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CHRISTOPHER D. GERRARD

Government-controlled Food Grain Markets, External Trade in Food Grains and Agricultural Development: the Case of Four Countries in East Africa

INTRODUCTION

Governments pursue two major kinds of policies that affect agricultural production and incomes. First, they control the domestic prices of agricultural commodities, which cause *movements along* agricultural supply curves. Second, they invest in agricultural research, education, and transportation systems, which *shift* agricultural supply curves over time. The first will be called 'commodity' policies and the second, 'development' policies. Positive policies of either type can increase agricultural production and, given input prices, agricultural incomes, but the means of achieving such increases, as Ricardo (1970 [1821], p. 79) pointed out more than 160 years ago, greatly affect the overall rate of economic development in less developed countries. This paper examines these two types of policies in the case of four countries in East Africa.

Kenya, Malawi, Tanzania, and Zambia are all former British colonies that became independent between 1961 and 1964. Owing to their common geographical and historical legacy, they have similar economic and institutional structures, including their governments' interventions in domestic food grain markets. All have been blessed with stable government since independence and considerable continuity in economic policy. The four countries are an economic laboratory for studying the impact of agricultural commodity and development policies.

Between 1964 and 1978 – which excludes the effects of the most recent drought to hit the region, beginning in 1979 – real GDP grew faster in Kenya and Malawi than in Tanzania and Zambia (see Table 1.) Real GDP per caput also grew faster in Kenya and Malawi. But a more striking difference between the two groups of countries is that while real private consumption per caput grew in Kenya and Malawi, it actually *declined* in Tanzania and Zambia. Not only did real GDP per caput grow more slowly in Tanzania and Zambia, but also government consumption grew more quickly than in Kenya and Malawi.

In all four countries, real growth in GDP has been associated with a declining share of agricultural production (see Table 2). But in Kenya and

TABLE 1 *Annual rates of growth in GDP, 1964 to 1978*
(per cent)

	Kenya	Malawi	Tanzania	Zambia
Real GDP	6.4	6.2	5.0	4.0
Population	3.5	2.6	2.7	3.1
Real GDP per caput	2.8	3.4	2.2	0.9
Real private consumption per caput	1.4	2.1	-1.2	-3.3

Note: All annual rates of growth in Tables 1 and 2 have been calculated by ordinary least squares from the equation, $Y_t = (1+r)^t Y_0$, estimated in logarithmic form.

Source: IMF, International Financial Statistics, 1981 Yearbook.

Malawi, domestic food grain production per caput has declined slightly, while export crop production has increased significantly. In Tanzania and Zambia, domestic food grain production per caput has increased slightly, while export crop production has declined significantly.

TABLE 2 *Annual rates of growth in domestic agricultural production per caput, 1964 to 1978*

(per cent)

	Kenya	Malawi	Tanzania	Zambia
Real GDP per caput	2.8**	3.4**	2.2**	0.9*
Major food grains	-0.6	-1.0	1.5	1.8*
Major export crops	3.2**	4.1**	-4.2**	-6.2**
Major food grains and export crops	1.4**	1.9**	-2.4**	0.03

Note: * indicates significant at the 5 per cent level and ** at the 1 per cent level.

Source: USDA, ESCS, 'Indices of agricultural production in Africa and the Near East', Statistical bulletins 556 and 623.

The main thesis of this paper can now be stated briefly. These trends are not accidental but are the result of government commodity and development policies. All four countries have controlled domestic food grain prices at levels that have maintained a relative degree of domestic self-sufficiency in food grain production over time. Hence, the rate of growth of food grain production per caput has been significantly different from zero for only one country, Zambia. In Kenya and Malawi, domestic self-sufficiency has been maintained by development policies that have successfully shifted agricultural supply curves to the right, so that domestic food grain prices have

declined relative to world prices and export crop production has expanded. In Tanzania and Zambia, domestic self-sufficiency has been maintained more by movements along agricultural supply curves, so that domestic food grain prices have increased relative to world prices and export crop production has declined. The different ways of maintaining self-sufficiency have translated into higher rates of economic growth in Kenya and Malawi than in Tanzania and Zambia.

