people. These disbursement avenues jointly account for around 86 000 of the 125 000 tonnes (69 percent) distributed annually, on average, during 2010/11–2014/15. Sales to WFP are at a premium, but the maize procured by them is also likely to be released free of charge as part of their own food security initiatives. Thus, although the NFRA does not explicitly have a price stabilization mandate, it could potentially reduce peak season prices through these disbursement activities.

Figure 3. Summary of NFRA food aid and sales, 2010/11–2014/15



Source: NFRA, 2016a.

2.3. Looking forward: NFRA capacity expansion plans

The NFRA's current storage capacity of 241 000 tonnes is spread across 33 warehouses located in the seven operational zones, with zonal capacities ranging from 14 500 tonnes in Shinyanga to 52 000 tonnes in Kipawa (Dar es Salaam). In addition to noting the need for rehabilitating around half the existing storage facilities, the NFRA Investment Plan 2014/15–2023/24 sets out an ambitious target of expanding storage capacity to 700 000 tonnes by 2020, a target that has also been adopted in the Strategic Plan 2016/17–2020/21 (NFRA, 2016b).

While the principle of maintaining strategic food reserves is not in question, there is less consensus about what optimal stock levels should be, and hence the storage capacity requirement. Rashid and Lemma (2011) argue that the determination of optimal stock is complicated due to political sensitivities and conflicting interests or objectives. In some countries strategic grain reserves perform the dual role of, firstly, providing food to those that become vulnerable due to annual seasonal factors or those affected by less frequent weather-related emergencies; and, secondly, stabilizing prices, which typically requires relatively large stock levels over and above what is required for food security purposes. In other countries, such as in Tanzania, strategic grain reserves only have food security mandate, while price stabilization roles may be performed by separate entities such as marketing or produce boards. Given varying mandates and political objectives public grain stocks, expressed as a percentage of domestic grain production, tend to vary greatly between countries. We briefly consider some examples:

- Tanzania: Current NFRA storage capacity is equivalent to around five percent of production. Capacity utilization is also high; for example, between 2008/09 and 2012/13 opening stock levels averaged 85 000 tonnes and procurement averaged 100 000 tonnes per year (Stryker, 2015). Procurement levels have increased more recently, with average procurement over 2010/11–2014/15 reaching 180 000 tonnes. This means by the time procurement is concluded and the bulk of disbursements only start, the NFRA warehouses are typically filled to capacity or even short on storage space. Recent procurement trends have likely influenced current thinking about the need for storage capacity expansion.

- South Asia: Dorosh et al. (2015:12) consider India's strategic grain stock level of 21.2 percent to be "excessively large" and Pakistan's stock level of 5.7 percent as a "better guideline" for optimal stock levels. In both these countries the grain reserves have a dual mandate of providing food assistance and stabilizing prices, and for the latter stock levels typically need to be larger in order to be able to defend a given price band. Bangladesh, by contrast, maintains its stock levels at only 2.9 percent, mainly because it relies substantially on trade policy to stabilize prices (see Dorosh, 2008).

- **Malawi and Kenya**: In placing its expansion plans in context, the NFRA (2014) cites the examples from neighbors Malawi, which has capacity to store over ten percent of its national crop, and Kenya, which in the past (i.e., 2007/08) maintained carry-over stock equivalent to one-third of its annual harvest. Unfortunately, neither of these examples are particularly useful. In Malawi capacity utilization has at times dropped to below 50 percent since their strategic grain reserve target is significantly below managed storage capacity (Thangata and Lemma, 2010). In Kenya the official reserve target is now around 315 000 tonnes (Business Daily, 2016), or nine percent of the national crop. Kenya also produces only about half the maize Tanzania produces in per capita terms and relies heavily on imports, and therefore maize market dynamics are very different.

- **Ethiopia**: Ethiopia's management of its strategic grain reserve is often hailed as a success story. They follow the World Food Program (WFP) and the Overseas Development Administration (ODA) proposed guiding principle that the food security stocks should be sufficient to provide 400 gr of food per day to 95 percent of food insecure people for a period of four months (Rashid and Lemma, 2011). With an average of around 3.9 million food insecure people per annum, this equates to around 180 000 tonnes of stocks. Additional stock is held for emergencies, bringing the total stock target to 407 000 tonnes, set in consultation with development partners following the drought in 2002/03. This equates to around 4.2 percent of the annual combined wheat and maize crop.

