

# DEPARTMENT OF AGRICULTURAL ECONOMICS AND EXTENSION

## WORKING PAPER

MAIZE PRICE CYCLES IN SOUTHERN AND EASTERN AFRICA

by

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Working Paper AEE 6/88

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## MAIZE PRICE CYCLES IN SOUTHERN AND EASTERN AFRICA

### Introduction

Maize prices have been established by central government in most countries in the region since the 1930s. Maize is the most important staple crop and adequate supplies are essential to food security. The major concern in the region is with the instability of food supplies rather than increased supplies since the agronomic potential exists for adequate or surplus maize production in normal rainfall years. This paper shows how the pricing system has exaggerated the inherently variable maize supplies.

While a general trend towards providing more attractive farm prices for maize is apparent in East and Southern Africa, this is linked to policies which emphasize maize self-sufficiency rather than comparative advantage in agricultural production. Most countries in Eastern and Southern Africa have adopted a policy of self-sufficiency in maize. Virtually all the maize grown is rainfed; both total rainfall and its distribution within a season exhibit considerable variability which in turn, is reflected directly in variations in the aggregate levels of maize output in Zimbabwe.

Planning is complicated by the fact that maize is a high-bulk, low-value commodity and the high bridging costs result in a wide gap between import and export parity. To avoid imports, maize pricing policy is strongly influenced by considerations of likely maize output in dry years. The prices necessary to ensure sufficient supplies in dry years lead inevitably to large surpluses in good years. Such excess maize production requires either export of the surplus, or its storage. Both are costly, and typically exports are made at a loss. On the other hand, large scale maize imports put a heavy strain on many areas of the economy, absorbing considerable amounts of scarce and expensive transport and foreign exchange resources. Imports are usually the less preferred yellow varieties and provide embarrassing evidence of failure to achieve the political goal of self-sufficiency.

The following analysis draws on data from Kenya, Malawi, Tanzania, and Zambia. Throughout, the assumption is that farmers respond to relative price changes in the short run wherever market opportunities exist. Gerrard found supply response to be positive in all four countries and that in most cases there was very little lag in the adjustment response to price changes from year to year. Kinsey provides further support for this view using Malawi data. Where the technology used requires very little long-term investment, lagged response is less likely.

## Kenya<sup>1</sup>

Maize production in the early 1960s declined as a result of low producer prices. A drought in 1965 led to food shortages and imported yellow maize. The resultant Commission of Inquiry recommended sharply increased producer prices, rainfall was favorable in 1966 and the increased local production left the Government with unsaleable stocks of imported yellow maize.

Cereals, particularly maize, continued to be in surplus and in 1968 the producer price was reduced; marketed output fell and imports were necessary in the early 1970s. Maize prices were raised significantly in the mid 1970s in order to ensure that Kenya maintained maize reserves of 200 000 tonnes. World prices were low in 1977 and with the Board holding almost 360 000 tonnes and a very large maize crop, restrictions on the free movement and direct purchase of maize from farmers were lifted. This meant that despite the high pre-planting prices promised by the Board, most farmers received very low prices since they were unable to sell to the Board. It was assumed that Kenya would have a permanent surplus of maize. Although the official pre-planting price for maize in 1978 was the same as that for 1977, both acreage and hybrid seed sales were down. Many of the small farmers had lost faith in the official marketing system and maize purchases in 1978 were low. With low world prices and high stock levels (despite poor deliveries in 1978) the 1979 pre-planting producer price was dropped.

Maize stocks were exported in 1979 which (combined with a fall in the area planted to maize, a fall in the use of purchased inputs and poor growing conditions) resulted in imports in 1980. Producer prices for both wheat and maize were substantially raised in mid-1980. The estimation of future demand and supply in the 1981 Sessional Paper on Food Policy indicated that Kenya would not achieve self-sufficiency in maize, wheat, rice, beans or milk until 1989 at the earliest. In fact by 1982 Kenya was self-sufficient and they have continued fluctuations in 1983 throughout the 1980s.