GOVERNMENT INTERVENTIONS IN DOMESTIC FOOD GRAIN MARKETS

Maize is the staple grain throughout East Africa. It is consumed in both rural and urban areas and produced wherever rainfall is sufficient. Notwithstanding the lingering influence of British policies that encouraged European settlement on large farms, domestic production comes primarily from small African farmers who cultivate small plots of land – generally less than 8 hectares. The typical small farmer grows food crops, such as maize and beans, and cash crops. For some, food crops are a cash crop, but for most, the cash crops are for export, such as coffee, tea, cotton, tobacco, and groundnuts, depending on the country.

Maize has not always been the staple. Before 1900 it was almost unknown in East Africa. Sorghums and millets were predominant and these are still grown by small farmers in drier areas where moisture is insufficient for maize.

Wheat is the next most important grain in terms of consumption, except in Tanzania. For wheat, large farms predominate, producing virtually 100 per cent of the crop in Kenya and 90 per cent in Tanzania. Malawi and Zambia do not produce much wheat, because it is a temperate crop that only grows successfully at altitudes above 1,800 metres in East Africa.

Rice is the least important grain, except in Tanzania which has a large upland rice crop. Kenya and Malawi grow rice under irrigation and Malawi has recently become a net exporter.

All four governments systematically control the domestic prices of food grains at both the producer and consumer levels. They enforce official prices through marketing boards that are statutory monopolies for food grains that enter national markets (that is, that are not consumed in close proximity to their production), and for international trade. The boards draw down stocks and/or import grain when domestic production is too low to meet the demand at the ruling prices, and they accumulate stocks and/or export when production is high. Government subsidies cover any losses incurred by the boards due to their fixed-price margins. In spite of the logistical difficulties in enforcing official prices, the controls have been effective. The present author has successfully estimated domestic supply and demand equations for food grains for all four countries as functions of official prices.¹ The quantity of food grains produced in East Africa depends directly on the level of government prices.

GOVERNMENT PRICE OBJECTIVES FOR FOOD GRAINS

The ideology of the four governments differs in many ways but in this respect their policies are uniform. The declared objective of all four governments is to achieve domestic self-sufficiency in those food grain crops for which significant domestic capacity exists. This permeates development plans, agricultural sector strategies and public discussions of food price policy. The most concise statement of government policies in this regard is found in FAO (1976). The political pressures for self-sufficiency are strong. In 1980, when Kenya was forced to import maize for the first time in nine years, the Minister of Agriculture was made the public scapegoat for this national failure and demoted to become Minister of Culture (Kwitny, 1980).

Of course, governments can say one thing and do another. To test the hypothesis that the governments set domestic prices in order to maintain domestic self-sufficiency, the author has estimated food grain models for the four countries in the eight cases where significant domestic production capacity exists – maize, wheat, and rice in Kenya and Tanzania, and maize in Malawi and Zambia.² Because a free-market model is clearly inappropriate, the models contain government price-setting, stock-adjustment, and net import demand equations in addition to domestic demand and supply equations.

The governments' main instrument of control is the annual determination of producer prices. From their public statements, the four governments apparently associate a welfare cost with dependency on external trade, either as an importer or an exporter. They desire to meet their own food grain requirements from domestic production at the lowest possible price to consumers in order to insulate themselves from demand and supply shocks transmitted from abroad. The world price, however, is the opportunity cost of grain to the country as a whole, and for a small country in international trade, there are also welfare costs when domestic prices diverge from world prices. The government must consider these costs as well, which will be larger, the greater the gap between world and domestic prices, and the more important the crop to domestic consumption.