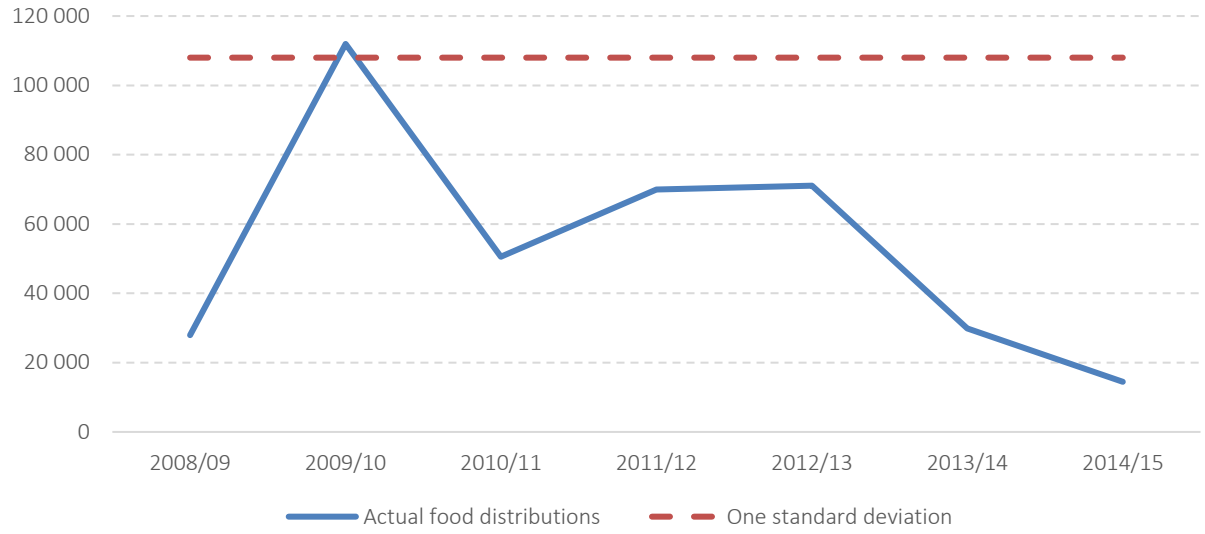
The NFRA (2014) uses as basis for expanding capacity to 700 000 tonnes the estimated standard deviation of maize production during 1991–2011 of 767 301 tonnes, which they note also happens to be close to annual import bill. Four points are worth highlighting. First, in striving to position themselves to cushion the average deviation from the production trend in its entirety, it appears the NFRA sees no role for the private sector to play in this regard. This goes against any stated policy ambition of increasing the role of the private sector in agricultural markets. Second, it is not immediately apparent that the government of Tanzania would be willing and able to provide the budget required to fully utilize storage capacity of 700 000 tonnes. It should be apparent that there is no economic sense in acquiring and maintaining storage capacity if it is going to be underutilized.

Third, in setting the expansion target, there appears to be no consideration for how stock or procurement quantities for food security activities have been determined in the past. With respect to food distribution, for example, NFRA (2016a) records suggest average disbursements of around 47 200 tonnes per annum during 2010/11–2014/15 (see discussion in section 2.2). The number of food insecure people reached in the past has varied significantly from one year to the next, and while consistent estimates are not readily available, an average number of around 1.2 million people seems a reasonable assumption. If we applied the WFP/ODA guidelines above, the food requirement would be around 55 000 tonnes, which is remarkably similar to actual disbursements, and a considerable distance from 700 000 tonnes.

Fourth, and related to the first point, arguably the concern should not be the extent to which production deviates from the trend, but rather the extent to which food consumption deviates from the trend. Households are resilient and resourceful: they do not rely solely on maize as a source of food; they do not only rely on the current production season (i.e. some may have access to personal stocks from previous seasons); and the onus is not entirely on government to support the food insecure: in a transparent and predictable market environment the private sector will fulfill the important role of regulating food supply within and across seasons. For this reason, in proposing an optimal stock level, Stryker (2015) analyzes consumption rather than production trends, and calculates a standard deviation of 108 000 tonnes from the required consumption trend. Statistically, this means national maize availability will drop below the trend (requirement) by more than 108 000 tonnes only once every five years, and by more than 216 000 tonnes (two standard deviations) only once every forty years.

Since its establishment in 2008/09, NFRA food disbursements indeed only exceeded 108 000 tonnes once, in 2009/10, when it reached 111 950 tonnes (NFRA, 2016a) (see Figure 4). That year excluded, average disbursements over this seven-year period was less than 50 000 tonnes. This evidence adds weight to Stryker's (2015) analysis, which also includes the proposal that annual procurement should be 100 000 tonnes, which will be sufficient for food aid distributions over a typical five-year period. The balance of maize stocks not disbursed as food aid can be sold as is current practice. Naturally procurement levels should be reviewed over time to adjust for changes in the population growth or the average share of the population that tends to be classified as vulnerable or food insecure. Storage capacity, which is sufficient at present, can then be expanded as needed.

Figure 4. Actual NFRA maize disbursements to vulnerable populations, 2008/09–2014/15



Source: 2008/09–2009/10 estimates reported by Stryker (2015); 2010/11–2014/15 estimates from NFRA (2016a).

Notes: The dashed horizontal line (108 000 tonnes) represents the standard deviation in consumption from its required level (Stryker, 2015).