## Tanzania

Tanzania faced a serious drought in 1962 which affected maize production and subsequent attitude to price policy and in the 1960s food crops received prices which were more favourable than those for export. (Kriesel *et al*). In 1968 and 1969 maize was exported at substantial losses. There was little or no increase in nominal prices for most agricultural commodities between 1969/70 and 1973/74 and real prices declined by up to 30% (Ellis). The harvest failures in 1974 and 1975 resulted in the

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<sup>1</sup>See Muir 1982 for a detailed description of pricing and marketing

necessity to import large quantities of grain (447 000 tonnes and 269 000 tonnes) which coming just after the 1973 oil price rises resulted in a serious shortage of foreign currency and a heavy burden to government expenditure. Lofchie (1976 and 1978) attributed the crisis predominantly to agricultural policy including price policy.

Although nominal producer prices increased after 1975 and the import requirement was reduced, inflation was so rapid that there was little real gain and Tanzania faced heavy imports in 1980. The downward trend in production was accentuated by the deteriorating internal transport and marketing position, lack of inputs and the shortage of consumer goods. Maize sales only grew in the southern region where they were encouraged by a transport subsidy. Real prices have been increased significantly since 1984 which have resulted, together with good rains, in the 40% annual increase in official purchases (Amani et al in Blackie and Muir).

#### Malawi

As with other countries, producer prices for maize increase sharply after the need to import; declining in real terms thereafter until it once again becomes necessary to import. Imports in 1970 and again in 1975-76 and 1980-81 were preceded by declining real producer prices and followed by significant increases in producer prices. Prices have particularly favoured maize since the crisis in 1980 as the government was determined to increase emergency stocks and as a result peasant farmers moved back towards maize monoculture. Malawi recovered from its droughts and was exporting three fifths of maize sales by 1984. The surpluses created a serious burden on the State marketing system and encouraged the current move towards privatisation of domestic marketing. However, declining real producer prices since 1985, poor rains and increased demand from Mozambique refugees resulted in major shortages in 1987 and 1988.

#### Zambia

High producer prices at Independence in 1964 brought surpluses and in 1967, the government reduced the price of maize whilst considerably increasing the consumer subsidy. The producer price was reduced again in 1968 to encourage the diversification away from maize into other crops and livestock. These lower producer prices and lower consumer prices resulted in the need to import maize in 1969. Producer prices were boosted but subsequently declined and in the latter half of the 1970s production also declined. This resulted in the need for substantial imports in the early 1980s and producer prices were increased sharply. Thus once again, imports, although precipitated by a drought, were made necessary by declining real producer prices in the preceding years.

Maize price cycles

The state marketing boards in all four countries operate a de jure or a de facto monopoly on major grain purchases, sales and exports. Producer prices are normally announced prior to planting in order to influence farmers' planting decisions for the coming growing season.

All four countries have followed a remarkably similar pattern of maize pricing. The pattern is for the maize producer price to rise sharply in the year following a drought when maize imports were either necessary or likely to be needed. A surplus of maize is produced in the next year of adequate rainfall and thereafter nominal maize prices remain virtually static. Maize prices thus decline both ~~in~~ real terms and relative to other crops. This leads to a steady downward trend in aggregate maize production, due to a decline in area planted, a decrease in the use of improved technologies<sup>2</sup> or both. The size of the maize surplus consequent on the original drought-induced price rise conceals the effect of the declining production trend until drought occurs again and production falls steeply. Imports are once again necessary and the cycle is repeated.

A common feature of pricing in the official markets in Eastern and Southern Africa is for the maize price to be fixed both between cropping seasons and over the country as a whole. The constraints on private marketing, plus the absence of any seasonal or regional maize price differentials, make the large-scale storage of maize grain a government responsibility; there is little incentive for the private holding of grain stocks. The cost of acquiring, holding and distributing sufficient maize stocks to carry the more populous countries of Southern and Eastern African over consecutive droughts, are substantial (Muir and Takavarasha). Maize imports typically become necessary when a country has experienced two or more drought years in succession; those nations with low levels of official marketings may experience sufficient maize shortages for imports to be necessary even after a single year of drought.

The total maize harvest in all four countries relies heavily on a short rainy season, the parameters of which are highly variable both within and between seasons. However, it will be shown in the following sections that in each case examined, a serious shortage of maize, although precipitated by a drought, has been the result of stagnating or declining per capita production for several years before a drought year. The predominant cause for this fall in per capita maize production is identified as a result of stagnating or declining producer prices.

