

# Can Regional Policy Initiatives Help Achieve Food Security in Southern Africa?

by  
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**Abstract:** This article reviews three different regional policy options that might be used to address food insecurity for the Southern African countries. The options that are explored are a regional strategic grain reserve, a food import insurance program, and a free trade zone. Compared with other regions, these options are particularly attractive due to a common staple (white maize), very high national (but not regional) production variability, and strong regional institutional ties. Some preliminary analysis is provided; questions are highlighted for future research.

Food security is a high priority issue for nearly all governments around the world. Food security can be defined as “access by all people at all times to enough food for an active and healthy life” (World Bank, 1986). This definition encompasses both the supply (aggregate availability) and the demand (access) dimensions. Numerous policy instruments have been proposed to address food insecurity and find alternatives to relying on food aid. This article examines some regional policy initiative proposals (as opposed to national level proposals) for the Southern Africa region that focus on the supply dimension. The options that are examined include establishing a regional strategic grain reserve, implementing an international food import insurance program, and establishing a free trade zone.

The Southern Africa region is particularly well-suited to regional food security initiatives for the following reasons: 1) the countries share in common a staple food commodity, white maize (which is not widely traded on the world market); 2) grain production tends to be highly volatile at the national level but not at the regional level; 3) there are fairly strong regional institutions already established, namely the Southern Africa Development Community (SADC) (created in 1980) and the Southern Africa Customs Union (SACU) (created in 1910);<sup>2</sup> and 4) much of the warfare in the region has finally ceased (although peace remains fragile in Angola). Furthermore, with the recent change of government in South Africa, which led to its joining SADC, many observers now believe that there is much greater hope of achieving the food security goals set forth by SADC members in the early 1980's.

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This article briefly reviews the root causes of food insecurity in Southern Africa. Then different policy options are examined that address the problems of food insecurity in the region. For each option, preliminary economic analysis is provided when available. Further research needs are identified in the summary.

## **Assessing the Problem**

The countries in the Southern Africa region are among the most food-insecure countries in the world. Most of these countries have very low per capita incomes and display low average nutritional levels.

Generally speaking, food supplies come from two primary sources, production and trade. Grain production has been increasing in Southern Africa, but it has not kept pace with population growth, leading to declining per capita production. Grain production in this region is also distinguished by its relatively high variability. This means that in a down year many people are vulnerable to hunger and sometimes even famine.

Many trade-related factors contribute to variable food supplies. These factors include volatile food import prices, unstable export earnings, and high debt service obligations from previously accumulated debts. Although real grain prices have been declining for decades, price variability has increased in the past 20 years for these commodities. It is expected that price volatility will increase even more in the coming years as major grain exporters continue with policy changes that result in lower stock holdings.

## **Strategic Regional Grain Reserve Option**

One policy option to address food security is the creation of a regional strategic grain reserve. The option has been considered in previous studies for different geographic regions (for example, the Sahel by McIntire, 1981) and has the

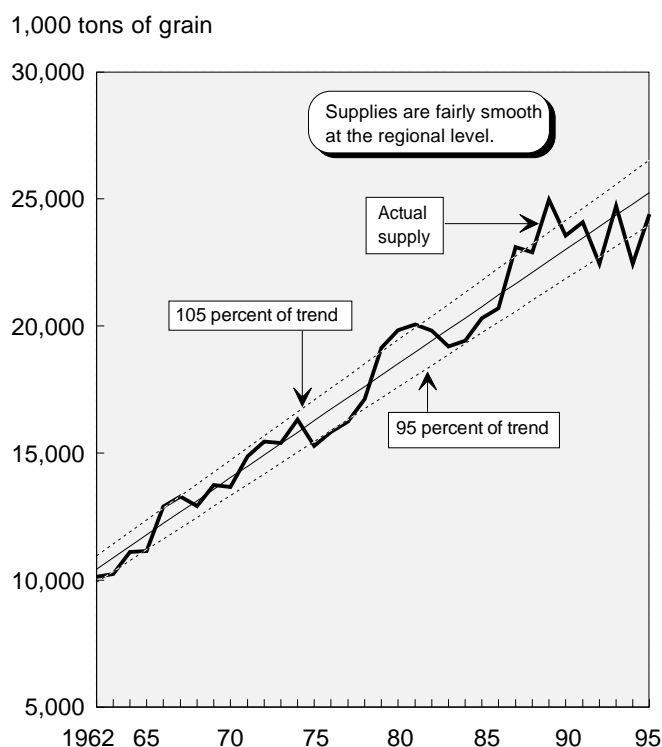
appeal of its direct food tangibility. In addition, this proposal has appeal for the Southern African region, whose consumers have in common similar tastes favoring white maize as a staple crop. As white maize is not widely traded outside of the region, it would appear to be a good candidate for a reserve. Furthermore, this buffer stock option has the merit that regional production variability is proportionally smaller than country level variability (see table B-1).