The cost of doubling procurement and rolling stock levels to 200 000 tonnes or more (i.e. similar to annual procurement levels seen in 2013/14 and 2014/15) will ensure Tanzania can deal with food insecurity internally over a forty-year period, but the cost of maintaining large stock levels over such a long period of time far outweigh the cost of relying on international markets, as Stryker (2015) illustrates in detail, and Dorosh (2008) discusses in the context of South Asia. The implication is that any procurement beyond 100 000 tonnes per year is no longer a food security decision but a commercial one that should not be funded out the government budget, but out of internal NFRA resources. Even then it would be reasonable to argue that commercial activities fall beyond the scope of the NFRA's mandate, although one of the justification for capacity expansion is to permit a more commercially-oriented role. In that regard, the future role of the newly established National Cereals and Produce Board (NCPB) as well its relationship with the NFRA should be clarified.

3. Methods and data

Following Jayne *et al.* (2008) and Mason and Myers (2011) we use a time series econometric model to evaluate the impact of NFRA activities on wholesale market prices. Specifically, we assess the extent to which NFRA buy or sell premiums—defined as the difference between the procurement or sale price and the price in the nearest wholesale market—affect maize price dynamic in wholesale markets. This essentially involves modelling price dynamics at wholesale market level, and thereafter simulating counterfactual price paths free of the impact of the NFRA buy or sell premiums. A comparison of the simulated and historical price paths reveals the likely impact that the NFRA pricing, procurement and disbursement strategies had on maize market price dynamics.

Our analysis is based on monthly observations on maize procurement and disbursements/sales and the associated quantities and prices from 2010/11–2014/15 supplied by the NFRA (NFRA, 2016a). As discussed, procurement prices are set annually by the NFRA, based on a representative cost of maize production, whereas selling prices tend to be set in a more ad hoc manner and may vary depending on the buying party involved (see earlier discussion). Among the seven NFRA operational zones, data for Sumbawanga and Songea, two important surplus maize-producing areas, as well as Arusha, Dodoma and Dar es Salaam (Kipawa), which are all deficit maize-producing areas, were included in the analysis. The other two regions, Makambako and Shinyanga, were excluded due tomissing price data and low transactions volumes. Data on wholesale maize market prices are from MALF (2016).

Our approach differs from Jayne et al. (2008) and Mason and Myers (2011) in certain respects. Both articles deployed an autoregression model (VAR) after rejecting the possibility of cointegration within their price system. First, given evidence that local maize market prices in Tanzania and those in Kenya, an important trading partner, are co-integrated (Baffes *et al.*, 2015), we use a vector error correction model (VECM) to estimate the long-run equilibrium between domestic prices and those in Nairobi, Kenya. Second, we model the short-run dynamics of maize prices a trigonometric function to control for seasonality. Third, in addition to including NFRA buy and sell premium as exogenous variables, we also control for relative quantities procured or sold in each market. The earlier analyses only considered pricing strategies. Other features include dummy variables to control for periods during which a maize export ban was in place, as well as a dummy for the 2012/13 maize price crisis in Tanzania (see Figure 2).

The final representation of the vector error correction model (VECM) is as follow:

$$\Delta \begin{bmatrix} P_t^{Local} \\ P_t^{Nairobi} \end{bmatrix} = \alpha\beta' \begin{bmatrix} P_{t-1}^{Local} \\ P_{t-1}^{Nairobi} \end{bmatrix} + \Gamma\, \Delta \begin{bmatrix} P_{t-1}^{Local} \\ P_{t-1}^{Nairobi} \end{bmatrix} + \Phi \left[\Delta BP_{t-1}^{Local} \quad \Delta SP_{t-1}^{Local} \quad Q_{t-1} \quad \cos\left({}^{t\pi}/_{6}\right) \quad \sin\left({}^{t\pi}/_{6}\right) \quad D^{Ban} \quad D^{Crisis}\right] + \varepsilon_t$$

where P_t^{Local} and $P_t^{Nairobi}$ represent the prices in local Tanzanian markets (zones) and prices in Nairobi; BP_t^{Local} and SP_t^{Local} represent the NFRA buy and sell premium respectively; Q_{t-1} represent the net volumes of operations, i.e., sales and distributions subtracted from procurements, as a share of production; $cos\left({}^{t\pi}/_{6}\right)$ and $sin\left({}^{t\pi}/_{6}\right)$ represent the cosine and sine functions to capture seasonality (Gilbert *et al.*, 2016); D^{Ban} and D^{Crisis} are dummy variables for the export bans and the 2012/13 food price crisis; and ε_t is an error term.

The left-hand side of the equation is the vector of market price changes. The first term on the right-hand side models the long-term relationship that represents the equilibrium between the Kenyan and Tanzanian prices and captures, through α, the rate of adjustment of prices towards the long-term equilibrium following a shock. The second terms accounts for short term price shocks in both Tanzanian and Kenyan markets. The vector Φ captures the impact of several exogenous variables on the short-run dynamics of maize price. The underlying assumption is that NFRA activities can influence the short-run dynamics of the maize price but not its long-run spatial equilibrium with Kenya. Hence, a positive shock to the buy premium is expected to generate short-term upward pressure on market prices. Similarly, a positive shock to the sell premium should create short-term downward pressure on market prices.