It is postulated that each government has a long-run target producer price for each food grain, PP_i , and that it sets these prices in order to *minimize* the following welfare losses:

$$W(PP_i) = a (PP_i - SSP_i)^2 + b (PP_i - WP_i)^2,$$

where SSP_i is the self-sufficiency price, WP_i is the world price, and a and b are non-negative government behavioural parameters to be estimated. The SSP_i is the producer price that would clear domestic markets under autarchy in an average year. It is the intersection of the domestic supply and demand equations at the producer level with zero random disturbances, with real private consumption expenditure (the income shifter in the demand equation) equal to its trend value, with consumer food grain prices

at the government-controlled margin over producer prices, and with domestic producer prices of export crops also at their government-controlled level.

The government's welfare function implies that welfare losses occur when domestic producer prices diverge from either the self-sufficiency or the world price. Unless SSP_t equals WP_t , the government must trade off one type of loss against the other. At one extreme, if $b = 0$ and $PP_t = SSP_t$, then the government can be said to be pursuing a policy of *absolute* self-sufficiency, or autarchy. At the other extreme, if $a = 0$ and $PP_t = WP_t$, then it is pursuing a policy of 'free trade', albeit with government price controls. In the intermediate range, say, with a greater than u and PP_t closer to SSP_t than to WP_t , the government can be said to be pursuing a policy of *relative* self-sufficiency.

TABLE 3 *Estimates of government behavioural parameters*

Commodity	Maize		Wheat		Rice	
	\hat{a}	\hat{b}	\hat{a}	\hat{b}	\hat{a}	\hat{b}
Kenya	0.047	0.407**	0.602**	0.206**	1.042**	-0.150
Malawi	0.444**	0.118**	-	-	-	-
Tanzania	0.665**	0.528**	1.057**	-0.347	0.779**	0.071
Zambia	0.898**	0.108**	-	-	-	-

Note: ** indicates significant at the 1 per cent level on a one-tailed test

It is not possible to report the complete econometric results of the eight models here, but the estimates of a and b are presented in Table 3. This first test supports the hypothesis that governments have been pursuing a policy of relative self-sufficiency. In every case but maize in Kenya, \hat{a} is the correct sign, significant, and larger than \hat{b} , which is the correct sign and significant only in the four maize models and for wheat in Kenya. In addition, in Kenya and Tanzania, the more important the commodity to domestic consumption of food grains, the more significant is \hat{b} . (Maize is most important in both countries, followed by wheat and rice in Kenya, but rice and wheat in Tanzania.) This is not considered a coincidence. The governments understand that the more important the crop to domestic consumption, the greater the costs of maintaining domestic prices that diverge from world prices.

A second test of the self-sufficiency hypothesis comes from direct comparisons of PP_t , SSP_t , and WP_t , which are presented in Table 4. Again, producer prices relate more closely on the whole to self-sufficiency prices than to world prices. There are a couple of inconsistencies – Kenya and

Tanzania, for example, have taxed rice production to an extent that has endangered self-sufficiency – but the following general pattern emerges. In relation to world prices, converted at official (over-valued) exchange rates, governments subsidize high-cost food grain production such as wheat in Kenya and Tanzania, and tax low-cost production, in each case moving in the direction of self-sufficiency. This explains why none of the countries has historically been a major exporter or a major importer of food grains that can be produced domestically, although net imports have fluctuated, sometimes dramatically, from year to year. Notice, however, that domestic prices relative to world prices, PP_t/WP_t , have been declining over time in

TABLE 4 *Comparison of government-controlled producer prices*

Commodity	Ratio	Mean	Linear trend
Kenya, 1964 to 1978			
Maize	PP_t/SSP_t	1.151	0.007
Wheat	PP_t/SSP_t	1.073	-0.016**
Rice	PP_t/SSP_t	0.912	-0.006
Maize	PP_t/WP_t	0.869	-0.026**
Wheat	PP_t/WP_t	1.077	-0.012
Rice	PP_t/WP_t	0.645	-0.004
Major export crops	PP_t/WP_t	0.953	0.001
Malawi, 1965 to 1978			
Maize	PP_t/SSP_t	1.023	-0.032**
Maize	PP_t/WP_t	0.504	-0.017**
Major export crops	PP_t/WP_t	0.508	-0.023**
Tanzania, 1964 to 1977			
Maize	PP_t/SSP_t	0.946	0.018*
Wheat	PP_t/SSP_t	0.8363	0.0001
Rice	PP_t/SSP_t	0.881	-0.001
Maize	PP_t/WP_t	0.760	0.023**
Wheat	PP_t/WP_t	1.152	0.015
Rice	PP_t/WP_t	0.638	0.010
Major export crops	PP_t/WP_t	0.683	-0.024**
Zambia, 1965 to 1978			
Maize	PP_t/SSP_t	1.0039	-0.0002
Maize	PP_t/WP_t	1.022	0.005
Major export crops	PP_t/WP_t	0.892	-0.023**