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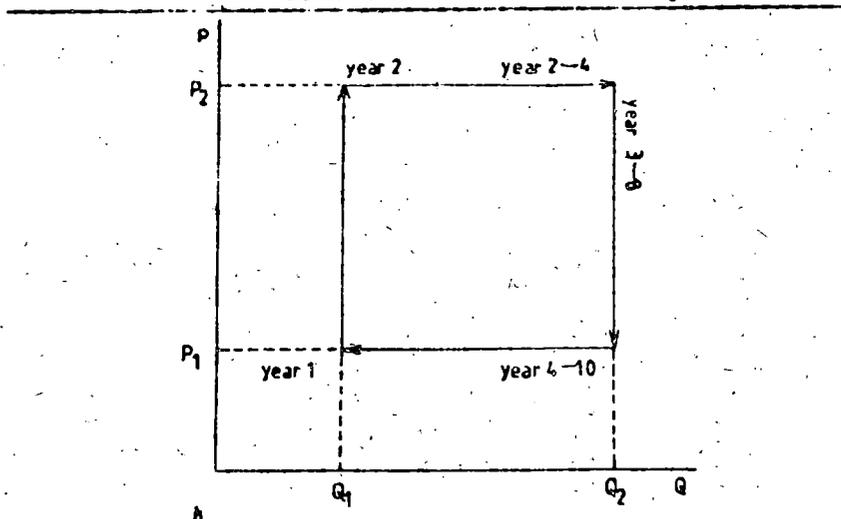
<sup>2</sup>especially cash demanding inputs such as hybrid seed and fertilizer

## Combined Analysis of Maize Price Cycles: An Application of the Cobweb Model

The cycle is the mirror-image of the classical textbook cobweb model and is shown graphically in Figure 1. The basic assumption in the cobweb model is that producers respond to last year's price and it is this lagged supply response which causes a cyclical relationship. In the countries studied, where prices are established by government, a lagged price response causes the cycle. The basic assumptions in this model are:

1. The government bases its price on current stocks which are a function of the previous year's supply
2. Current supply is a function of rainfall and current price. Current price is a function of the previous year's supply.

Figure 1 / Cyclical Movement of Institutionally Established Prices and Marketed Output



In the first period declining real prices have resulted in low marketed output:  $Q_1$ , where grain has to be imported

In response, government increases pre-planting prices for the following season to  $P_2$

Farmers respond over the next few seasons by increasing output to  $Q_2$  which results in a surplus for export

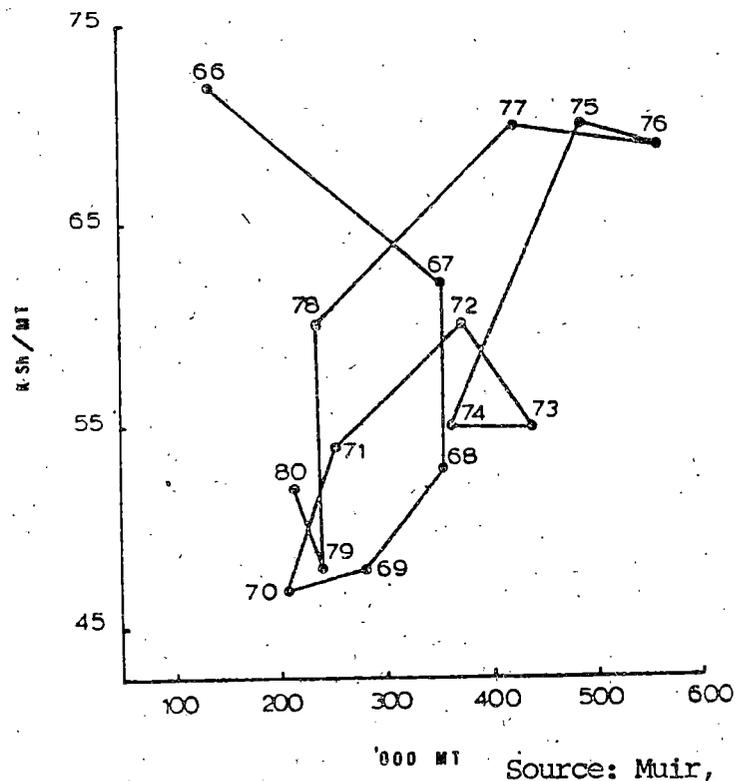
For a number of years government does not increase nominal prices or the increases are insufficient to keep pace with inflation so that real producer prices decline to  $P_1$

Farmers respond by reducing production to  $Q_1$   
Imports are necessary and the cycle begins again.