Once the VECM is estimated for each local market, we recover its vector autoregressive (VAR) form through matrix algebra (see Pfaff, 2008) for forecasting purposes. We can then follow the same procedure as Jayne et al. (2008) and Mason and Myers (2011) and simulate hypothetical maize market price paths under the assumption that NFRA had concluded their transactions at market prices rather than at administratively fixed procurement prices or ad hoc selling prices. This is achieved by setting the error terms to their estimated historical values, fixing the NFRA policy variables (i.e. the buy and sell premiums are set to zero), and constructing dynamic on step ahead forecasts for the market prices. The simulated paths of the market variables can then be compared to their historical paths in order to evaluate the effects of alternative buy and sell prices on market variables.

4. Results and analysis

Unit root tests support the hypothesis of integration of the first order for all market price series (see Annex Table 1). The Johansen (1988) procedure tests reported in Annex Table 2 reveals co-integration within our dataset and therefore provides justification for including the long-term relationships between local markets and the Nairobi market in our econometric model. Estimated coefficients for each regional market equation are reported in Table 2.

Table 2. Johansen procedure VECM estimation results

		Sumbawanga		Songea		Arusha		Dodoma		Dar es Salaam	
Endo-genous variables	Error correction term	-0.428	***	-0.350	***	-0.010		-0.323	***	-0.243	*
	Local Price (ΔP_{t-1})	-0.528	***	-0.176		-0.605	***	-0.165		-0.321	
	Nairobi Price ($\Delta P_{t-1}^{Nairobi}$)	0.186		-0.101		0.284	*	0.398	***	0.272	
Exogenous variables	Export ban	-0.125	**	-0.065		-0.057		-0.076	*	-0.152	
	Seasonality cos($t\pi/6$)	0.000		0.003		0.015		0.040	*	0.056	
	Seasonality sin($t\pi/6$)	-0.040		-0.080		0.041	*	0.002		0.026	
	Price Crisis	0.319	***	0.264	***	0.053		0.127	**	0.038	
	Buy Premium (ΔBP_{t-1})	-0.001		0.132		-0.044		0.047		-0.669	***
	Sell Premium (ΔSP_{t-1})					-0.348	**	0.109		0.076	
	Quantity (Q_{t-1}^{net})	-0.516		-2.840	***	-0.746		-0.137		-0.007	
	R^2	0.392		0.422		0.339		0.397		0.273	
	N	57		57		54		57		45	

Source: Authors' estimates based on NFRA (2016a) and MALF (2016).

Notes: Significance codes: 1 percent ***; 5 percent ** ; 10 percent*

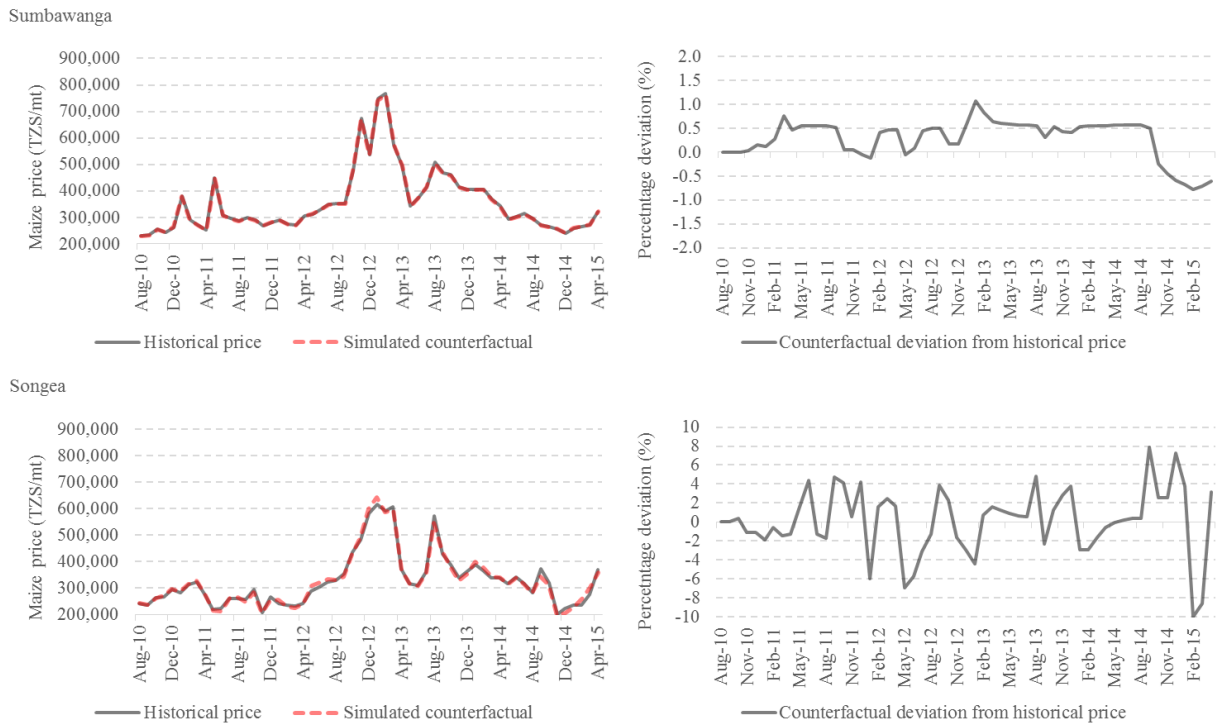
The error correction term is negative and significant for all markets, except for Arusha, confirming that the domestic prices and the Nairobi market tend to, over time, converge around a long-run equilibrium. The export ban coefficient is always negative and significant in two zones, signaling a price-reducing effect of this particular trade policy. The price crisis in 2012/13 is captured and controlled for by the related dummy. The coefficients for the price premium variables do not have a consistent sign across markets. The buy premium has a statistically significant price-reducing effect only in Dar es Salaam, while the sell premium is statistically significant and negative only in Arusha. The coefficients associated with the net volume of operations are not signification except in Songea, suggesting that an increase in NFRA procurement operations could have a price reducing effect in that market.