Notes:

1 World prices of food grains are export prices, f.o.b. gulf ports US for maize and wheat, and f.o.b. Bangkok, Thailand, for rice, converted to domestic currency at official exchange rates.

2 Producer prices of food grains are long-run target prices after the effects of short-run influences on prices such as government-held grain stocks and foreign exchange reserves have been eliminated.

3 The ratio, PP_t/WP_t , for export crops is an average of export prices, weighted by the quantities of the various export crops produced.

Kenya and Malawi, while increasing in Tanzania and Zambia, in order to maintain domestic self-sufficiency.

Table 4 also shows producer prices of export crops in relation to world prices. Again at official exchange rates, taxes on export crop production have been about 5 per cent in Kenya, 11 per cent in Zambia, 32 per cent in Tanzania, and 49 per cent in Malawi.³ Kenya stands out as the country with the lowest and most stable rate of taxation. In the other three countries, the rate of taxation has been increasing significantly by more than 2 percentage points per annum.

TABLE 5 *Actual and simulated net exports of food grains, thousand metric tons, 1964 to 1978 average*

		Kenya	Malawi	Tanzania	Zambia
Maize:	Actual	71	17	-17	43
	Simulated	500	600	120	360
Wheat:	Actual	7	-	-37	-
	Simulated	-45	-	-90	-
Rice:	Actual	-1	-	-23	-
	Simulated	8	-	80	-

Government commodity policies have significantly affected external trade in food grains. In Table 5, the author has simulated external trade assuming that domestic prices of food grains and export crops were at world prices, and that governments neither subsidized nor taxed consumers of food grains through the consumer-producer price margin.⁴ These calculations are not definitive because they are based on extrapolations of supply and demand curves outside the range of the data, particularly for Malawi, but they are suggestive. If governments had not been pursuing their policy of relative self-sufficiency, all four countries could have been net exporters of maize, while Kenya and Tanzania would have been net importers of wheat and net exporters of rice.

AGRICULTURAL DEVELOPMENT POLICIES

This section now examines the four governments' agricultural development policies. Owing to the nature of the questions addressed, the results of this section are less definitive, and more suggestive of areas for future research.

British agricultural development policy was fairly uniform throughout these four East African colonies. Before World War II, the colonial governments directed most attention to British settler agriculture. After the War, they finally began to pay some attention to the small African farmers. The major problem was thought to be that rapidly growing populations

using the traditional slash-and-burn system of cultivation were creating problems of soil depletion. Efforts to correct this spawned a large number of administrative ordinances that attempted to govern cultivation practices. When these measures failed to improve the situation, policy shifted in the mid-1950s towards increasing the intensity of land use in the high-potential areas (typically those of higher-altitude) by consolidating land-holdings, by distributing improved seeds and fertilizers, by concentrating extension advice on 'progressive farmers', and by introducing cash crops. These measures produced a truly dramatic upsurge in agricultural production in the late 1950s and early 1960s in all four countries. They also brought about considerable inequalities in the level of development between different regions of each country (in the case of Kenya, see Heyer, 1975).

Notwithstanding land transfer programmes like the Million-Acre Settlement Scheme in Kenya, the most striking feature of post-independence agricultural development policies in Kenya and Malawi has been their essential continuity with colonial policies (Harbeson, 1973, p. 78 and Chanock, 1977, p. 407). They have continued to emphasize small farm production, individual land tenure, and expanded services to the rural areas. They have developed technologies appropriate to small farms, promoted them through their agricultural extension services, and extended transportation systems that link products with markets. British policy had created a rural middle-class that took over the reins of power when Kenya and Malawi became independent. This class, which had benefited from British development policies before independence, continued them afterwards.