In Kenya (Figure 2) low producer prices in the early 1960s resulted in imports from 1964-66. Very high producer prices in 1966 and 1967 resulted in export losses in 1968 and 1969; low prices in 1968-70 resulted in imports in the early 1970s. High nominal prices to farmers throughout most of the 1970s maintained high marketed output and kept Kenya in a surplus position. But declining producer prices in 1978 and 1979 together with poor weather conditions resulted in the need for very large imports of maize in the early 1980s.

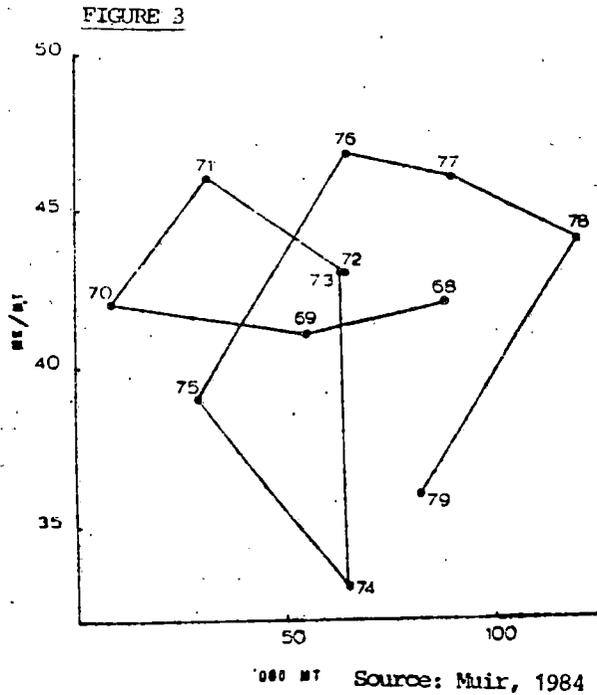
KENYA  
OFFICIALLY MARKETED MAIZE OUTPUT  
PLOTTED AGAINST REAL PRICES  
1966-1980

FIGURE 2



In Malawi (Figure 3) imports in 1970 and again in 1975-76 and 1980-81 were preceded by declining real producer prices and followed by significant increases in producer prices.

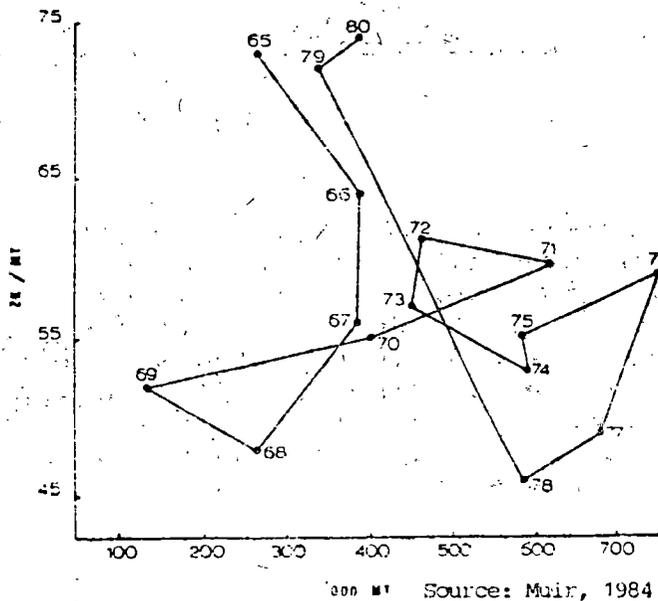
MALAWI  
OFFICIALLY MARKETED MAIZE OUTPUT  
PLOTTED AGAINST REAL PRICES  
1968 - 1979



In Zambia low producer prices from 1967-69 resulted in imports from 1969 to 1972 and declining real prices in 1977 and 1978 resulted in imports from 1979-83.