We next consider the simulated counterfactual price paths obtained under the hypothesis of competitive pricing of NFRA operations. Results are displayed separately for surplus maize-producing areas (i.e. Sumbawanga and Songea) in Figure 5 and deficit maize-producing areas (i.e., Arusha, Dodoma, and Dar es Salaam) in Figure 6. For each market, the left-hand side figure shows the historical price path (solid line) against the simulated counterfactual (dashed line), while the right-hand side figure shows the deviation of the counterfactual price from the historical price in percentage difference terms. Thus, a positive sign suggests that maize prices would have been higher in the absence of NFRA distortive behavior and vice versa.

In general, and consistent with the expectations given the size and significance of NFRA policy variable coefficients reported in Table 2, the simulated counterfactuals deviate very little from their historical counterparts. The general conclusion is that the pricing, procurement and selling strategies of the NFRA do not have any substantial impact on maize market prices. Higher prices offered to farmers and traders during procurement only tends to benefit those directly engaged in the transactions; spillover effects to the rest of the market are absent. Likewise, subsidized sales to millers or vulnerable households also do not have any significant price-reducing effect in the market in general, and once again only benefits those buyers with direct access to NFRA maize or the targeted beneficiaries.

Next we consider surplus maize-producing zones more specifically (Figure 5), where NFRA procures relatively large quantities of maize (see Table 1). Overall, the NFRA impact in Sumbawanga is relatively weak, with prices having been pushed up by only around 0.5 percent on average over the period. Even in Songea, where the NFRA has a slightly larger market presence, the price effect, although more variable over time, is centered around a zero mean.

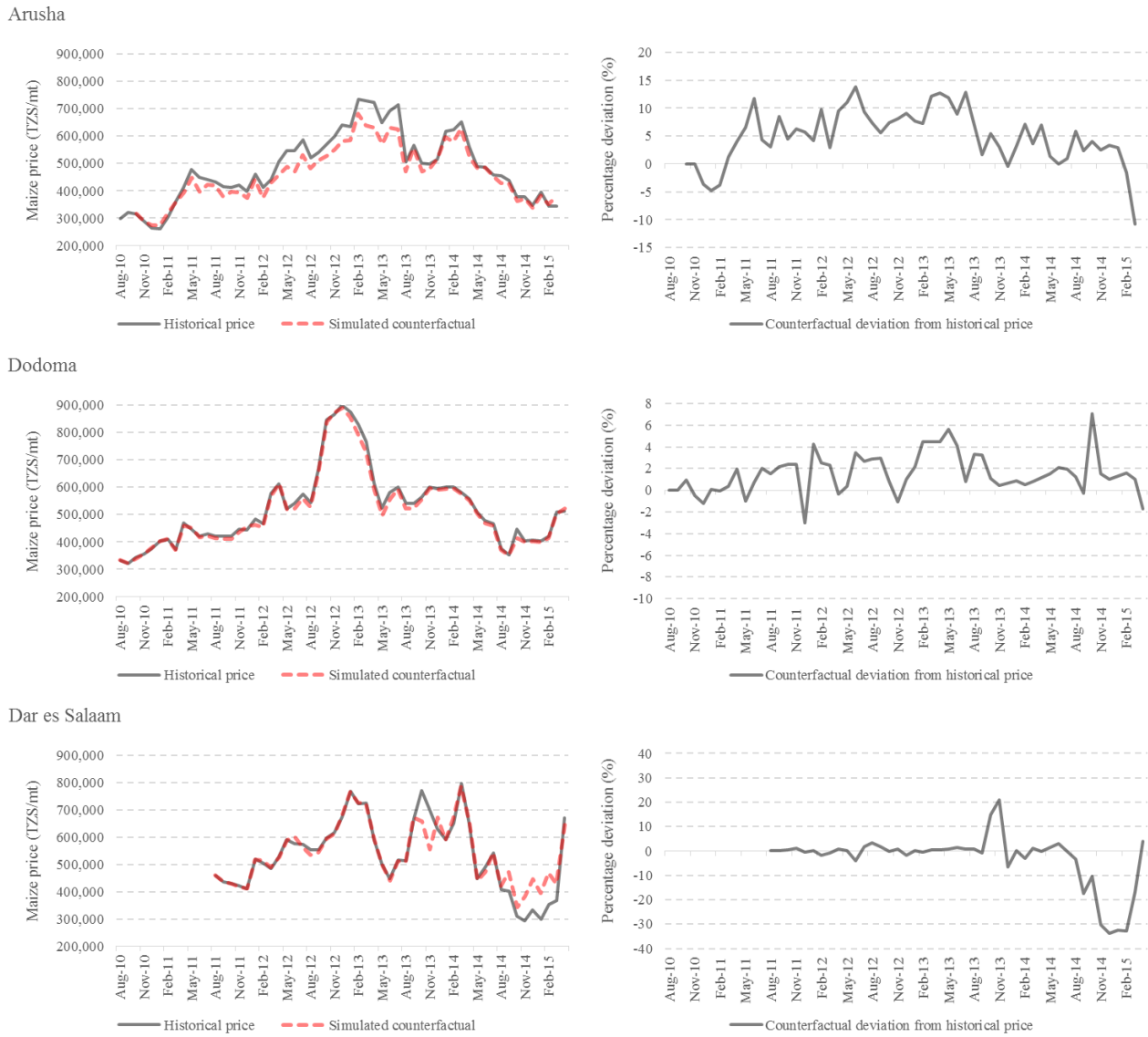
Figure 5. Simulated NFRA wholesale maize market price impact in surplus zones, 2010/11–2014/15