Unlike most earlier proposals, this policy proposes that a regional buffer stock be created as opposed to national level buffer stocks. There are two mechanisms discussed in the literature: quantity-based rules and price-based rules that determine when stocks are bought and sold. Given the regional dimension of this proposal, it makes more sense to think in terms of quantity-based trigger rules (that would avoid problems with exchange rates and inflation). Precedents for analyses of quantity-based trigger mechanisms include Walker, Sharples, and Holland (1976) and Reutlinger, Eaton, and Bigman (1976).

At the regional level, it is clear that grain supplies have been relatively smooth, rarely deviating outside of 5 percent of the trend use (see figure B-1). This suggests that it should be possible in principle to better stabilize national level grain supplies, which have been much more volatile. The challenge, however, is to devise a grain stocking arrangement for each country that can achieve this objective.

For the purpose of demonstration, one type of storage rule is discussed below. Let us first define supply as random production plus a trend level of imports. Now suppose that historically each country had abided by the following interannual grain storage rule:

**Figure B-1--SADC Grain Supply Trend**



Source: USDA data base.

If supply is:  
 greater than 120 percent of trend supply, then store amounts greater than 120 percent of trend supply;  
 less than 80 percent of trend supply, then release grain to reach the 80- percent level of trend supply;

Table B-1--Cereal Balance Information, Southern African Countries, 1993-1995

Country	Production	Net imports *	Food aid imports	Utilization**	Population	Per capita util.	Production coefficient of variation
	----- 1,000 MT -----				--Millions--	-- Kg/cap --	1962-1995
Angola	294	468	247	762	9.80	78	0.257
Botswana	48	148	8	176	1.43	123	0.698
Lesotho	164	188	31	344	1.94	177	0.261
Mauritius	2	230	1	232	1.12	207	0.933
Malawi	1,585	400	154	1,934	9.73	199	0.241
Mozambique	869	435	315	1,302	17.35	75	0.230
Namibia	85	108	0	178	1.58	112	0.310
South Africa	12,160	-1,210	0	11,101	40.29	276	0.309
Swaziland	88	80	9	168	0.94	179	0.918
Tanzania	3,791	170	59	3,932	27.99	141	0.512
Zambia	1,292	203	25	1,512	9.19	165	0.371
Zimbabwe	2,043	49	9	2,229	10.98	203	0.371
Region	22,420	1,269	858	25,540	132	193	0.243

\* Negative values indicate exports.

\*\* Utilization = Production + imports + beginning stocks.

Sources: USDA, FAO for Botswana, Mauritius, and Namibia.

between 80-120 percent of trend supply, then do nothing.

In this rule it is assumed that each country commits to a trend level of imports. This is a simple modification of the rule discussed by Newberry and Stiglitz (1981, pp. 406-409), in that imports are also considered as a source of supply. This means that production variability is what drives supply variability and therefore stock decisions. Other scenarios could be considered using other stocking rules, such as allowing wider or narrower bands to act as trigger mechanisms.

With the benefit of historical data, we can compare the results of these storage rules with the actual data, thereby providing important counterfactual analysis.<sup>3</sup> Figure B-2 shows how the stocking rules are applied in the case of Zambia. When grain consumption levels, driven by production levels, exceed the upper bound trend, then a country contributes to the regional grain reserve. When consumption levels fall below lower bound trends, then the country withdraws from the regional grain reserve. It is clear that these stocking rules do lead to smoothed consumption at the aggregate level, which presumably would lead to less price volatility and individual consumption variability.<sup>4</sup>