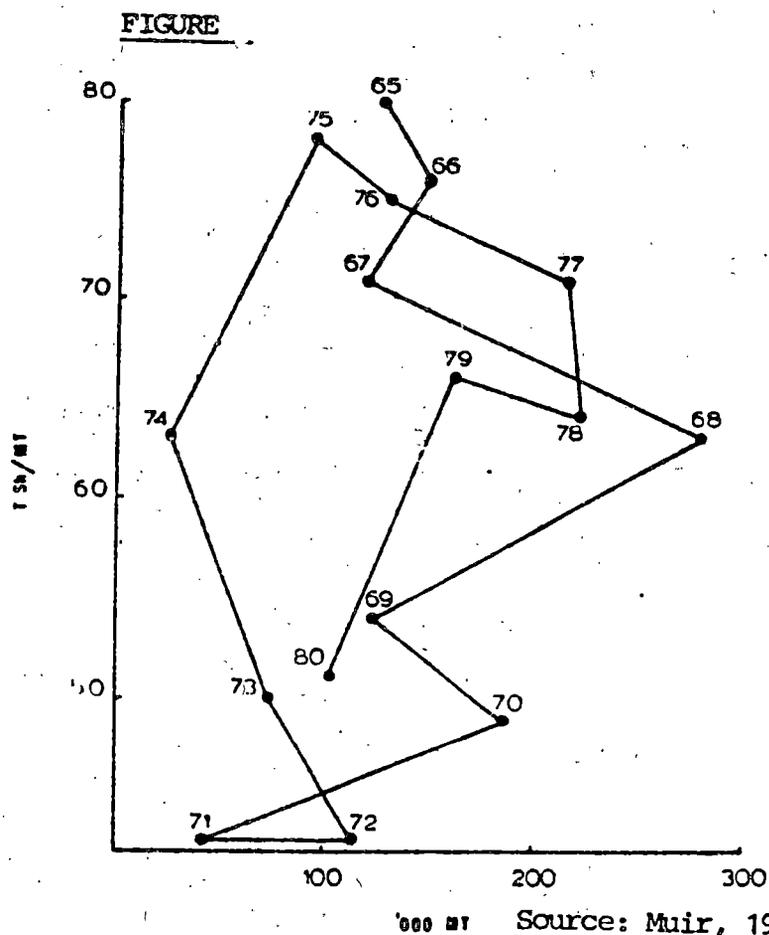
ZAMBIA  
OFFICIALLY MARKETED MAIZE OUTPUT  
PLOTTED AGAINST REAL PRICES  
1965 - 1980

FIGURE 4



In Tanzania (Figure 5) the massive imports necessary in 1973-74 followed declining real producer prices. Producer price increase of 52% from 1973 to 1974 were given as a result of these large deficits, and by 1978 there was a surplus for export. However, declining real prices since 1978 resulted in large deficits.

TANZANIA  
OFFICIALLY MARKETED MAIZE OUTPUT  
PLOTTED AGAINST REAL PRICES  
1965-1980



1980 heralded a crisis as all four countries were forced to import significant quantities of their major staple food, maize.. These imports were not only politically embarrassing; they also accentuated a difficult balance of payments position created by increased oil prices and a slump in the world demand for primary commodities, particularly copper, coffee and tobacco. All four countries took immediate steps to increase significantly producer prices of maize. In all the countries, producers responded rapidly to the increases in real producer prices of maize.

### Further Evidence from Zimbabwe

A similar pattern is also in evidence in Zimbabwe since independence. When the new government came into power in April 1980, producer prices and the area planted to maize had been declining for a number of years. For the first time in several decades, Zimbabwe was faced with the need to import maize. The government agreed to a pre-planting price of Z\$120 (a 40% increase over the previous year's official price). Farmers responded enthusiastically to the price, the cessation of the war and the distribution of seedpicks to smallholder. Sales to the official Grain Marketing Board (GMB) increased from 800,000 tonnes in 1980 to 2 million tonnes in 1981.

Exports of the surplus maize were at a loss. For the next three years, despite poor rains, prices remained static in nominal terms (falling 27% in real terms compared to 1980/81). The area planted by large scale farmers fell 20%. In reaction to low maize stock levels and the maize imports, government announced a 30% nominal increase in the pre-planting producer price for the 1985/86 season. Again, an embarrassing surplus of maize resulted. In consequence, a two-tier maize price was introduced for the 1986/87 season which intended to provide an incentive price to smallholders, while encouraging large-scale producers to switch to alternative crops. Drought in that season resulted in a marked decrease in marketed maize production, but there were sufficient stocks on hand to avoid imports and allow limited regional maize exports.

