

POLICY SYNTHESIS

FOOD SECURITY RESEARCH PROJECT - ZAMBIA

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ALTERNATIVE APPROACHES FOR MODERATING FOOD INSECURITY AND PRICE VOLATILITY IN ZAMBIA

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Key Policy Messages

- Maize production varies widely from year to year, given Zambia's heavy dependence on rainfed cultivation. Thus consumers face wide swings in availability of their primary food staple.
- Typical public responses include increased food aid inflows, government commercial imports and stock releases, and tight controls on private sector trade. While intended to improve domestic supply, these public responses can inadvertently exacerbate price instability and food insecurity for Zambian consumers.
- Two key private sector responses – private cross-border maize trade and consumer substitution of alternate food staples (such as cassava) for maize - can also help to moderate food consumption volatility.
- Together, private imports and increased cassava consumption could fill roughly two-thirds of the maize consumption shortfall facing vulnerable households during drought years.
- But policy changes – including more open borders and greater transparency in public import and pricing decisions – will be required to induce the private sector to expand imports, storage and production of key staples and, in turn, improve food security for the poor consumers in Zambia.

DROUGHT AND FOOD INSECURITY:

Maize provides over half of all calories consumed in Zambia. Yet dependence on rainfed maize production leads to highly volatile output from one year to the next (Figure 1). Given erratic rainfall, and less than 5% of cropped land under irrigation, Zambia's maize crop fails to satisfy national consumption requirements, on average, in one year out of three. In good harvest years, Zambia produces a maize surplus, enabling the country to export

maize. In bad years, when drought, reduces output, Zambia imports maize.

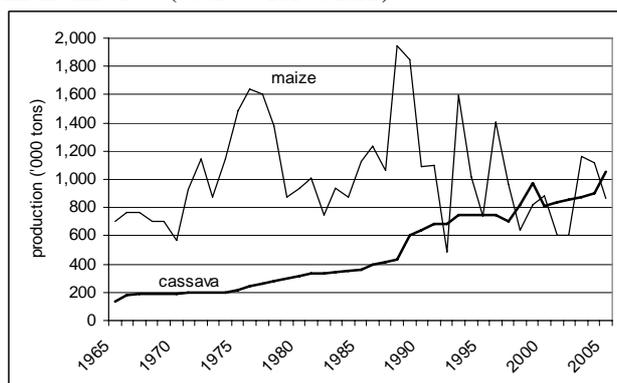
Public Responses. Typical policy responses during years of production shortfall include increased food aid flows, government commercial imports and stock releases, and tight controls on private sector trade.

Two key private sector responses can also moderate food consumption volatility.

Private imports. In drought years, open borders and private imports cap domestic price increases at import parity (Figure 2). In contrast, under import bans and closed borders, maize prices can easily increase by 100% or more.

Consumer substitution of alternate staples for maize. In the event of a drought, the maize price rises and consumers reduce their consumption of maize. At the same time, they reorient consumption towards more readily available, drought-tolerant staple foods such as cassava, sweet potatoes, millet and sorghum. Of these, cassava is most important in Zambia,

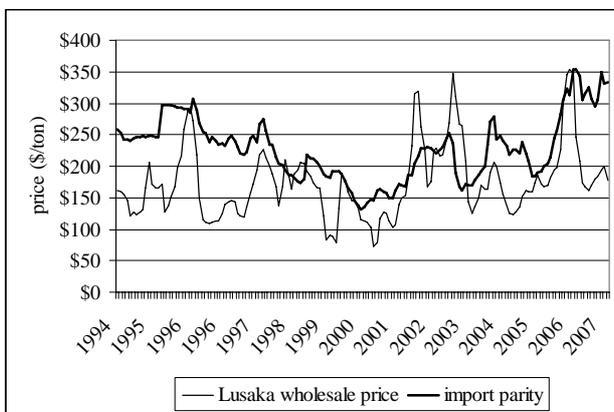
Figure 1. Production Trends in Food Staples in Zambia (Source: FAOSTAT)



accounting for 15% of national calorie consumption and serving as the food staple in northern and northwest Zambia.

Because of its drought resistance and because farmers can harvest their cassava any time from eighteen months to three years after planting, Zambia's cassava fields enable farmers to store food reserves in the ground, in their cassava fields, for up to three years. In the event of a sudden fall in maize availability, farmers can simply harvest more cassava than they would have otherwise and free up maize for sale or for consumption by others.

Figure 2 – Trends in Import Parity and Domestic White Maize Prices



Source: Dorosh, Dradri and Haggblade (2007).