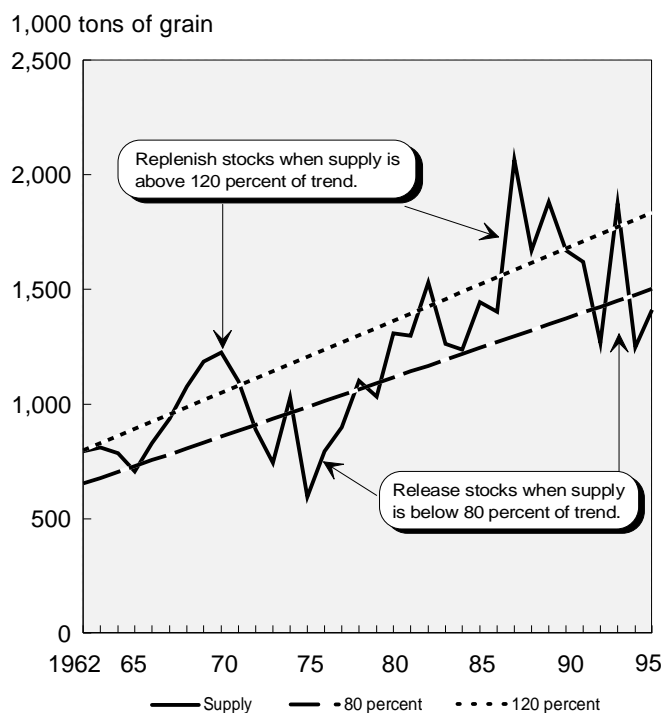
Developing a cost-sharing arrangement for such a scheme has proven to be difficult in the past. To develop a cost-sharing mechanism under the program, the individual country's costs and benefits have to be estimated. Previous studies have compared the welfare effects to producers, consumers, and governments. In the case of a region, that would entail making the calculations within and across countries. Earlier studies (McIntire, 1981; Reutlinger, 1984) have found that while the buffer stock program is overall beneficial to a country, it is not as beneficial as other food security programs. Furthermore, benefits can be high if consumers are very unresponsive to price changes (such as in the case of staple foods), but costs typically rise sharply at higher levels of food security (Houck and Ryan, 1979). Buccola and Sukume (1987), for example, found that holding large grain stocks was prohibitively expensive for the case of Zimbabwe.

### Food Import Insurance Option

An import insurance program is another approach to achieve food security. The rationale for this program is that international grain prices are subject to wide fluctuations. Food security is at risk when grain prices reach their upswing

<sup>3</sup>Houck and Ryan (1979) distinguish three categories of stocking models. The model presented here is in the tradition of Waugh (1967) of identifying appropriate stock levels based upon historical time series analysis. The other model categories are simulation models (a good example for three Southern African countries is Pinckney (1993)) and dynamic programming optimization models (a thorough treatment can be found in Gardner, 1979).<sup>4</sup>This implies that some countries would need to absorb to some extent the peaks and valleys (but less than without the buffer policy option). In reality, there would need to be more complex policy interaction between stocks and trade, such as that considered by Reutlinger, Eaton, and Bigman (1976). This type of interaction will be considered in a later study.

**Figure B-2--Zambia's Stocking Rules--  
A Hypothetical Scenario**



Source: USDA data base.

peaks, which inhibits each country's capacity to import the necessary grain volumes, and domestic production in a given year is low. This proposed policy mechanism could be implemented by a regional or international organization and is basically a financial program.

Suppose again that a set of policy rules were adopted by each government for a self-financing program. For the sake of example, let the rules be as follows:

If import needs:

- exceed the threshold of 1 standard deviation above trend level imports, then receive reimbursement of actual costs exceeding the threshold costs;