### Conclusion

The trend established in the 1960s and 1970s appears to be continuing in the 1980s as the countries continue to move between extreme deficit and surplus positions. Both importing and exporting maize is usually uneconomic. In 1981 the Zimbabwe export parity price was US\$110 and the import parity US\$245 (Muir-Leresche).<sup>3</sup>

Government intervention in the market is aimed, amongst other objectives, at maize self-sufficiency and stable prices. The evidence suggests, given the unreliable climate and the high costs of acquiring and holding stocks sufficient to carry the countries through several years of drought without imports, that the maize market in Southern and Eastern Africa is inherently unstable. It also appears that government intervention has exacerbated this situation. Currently efforts to encourage African countries to decontrol agricultural markets is based on the assumption that a free market system for maize would be less disruptive than the present system. The important role of parastatals to welfare in areas with poorly developed

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<sup>3</sup>Where regional trade is feasible, the differentials could be greatly reduced.

infrastructure is often unrecognised. It is likely, therefore, that governments will resist decontrol, and that some other means of reducing the destabilising effects of the current pricing systems must be found.

A partially decontrolled market would provide a possible alternative and readers are referred to Child, Muir and Blackie for details of one such a system. Where even partial decontrol is not feasible, an independent basis for establishing prices would reduce the influence of the previous year's import position when setting the official current year's price. It would also reduce the impact of both consumer and producer lobbies, leading to a more efficient allocation of resources. Governments would still exercise control but would be more fully aware of both the distributional and efficiency costs of such policy. Muir suggests a system based on a moving average of US Gulf Port prices (Muir-Leresche, 1984).

Underlying both these analyses is the assumption that controlled marketing answers a real political and economic need in sub-Saharan Africa. The uncertainty of food production, and the difficulties of trade in the region, are such that governments are unlikely to gamble on private trading to supply the market for major staples. Governments of such different political persuasions as South Africa and Tanzania rely extensively on public sector involvement in maize marketing. Gsaenger and Schmidt, have shown that, with low income and price elasticities of demand for maize, consumer welfare (particularly for low income groups) will fluctuate widely under free market conditions; an undesirable and politically destabilising condition. Their analysis of the welfare effects of various stabilisation schemes indicates that price stabilisation has net positive welfare implications where fluctuations are due to random shifts in supply. This is the case particularly in Eastern and Southern Africa, where total maize production is highly influenced by annual variation in rainfall.

Either partial decontrol or an independent price formulae leave the management of national maize food security firmly with the official agency. The maintenance of a strategic reserve or the importation of maize to cover supply shortfalls are policy options available to cover periods of insufficient maize production. An official marketing agency is well suited to undertake both these functions in the African context where there is heavy state control of foreign exchange allocations to both public and private sectors. The maintenance of strategic reserve is not attractive to the private sector under current price and investment environments in the region. Empirical evidence from Tanzania shows while free market conditions were able to equate internal supply and demand in normal seasons, this was not true in periods of severe drought when major deficits occur (Kriesel et al). Similarly, the import and export of grain can remain under public management, particularly in countries where the private sector has not experienced the competitive environment of

international grain trade. A well run maize board should be informed on both national supply conditions and on government foreign currency allocation priorities and availability. Particularly in the landlocked countries of sub-Saharan Africa, trade in bulk commodities is slow, difficult and expensive. On the other hand, the preceding evidence has shown that the maintenance of buffer stocks sufficient to stabilise supplies is beyond the budgets of most official maize agencies.

The partial decontrol approach brings maize marketing and pricing out of the either/or debate of privatisation. The issue is one of trade-offs between the size and cost of publicly owned stocks, and the volume and price of periodic imports. It allows African governments, through their official marketing boards, to retain an important influence on the overall trade in maize. The particular emphasis in national policy moves to one of maintaining sufficient national maize supplies. The private sector takes on an expanded role in local and regional maize grain trade. Thus, public control over maize stocks is maintained while the high costs, inefficiencies and general exploitation of both producers and consumers, which has come to be associated with African parastatal maize boards, is avoided.

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