In Tanzania and Zambia on the other hand, in line with their commitment to socialism, governments have attempted to change the organization of agricultural production. This policy has advanced furthest in Tanzania with the *Ujamaa* villagization scheme which relocated scattered small farmers in villages where, in principle, the government could more readily provide services that would improve the technology of rural life, and combine individual plots into large fields where 'more efficient' large-scale cultivation practices could be applied. In practice, according to the noted French agronomist, Rene Dumont, many villages are too large, are located long distances from the fields, and are contributing to rapid soil depletion (Africa Research Bulletin, 1980, p. 5739). Programmes such as *Ujamaa*, the National Maize Production Programme, and the 'farming as a matter of life and death' campaign have suffered from poor organization and lack of trained personnel, and have disrupted the activities of the agricultural research stations and the agricultural extension service.

Zambia has experimented with co-operative farms and Rural Reconstruction Centres – both attempts at large-scale farming. When the latter could only produce maize at four times the unit cost on small farms, President Kaunda announced Operation Food Production in June 1980, a programme to build two state farms of 20,000 hectares in each of Zambia's nine provinces (Africa Research Bulletin, 1980, p. 5556). The farms are to be highly-mechanized, financed by foreign donors, and managed by skilled

ex-patriate personnel. Clearly, the government has no confidence in its own small farmers to achieve rates of growth of output like those in Kenya and Malawi.

These policies have influenced the rates of growth of agricultural production in the four countries, as shown in Table 2 above. They have also affected the domestic cost of producing food grains relative to world prices over time. The author has simulated these domestic costs, DP_t , as the intersection of the domestic supply and demand curves, assuming that domestic prices of export crops equalled world prices and that consumers were neither subsidized nor taxed through the consumer-producer price margin.⁵ The simulations in Table 6 show the impact of agricultural development on domestic costs of production in relation to world prices. They more accurately measure trends in domestic costs than a simple comparison of population growth, real consumption growth per caput, the expenditure elasticity in the demand equation, and the time trend in the supply equation.

The results are consistent with previous observations. All four countries are low-cost producers of maize (even at official exchange rates). But the domestic cost of producing maize has been declining only in Kenya, and significantly so. Of the other three countries, it has been increasing the least in Malawi, increasing somewhat more in Zambia, and increasing significantly in Tanzania. Government development policies have been more favourable to domestic production in Kenya and Malawi than in Tanzania and Zambia. Given the self-sufficiency objective in all four countries, it is not surprising to recall from Table 4 that producer prices of maize have been declining *vis-à-vis* export crops in Kenya, increasing the least in Malawi, somewhat more in Zambia, and the most in Tanzania.

CONCLUSIONS

In their work on the Asian rice economies, Timmer and Falcon (1975) demonstrated the importance of government-controlled domestic prices of grain in explaining international trade in rice. This paper continues in their footsteps with regard to four maize economies of East Africa.

In East Africa also, governments pursue commodity policies that affect agricultural production and incomes and external trade in food grains. They control domestic prices at levels that amount to a substantial indirect tax on agricultural production, even at official exchange rates and even more so at realistic ones. While agricultural economists have long recognized that governments control domestic agricultural prices, it is time to stop studying agricultural development as if they did not. Looking only at the growth rates of food grain production in Table 2, for instance, one might have erroneously concluded from the superior rates in Tanzania and Zambia that the domestic cost of producing food grains has been declining in these two countries relative to Kenya and Malawi. Government food grain policies are orientated towards urban consumers. Their purpose is to reduce

domestic prices of food grains to the minimum level consistent with domestic self-sufficiency. Government commodity policies are also part and parcel of the general development Strategy in all four countries, which can be characterized as import substitution industrialization.