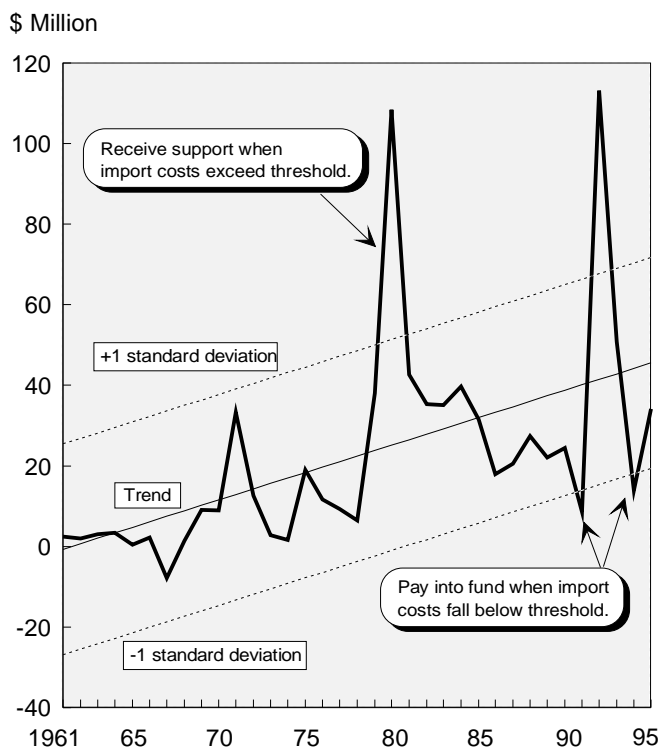
- fall below the threshold of 1 standard deviation below trend level imports, then pay into a fund the actual costs below the threshold costs;

- are between plus or minus one standard deviation, then do nothing.<sup>5</sup>

An example of this rule is shown for the country of Zambia in figure B-3. Table B-2 and figure B-4 show the results of the rule for the region had it been adopted historically. As a counterfactual exercise, the results suggest that nearly every country would have saved millions of dollars on its food import bills, although some more than others. Our analysis shows that the exporting countries (South Africa and

<sup>5</sup>Recall from statistical theory that about 67 percent of sampling variation of a normal distribution falls between plus and minus one standard deviation.

**Figure B-3--Hypothetical Import Rules to Zambia**



Source: FAO data base.

**Table B-2--Comparison of Accumulated Import Cost Savings with Insurance Program, SADC Countries**

Country	Actual imports, 1962-1995 *	Hypothetical imports, 1962-1995 *	Savings, 1962-1995	Share of regional benefits, 1962-1995
	----- \$U.S. Million -----			Percent
Angola	845.0	841.2	3.8	0.6
Botswana	304.3	300.0	4.3	0.6
Lesotho	357.5	354.4	3.1	0.5
Mauritius	601.2	600.6	0.6	0.1
Malawi	401.9	376.5	25.4	3.8
Mozambique	1,191.5	1,148.3	43.2	6.5
Namibia	252.1	245.8	6.3	0.0
South Africa	-5,366.6	-5,513.8	147.2	22.1
Swaziland	157.3	157.2	0.2	0.0
Tanzania	700.7	634.3	66.4	10.0
Zambia	712.5	635.3	77.2	11.6
Zimbabwe	-48.0	-336.2	288.2	43.3
Region	109.3	-556.5	665.8	100.0

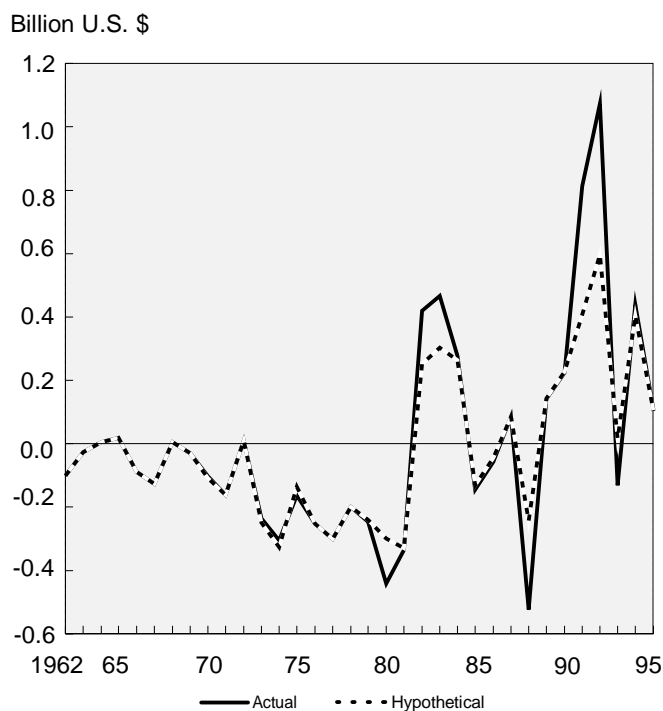
\* Negative values in parentheses are exports.

Zimbabwe) would gain the most, although Mozambique, Tanzania, and Zambia would also gain substantially.