Source: Authors' estimates based on NFRA (2016a) and MALF (2016).

In Arusha, a deficit market close to the Kenyan border, prices tend to be higher than the rest of the Tanzania. Buy and sell premiums, even though slightly negative on average, generated some upward pressure on market prices, particularly during 2012/13, a surprising result considering attempts at the time to lower prices through active disbursement of subsidized maize to millers (Figure 6). Also in Dodoma the average buy premium was negative, but periods of a positive buy premium combined with a positive average sell premium pushed prices upwards by around three percent on average. In Dar es Salaam, the NFRA price premium impact was largely insignificant, although it seems NFRA pricing strategy contributed significantly to already low market prices during 2014/15.

Figure 6. Simulated NFRA wholesale maize market price impact in deficit zones, 2010/11–2014/15



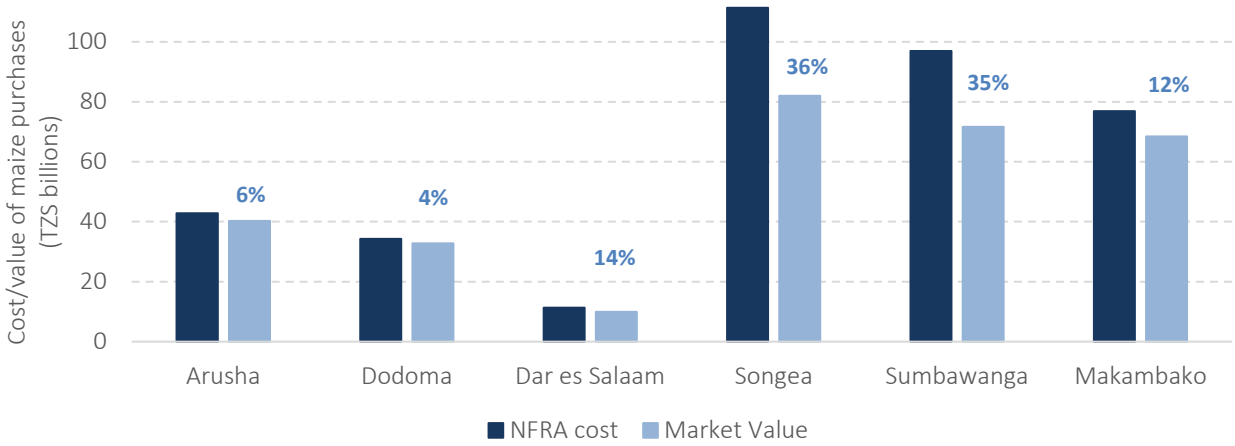
Source: Authors' estimates based on NFRA (2016a) and MALF (2016).

There are several notes of caution in the analysis of these results. First, inter-regional maize trade flows may cancel out or displace NFRA effects. This is particularly true in a region such as Dar es Salaam, a major consumer center which relies on substantial imports from the rest of the country. Second, although periods of procurement and sales of maize stocks tend to follow sequentially, these activities may at times overlap, thus potentially having opposing effects in the market. Third, as shown in Figure 2, selling prices may differ depending on the nature of the transaction (i.e. motivated by food security or stock releases of a more commercial nature), and hence what we observe here at wholesale market level may be an average and possibly insignificant effect compared to prevailing market prices. Lastly, and related to the previous point, is the fact that the NFRA impact is most likely more pronounced at a very localized level, whether through procurement from specific farmers or traders, or food disbursements to select districts. Some of these localized effects may not be observed at the wholesale level.