TABLE 6 *Comparison between domestic costs of production and world prices of food grains over time*

Country	Commodity	DP _t /WP _t	
		Mean	Linear trend
Kenya, 1964-78	Maize	0.724	-0.028**
	Wheat	1.121	0.008
	Rice	0.776	-0.002
Malawi, 1967-76	Maize	0.765	0.005
Tanzania, 1964-77	Maize	0.899	0.019*
	Wheat	1.513	0.013
	Rice	0.732	0.013
Zambia, 1965-78	Maize	0.754	0.011

In spite of taxes on agricultural production, Kenya and Malawi have achieved impressive annual rates of growth in agricultural production exceeding 4.5 per cent in total and 1.5 per cent per caput since independence, which have permitted a relative decline in domestic food grain prices. This successful experience suggests, first, that agricultural land resources do not yet limit agricultural production in East Africa, since Kenya and Malawi already support the most intensive use of land. It suggests, second, that small African farmers do respond to opportunities to improve their productivity if appropriate technologies are developed and made available, since Kenya and Malawi have based their agricultural development strategies on the small farms. These results are consistent with T.W. Schultz's well-known views expressed in *Transforming Traditional Agriculture* in 1964. With little doubt, this successful experience has contributed significantly to overall economic development in these two countries.

Tanzania and Zambia have been less successful in promoting agricultural development. Domestic self-sufficiency in food grain production has been maintained at the expense of export crop production, by raising domestic prices of food grains relative to those of export crops. The comparisons between the two groups of countries suggest that this has impeded overall economic growth in Tanzania and Zambia. These two countries appear to be experiencing a classical Ricardian bottleneck to economic growth as food prices rise in consequence of population growth more rapid than technological advance in agriculture.

NOTES

¹ The supply and demand equations are conventional. The former are Nerlove partial adjustment models with two supply shifters: an index of the producer price of export crops, and a time trend as a proxy for technological change. Demand is a function of consumer prices and private consumption expenditure. All nominal variables are deflated, by the consumer price index in the demand equations, and by the domestic price of fertilizer in the supply equations, see Gerrard, 1981.

² Malawi is now a net exporter of rice, but this model could not be estimated due to a lack of consumer price data. The other models, which are the same for each food grain, resemble Abbott's (1979) model, except that Abbott proceeded to estimate reduced form equations – net import demand as a function of the exogenous variables – for a total of thirty-three countries, as opposed to structural equations for four countries, done by the author.

³ Accurate calculations of the degree of overvaluation are hard to find. But *Pick's Currency Yearbook, 1976–77* reports that the average black market premium for the Kenya Shilling was 32 per cent in 1971 and 31 per cent in 1976; for the Malawi Kwacha, 63 per cent in 1971 and 114 per cent in 1976; for the Tanzania Shilling, 62 per cent in 1971 and 207 per cent in 1976; and for the Zambia Kwacha, 49 per cent in 1971 and 191 per cent in 1976. The over-valued exchange rate represents a substantial tax on the export sector of each country and the degree of taxation has been increasing over time in every country but Kenya.

⁴ The author's best estimate is that Zambia subsidizes the consumer-producer margin by about 45 per cent, Malawi taxes it by about 55 per cent, and Kenya and Tanzania are intermediate.

⁵ This is not the same as SSP_t , which is conditional on *actual* export prices that prevailed during the period and *actual* subsidies or taxes on the consumer-producer price margin.

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DISCUSSION OPENING – M. L. A. de SWARDT

It seems to me that what the paper is saying is that Kenya and Malawi, with their policies of ‘improving’ and intensifying agriculture within the existing system and at the same time promoting export crop production, have succeeded in shifting their agricultural supply curves and in maintaining food self-sufficiency. Tanzania and Zambia, on the other hand, who have tried to ‘transform’ their agricultural sectors and concentrated on state farms and centrally-run co-operatives and who have stressed food self-sufficiency at the expense of export crops, have only succeeded in achieving food self-sufficiency by moving up the supply curve by maintaining high producer prices for food crops at the expense of export crops which have been heavily taxed. This has been said in a different way by a number of different writers (Lele; Jansen) but never quite in this way and not so closely examined. It is good to have the empirical research analysed so as to highlight the differences and give substance to the arguments.