OBJECTIVES AND METHODS: This policy brief examines the size and impact of public and private sector responses to drought. Summarizing results from a larger paper (Dorosh, Dradri and Haggblade, 2007), it uses historical data and experience from Zambia to assess the likely impact of maize production variations on the domestic maize price and on staple food consumption. The analysis relies on a simple economic model to assess the likely impact of maize production shocks and private sector responses under alternative policy regimes.

PRIVATE SECTOR RESPONSES: Consider a typical drought year, where maize production contracts by 30% below normal. Using a simple two-commodity simulation model, Table 1 reports the expected results under a variety of policy and private sector responses.

Under closed borders. For Zambia's low-income consumers, the worst of all worlds occurs when they are forced to contend with a production shortfall without recourse to maize imports which would cushion the fall in maize availability and the consequent increase in price. If Zambia were to prevent imports in the face of a drought – by failing to issue import permits to the private sector, by announcing large volumes of subsidized public imports and then failing to provide adequate funding (as in 2001), or by some combination of disincentives (as in 2005), the domestic maize price would increase by over 160 percent. Because poor households bear the brunt of this weather-induced compression in food availability, their maize consumption would fall by roughly 25%, 101 thousand tons below normal (Table 1, column b).

Consumer substitution of cassava for maize. This worst-case scenario overstates the compression in food consumption by poor households, because Zambian consumers can fall back on alternative staple foods in situations where maize becomes scarce and the maize price spikes. The projections from our simple multi-market model suggest a 160 percent increase in the maize price would induce Zambians to consume roughly an additional 43 thousand tons of cassava (measured in dry weight or maize-equivalent calorie terms), thus offsetting about 40% of the shortfall in maize availability. In the cassava-producing regions of northern Zambia, this substitution of cassava for maize would largely eliminate the vulnerable households' maize deficit, freeing up maize they would have otherwise consumed for sale in other zones where consumers have developed a more pronounced preference for maize. In calorie terms, the maize-equivalent consumption shortfall among poor households would fall from 101 thousand to 57 thousand tons (Table 1, column c).

Free Trade. Equally important to vulnerable households are private imports of maize. Historic price spreads between Lusaka and Johannesburg suggest that the private sector would import about 155 thousand tons of maize in response to a 30% maize production shortfall, capping the maize price increase at import parity, or 36 percent above normal lean-season levels. The resulting shortfall in staple food consumption by poor households falls to 33 thousand tons (Table 1, column d).

Table 1. Projected Impact of Drought in Zambia under Alternative Policy Regimes

| | Baseline | | Market responses | | | Government or food aid imports | | | Income transfers | |
|---|---------------------|----------------------------------|-----------------------------------|---------------------------------------|------------------------|--------------------------------|----------------------------|---------------------------|--------------------------------------|--|
| | a. historic average | b. maize market under import ban | c. cassava substitution for maize | d. cassava plus private maize imports | e. small public import | f. large public import | g. private imports impeded | h. targeted cash transfer | i. cash transfer under an import ban | |
| Production Shock (% change from base) | | -30% | -30% | -30% | -30% | -30% | -30% | -30% | -30% | |
| Policy responses | | | | | | | | | | |
| trade policy | | import ban | import ban | free trade | free trade | free trade | traders spooked | free trade | import ban | |
| public imports (government or food aid) | | none | none | none | small | large | small | none | none | |
| Maize market impact | | | | | | | | | | |
| Net production ('000 tons) | 851 | 596 | 596 | 596 | 596 | 596 | 596 | 596 | 596 | |
| Public imports (government or food aid) | 0 | 0 | 0 | 0 | 50 | 255 | 50 | 0 | 0 | |
| Private imports | 0 | 0 | 0 | 155 | 105 | 0 | 0 | 159 | 0 | |
| Supply | 851 | 596 | 596 | 751 | 751 | 851 | 646 | 755 | 596 | |
| Price (percent change from base) | 0% | 163% | 163% | 36% | 36% | 8% | 115% | 36% | 167% | |
| Maize production (next year) | 0% | 34% | 34% | 10% | 10% | 2% | 26% | 10% | 34% | |
| National consumption of food staples ('000 tons of maize-equivalent staples) | | | | | | | | | | |
| Cassava consumption (dried weight) | 285 | 285 | 364 | 298 | 298 | 315 | 352 | 298 | 365 | |
| Total maize plus cassava consumption | 1,136 | 881 | 959 | 1,049 | 1,049 | 1,165 | 997 | 1,053 | 960 | |
| Change from base | 0 | -255 | -177 | -87 | -87 | 30 | -138 | -82 | -176 | |
| Food consumption of poor households ('000 tons of maize-equivalent staples) | | | | | | | | | | |
| Maize | 408 | 308 | 308 | 365 | 365 | 421 | 330 | 372 | 312 | |
| Cassava (in maize equivalents) | 178 | 178 | 221 | 189 | 189 | 185 | 212 | 189 | 222 | |
| Total maize equivalents | 586 | 485 | 529 | 553 | 553 | 606 | 542 | 561 | 534 | |
| Estimated change in staple consumption | | | | | | | | | | |
| poor northern households | 0 | -47 | -5 | -9 | -9 | 10 | -4 | -9 | -5 | |
| poor southern households | 0 | -54 | -52 | -23 | -23 | 9 | -40 | -16 | -47 | |
| total poor households | 0 | -101 | -57 | -33 | -33 | 20 | -44 | -25 | -52 | |

Source: Dorosh, Dradri and Haggblade (2007).