We finally turn to a brief analysis of operational costs. The NFRA does not explicitly have a price stabilization mandate, but in its role of ensuring food security it does tend to offer a premium on maize purchases and it also releases stock at discount prices. Considering the indication from our results that the NFRA activities ultimately have no significant spillover effects in regional markets and tend to benefit only a select few, their strategy may be at odds with its commitment of operating in a cost-efficient manner. Focusing on the procurement-side, it is evident that not buying at market prices has

budgetary implications. In fact, over the 2010/11–2014/15 period, the accumulated cost of buying maize at official procurement prices rather than at prevailing market prices was TZS 68.3 billion. Figure 7 shows the actual cost differentials as well as the premium paid in percentage terms. It is evident that the bulk of additional costs were incurred in surplus maize-producing zones of Songea, Sumbawanga and Makambako where both procurement levels and price premiums were highest.

Figure 7. Budget implications of buy premiums, 2010/11–2014/15



Source: Authors' estimates based on NFRA (2016a) and MALF (2016).

Notes: Mbeya market prices were used as a proxy for prices in Makambako. Shinyanga is excluded here due to insufficient price data and low traded volumes.

5. Conclusions and policy recommendations

Tanzania's National Food Reserve Agency (NFRA) has a mandate of ensuring food security by procuring, reserving and recycling strategic grain stocks, focusing mainly on maize, one of Tanzania's key staples. As with any strategic grain reserve with a relatively large government-funded budget its activities are closely scrutinized. In addition to public demands that the NFRA operations are conducted in a cost-efficient manner, many have voiced concerns that NFRA activities distort the maize market and, as such, may displace the private sector from engaging in trade-related activities, or create disincentives to farmers to produce maize for the market.

This study follows an approach similar to that adopted by Jayne et al. (2008) in Kenya and Mason and Myers (2012) in Zambia to examine the NFRA's impact on wholesale market prices. An econometric model was developed to disentangle the relationship between wholesale market prices and NFRA buying or selling premiums in surplus or deficit maize production zones, controlling for a variety of factors, including relative procurement and sales quantities, co-integration between local Tanzanian markets and the Nairobi market in Kenya, price seasonality, policy shocks such as export bans, and external market shocks such as the price shock in 2012/13. The recovered coefficients from the model were then used to simulate hypothetical maize price paths assuming NFRA procured and sold maize at the prevailing market price rather than at administratively set prices.

The analysis suggests that the impact of the buy and sell premium of NFRA is overall weak and difficult to observe. The simulated counterfactual price paths obtained under the hypothesis of competitive pricing of NFRA operations show very little difference with their historical counterparts. This suggests little to no evidence to suggest that the NFRA pricing strategy distorts wholesale maize markets, with the exception perhaps of isolated periods in some markets, such as the price-increasing effect identified in Arusha during the 2012/13, and the price-reducing effect observed in Dar es Salaam during 2014/15. Our results further suggest that the market context of trade partners such as Kenya cannot be ignored when designing domestic price policies; put differently, whereas domestic policy interventions that fall under the mandate of the NFRA may influence prices in the short run, they are unlikely to have sustained market effects due to global market integration.

The buy and sell premiums are, however, not the only avenue through which the NFRA can influence markets. Another is its mere presence in markets as a buyer or seller of maize. Already the NFRA controls relatively large shares of marketed production in key areas and is actively engaged in counter cyclical and food security operations. However, also in this regard, evidence suggests that net procurement volumes also do not significantly affect the market price. Nevertheless, in the context of plans to significantly expand its storage capacity and market presence—by almost 200 percent—it is certainly plausible to think that this result could change in the future. Unfortunately, model limitations prevent us from simulating such an eventuality; yet, as argued in this paper, in the context of the food security mandate of the NFRA there is little economic justification for such expansion, and current plans deserve reconsideration by policymakers.

In the context of its food security mandate that explicitly does not include a price stabilization role, and in consideration for budgetary efficiency, several specific policy recommendations flow from the analysis that could guide future NFRA activities and the broader food security strategy in Tanzania.

1) **In order to reduce NFRA procurement costs and potential market distortions, MAFAP recommends that the NFRA procures maize at market prices.** Procurement prices have generally exceeded prevailing market prices. This practice only benefits a few farmers or traders. Procurement strategy reforms, such as the adoption of public tenders or bid-volume-only online auctions, will bring more transparency to the market, prevent rent-seeking behavior, and bring about significant savings to NFRA.

2) If the Ministry does not wish to adopt the above recommendation, **MAFAP advises to at least set prices by region and take into account the market price of maize in addition to the input and production costs for that region.** The pan-national price premium results in unevenly distributed benefits, with farmers in Songea and Sumbawanga receiving a 35 percent premium, while farmers in Arusha and Dodoma receiving only 5 percent. MAFAP could support the ministry in designing a dynamic pricing formula that could be adapted on a regular basis to reflect market price changes

3) **MAFAP recommends against increasing NFRA's procurement quantities and operational capacity and advises to link procurement to the volumes required for disbursements and sales under its food security mandate**. Current NFRA storage capacity is sufficient to provide for food insecurity needs over a typical five-year period, while more severe but infrequent disasters can be dealt with through international food imports in a much more cost-effective way than maintaining large stock levels. Expanding procurement volumes and operational storage capacity is not consistent with NFRA's mandate to ensure food security in a cost-effective manner.