### Free Trade Area Option

Some analysts have also suggested that a free trade zone could go a long way towards solving food security. The rationale is that with a free trade zone, when one country

**Figure B-4--Total Import Costs for SADC Region, Actual and Hypothetical**



Source: FAO data base and own calculation.

experiences a production shortfall which leads to high prices, then a nearby country with a surplus (and low prices) would export their surplus to the other country, assuming that it is profitable to do so after considering transportation and transaction costs. A free trade zone would lower the trade barriers, which would increase the likelihood of nearby suppliers being able to profitably export their surpluses.

One of the important premises of free trade, though, is profitability after considering transportation and transactions costs. In the Southern Africa region, transportation infrastructure is weak, making intra-regional trade expensive (table B-3). Koester (1986) showed that the region's transportation and handling costs per ton nearly equaled the value of the bulk grain shipments per ton, making it very difficult to profitably import grain in many countries. This continues to be a major problem for the region since it implies that most countries have to rely on domestic supplies of white maize (which are unstable). Research in South Africa shows that consumers are unwilling to purchase blended white and yellow maize—which are available on the world market—without a substantial price discount (Missiaen, 1995).

With the advent of peace, many new infrastructural projects are currently being built (or re-built) (Economist, 1997). This holds promise that transportation costs will begin to go down over time. The U.S. Agency for International Development (AID) is currently sponsoring research that is estimating some of the transportation costs in the region, which will be useful for conducting updated studies of trade

Table B-3--Road Density, Selected Countries

	Kilometers per million persons, 1992
SADC:	
Angola	NA
Botswana	1,977
Lesotho	452
Mauritius	1,549
Malawi	NA
Mozambique	343
Namibia	2,722
South Africa	1,394
Swaziland	NA
Tanzania	142
Zambia	795
Zimbabwe	1,406
Others:	
Uruguay	2,106
Tunisia	2,080
Turkey	5,514
Portugal	6,130
Hungary	7,756
Greece	10,341
France	13,008
United States	14,453

Source: World Bank, World Development Report 1995, Table 32.

profitability (for an analysis of East African transportation costs see AID, 1996).

Perhaps more importantly, the SADC countries have, in fact, signed a trade protocol in the past year. The treaty includes freer trade in nearly all agricultural commodities (as well as non-agricultural trade) and honors previously existing bilateral trade treaties. This treaty comes after many countries in the region recently have undertaken many domestic and trade reforms (AID, 1996b). South Africa is perhaps the best example of this, since it has abolished many parastatals (including the Maize Marketing Board in April 1997) in its effort to join GATT and the WTO.

### Summary and Outlook

This article highlighted three major regional policy proposals that address food security on the supply (food availability) side. Each proposal could have numerous variations, which leaves many possible options for further analysis open.<sup>6</sup>

Each proposal has numerous logistical and economic questions that will be researched further over the coming year. Among the factual and logistical questions are:

- What is the grain storage capacity in each country?
- What are the costs of building and maintaining new facilities (if necessary)?

<sup>6</sup>One could, for example, analyze the effect of different bounds for the strategic regional reserve option or calculate the costs and benefits of different rules for the import insurance program.

- What are the transportation costs among the countries for trade?
- What are the current grain policies and trade barriers?
- Who would implement the suggested program(s)?
- Who would enforce the policy arrangements?

Among the economic questions are:

- Which policy initiative is most cost-effective, and how do those costs compare with traditional food aid?
- What are the welfare effects for producers, consumers, and governments for each country for each proposal?
- Do any of these proposals invite rent-seeking behavior?
- What types of arrangements are likely to entice regional cooperation (or conversely what arrangements might induce sabotage)?
- How would the costs and benefits be apportioned?

The last two questions are particularly important. Economic theory suggests that countries will participate in a new arrangement if their expected position is at least as good as the current arrangement (according to the Pareto efficiency principle). If a particular country expects to be worse off while the group is better off, then, in principle, it is possible to compensate the country for its losses. Koester argues, after surveying the successes and failures of other regional arrangements, that the successful arrangements were those that divided the benefits fairly evenly (Koester, 1986).

In summary, each of the regional policy options discussed in this article—strategic grain reserve, food import insurance, and a free trade zone—has the potential to contribute significantly to food security in the Southern Africa region. Which option or combination of options can reach this goal most effectively will be the subject of future research.

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