PUBLIC IMPORTS:

Small volumes. If food aid agencies or the Zambian government were to import small volumes of maize to sell domestically at market price -- where small is defined as any amount less than the 155 thousand tons the private sector would bring in at import parity prices -- the results would be the same as under free trade (Table 1, columns d and e). In this situation, public imports would simply displace an equivalent volume of private imports.

For this combination of side-by-side public and private imports to occur, however, the private sector needs to have confidence that public food managers will operate under transparent, predictable decision rules governing quantities, timing and release prices. The private sector needs to have confidence that government will not sell imported grain at below-market prices, as the FRA did in 2005, causing commercial losses for private importers (Mwanaumo et al., 2005). Government, likewise, needs to have confidence that private importers will not

collude to artificially boost import prices above import parity. To develop this mutual trust will require good communications and good will on both sides.

Large public imports. If government or food aid agencies bring in maize volumes in excess of what consumers would purchase at import parity, these large-scale public imports will drive domestic prices down below import parity. Using historical averages, public imports of 255 thousand tons (the maize supply gap projected in column b) would bring down prices below the \$311 import parity level to \$247 per ton, resulting in government trading losses of \$64 per ton and a maize price only 8 percent above normal, in spite of the drought. While benefiting local maize consumers, this would dampen farmers' production response for the coming year from 10 percent to 2 percent (Table 1, column f).

Private imports impeded. Given late and unpredictable decision-making by Zambian authorities, many private firms have become

wary of cross-border maize trade. Simulation 1h considers a scenario, similar to 2001, in which government announces that it will tender for the import of large volumes of subsidized maize, thus scaring off the commercial private trade (Nijhoff et al., 2002). Then, due to a shortage of funds or to management difficulties, government ends up bringing in less maize than they intended. If government were to announce they would import 255 thousand tons of maize (as in simulation 4g), thus scaring away private traders, but then import only 50 thousand tons, then maize prices would more than double and staple food consumption (of maize and cassava) by low-income consumers would fall 44 thousand tons below normal and 111 thousand tons below the free trade level (Table 1, columns d and g).

TARGETED INCOME TRANSFERS:

Under free trade. Both food aid agencies and the Zambian government have experimented with temporary employment schemes and cash transfers aimed at increasing the purchasing power of vulnerable households during drought years. The last two columns of Table 1 estimate the impact of a cash transfer equal to 5 percent of annual household income, targeted at low-income households in southern Zambia, at a cost of roughly \$74 million. Under free trade, this increased purchasing power would reduce the deficit in food staple consumption among vulnerable households from 33 thousand to 25 thousand tons, for a gain of 8 thousand tons (Table 1, column i).

With closed borders. Under closed borders, however, this income transfer would accomplish very little, other than a minor redistribution of purchasing power. Because wealthy households can outbid the poor, the net impact on maize consumption by vulnerable households becomes very small. Their food staple deficit jumps to 52 thousand tons, only a 5 thousand ton improvement over the autarky solution (Table 4, columns d and j). With no additional food supplies to purchase, poor households, even with additional disposable income, find themselves competing against the wealthy for the limited available food supplies. As a result, income transfer programs are of little use unless free trade, or public food imports, enable available supply to increase along with consumer spending power.

CONCLUSIONS: *Maize imports* - Open borders offer a financially inexpensive means of reducing the domestic price volatility of staple foods. The alternative policy of closing borders can easily lead to price volatility in the range of 100 percent from one year to the next. Moreover, common government interventions – such as export and import quotas and price subsidies – may inadvertently accentuate domestic price volatility. Uncertainties over government intentions about trade volumes, tariffs and pricing risk driving commercial traders out of the market, thereby exacerbating price fluctuations.

Substitution among food staples - Drought-tolerant staples such as sorghum, millet, sweet potatoes and cassava allow consumers to substitute these foods for maize in response to highly variable maize availability. As an indicative order of magnitude, our projections suggest that, together, open borders and consumer substitution of cassava for maize could absorb roughly two-thirds of the consumption shock to vulnerable households during a drought year.

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