   As shown in Figure 2, in the last seven years, procurement and disbursements have followed an opposite trend, with disbursements well below the 110,000 threshold, the volume required to fill the consumption gap owing to price or environmental shock. However in 2013/14 and 2014/15, procurement volumes were over 200,000 and 300,000 tonnes. The cost of managing and maintaining such high stock levels far outweigh the cost of relying on international markets in cases of rare food shortages beyond 100,000 tonnes. Any procurement beyond 100 000 tonnes per year is no longer a food security decision but a commercial one that should not be funded out the government budget. Future operational capacity expansion may be anticipated, but the expansion rate should be based on a combination of population growth and food insecurity projections.

4) **If NFRA has capacity in excess of its requirements for food security needs, MAFAP recommends that the Government assesses the feasibility of leasing out this storage under a public-private partnership.**

   A study may be commissioned on which PPP modality is most suitable to operate excess public storage and generate revenue for the NFRA. The study could include stipulations related to direct purchase from farmers instead of traders. A financial analysis could indicate the magnitude of cost-savings and revenue for the Government.

5) **MAFAP recommends that annual subsidized sales or handouts to targeted, vulnerable people remain the NFRA's core business.**

   A commercially-oriented role for the NFRA, focusing on price stabilization, is excluded from this mandate. To serve the needs of food insecure households effectively, MAFAP recommends that the Government: (i) maintains transparency in identifying beneficiaries; (ii) analyzes beneficiary trends over time in order to better understand the dynamics of food insecurity, with a view to develop strategies to enhance communities' resilience to shocks; and (iii) regularly evaluates the option of providing cash rather than food transfers in certain areas, especially surplus-producing regions with vibrant local markets.

6) **Sales to millers are also an appropriate means of providing food at affordable prices to regions experiencing high prices.**

   However, current evidence suggests that NFRA's sales activities have not had a meaningful effect on regional market prices. Therefore, sales to millers should be based on clear, pre-defined rules, for example: (i) sales can only be approved when regional or district-specific prices breach a pre-determined price level; (ii) the agreed sales price should equal the upper limit of the price band, and flour retail prices should be derived accordingly; and (iii) the exact sales price and quantities available each year should be pre-announced so as to prevent unanticipated shocks to the market.

7) **Sales to prisons or international aid agencies are appropriate given the need to recycle unutilized stocks, and these can continue in a transparent manner and at market-related prices as is presently the case.**

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Annex: Statistical test results

Annex Table 1. Market price series unit root tests

	Level		Level and trend		Difference			
	ADF	PP	ADF	PP	ADF		PP	
Dodoma	0.48	-1.97	-2.11	-1.69	-5.39	***	-6.78	***
Nairobi	0.76	-3.19 **	-2.70	-2.74	-5.63	***	-4.89	***
Songea	0.28	-2.64 *	-2.11	-2.64	-5.44	***	-7.59	***
Sumbawanga	0.25	-2.53	-2.70	-2.37	-5.77	***	-8.88	***
Arusha	0.38	-1.38	-1.90	-2.29	-3.76	***	-6.39	***
Dar es Salaam	0.34	-1.54	-2.33	-2.76	-3.71	***	-8.97	***

Source: Authors' estimates.

Notes: Significance codes: 1 percent ***; 5 percent ** ; 10 percent*. ADF = Augmented Dickey Fuller; PP = Philips and Peron.

Annex Table 2. Co-integration test with Nairobi

	Sumbawanga	Songea	Arusha	Dodoma	Dar es Salaam
$r \leq 1$	11.52 **	4.74	6.27	9.83 **	4.59
$r = 0$	21.31 ***	18.90 **	21.36 ***	18.83 **	33.72 ***

Source: Authors' estimates

Notes: Critical values of test for 10 / 5 / 1 percent: r ≤ 1: 7.52 / 9.24 / 12.97; r = 0: 13.75 / 15.67 / 20.20. The no co-integration hypothesis is rejected for all markets. The test results are straightforward for Dar es Salaam and Songea and Arusha, for which one co-integration vector is indicated. For Sumbawanga and Dodoma, the "no co-integration" hypothesis is rejected together with the "one or less relationship" hypothesis, implying two vectors. As the ADF and PP unit root tests confirmed, the presence of unit roots and for the sake of parsimony and comparability across our markets we retain the one co-integration vector option as only one co-integration relationship can exist between these markets.

MONITORING AND ANALYSING FOOD AND AGRICULTURAL POLICIES [MAFAP]

The Monitoring and Analysing Food and Agricultural Policies (MAFAP) programme seeks to establish country owned and sustainable systems to monitor, analyse, and reform food and agricultural policies to enable more effective, efficient and inclusive policy frameworks in a growing number of developing and emerging economies.

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