However, I have the following queries:

1 Has the author run his regressions with the period broken up, taking say 1962–72 or 1964–70 and 1970–78? It is my understanding that in both Tanzania and Zambia agricultural commodity prices – including those for food crops – were kept low in order to extract a surplus from agriculture (Tanzania) or to keep the influential urban workers happy (Zambia). It would therefore be a more recent phenomenon that food crop prices have been increased to increase food supply. If this is the case then (for Tanzania anyway) it may be the high export taxes that account for declining export crops and increasing food crops, or it may even be the result of the ‘development’ policies which in these two countries have tended to ignore or discourage export crop production. On the other hand, if prices for the earlier period were relatively more favourable to food crops than export crops then the given interpretation stands. Or perhaps reversal has been so great in the latter period that it has overridden the effects of the earlier.

2 I am not happy with SSP, the self-sufficiency producer price, and would like some detail on how it is derived. Another thing the author does not mention in taking world price at f.o.b., US gulf or Thailand – has he made any allowance for transport differentials? That is would not it have been better to use a border price and producer costs to estimate welfare losses of pricing policy rather than to use current government price setting to measure the effects of that price fixing?

3 Can he give details of his estimates of consumer-producer margin subsidies and taxes? I am interested to find out how he went about his calculations here.

4 There appears to me to be an inconsistency in Table 3. Using government behavioural estimates the long-run target producer price for wheat was below the world price (for wheat in Tanzania, b was 0.347) whereas in Table 4 it comes out positive at 1.152 and is used as an

example to show that Tanzania subsidizes wheat (the high-cost grain). I do not know whether they do or not but I do know that real wheat prices have declined by approximately 20 per cent since 1972.

5 If the author has simulated net food exports, has he taken cross-price effects with other crops (particularly other export crops) into account in his supply models? Or does he not consider land, labour, management or whatever, to be a constraint on total possible agricultural output from these countries?

Food self-sufficiency is a major goal for most developing countries. The mechanism by which it is achieved differs from country to country with varying degrees of success. The Zambian and Tanzanian attempts to shift production along the supply curve has been dependent on heavy government intervention in the market along the following lines:

- (a) control of producer prices;
- (b) control of input costs;
- (c) by definition, therefore, government controlled margins.

If the farmers do not perceive this margin as adequate in real terms they simply will not produce for sale. The discouragement of export crops, be they food grain or non-food grain, carries a high cost. The active discouragement of farmers from producing export crops by the use of pricing, explicitly denies the country access to agriculturally earned foreign exchange. All too often these developing countries have no manufacturing base and therefore this curtailment of exports reduces the external purchasing power of the country dramatically. The Tanzanian example currently bears this out where one of the principal sources of foreign exchange is aid money, either in the form of expatriate salaries or in project money itself.

It must also be noted that this paper only deals with data up to 1978. This seems to be a key period for Africa and one wonders why. Zambia has been on the market twice since then for maize, both times in the order of 300,000 tonnes, which is approximately equal to half its marketed volume. On each occasion there have been severe payment difficulties. Does food self-sufficiency only imply local production of food, or does it also contain an element of substitutability between export crops and local food grains? Had Zambia maintained its cotton and tobacco production programmes, the country might not have found itself in quite the foreign exchange difficulties it does now, despite the problem in copper production. More important, the natural complementarity between these crops and maize would have ensured that farmers continued to produce at least their subsistence food requirements.

Farmers will respond to price; if the real margins were good enough sufficient maize would be produced even now. Zimbabwe, faced with having to import maize in 1979 (some 90,000 tonnes) put sufficient incentive into the price, which produced a three-year stockpile. Similarly during UDI when Australian wheat supplies were cut off, an incentive produced a wheat stockpile that lasted three years.

An important consideration in countries that have had their economies deteriorate as far as those of Zambia and Tanzania is the purchasing power of money. If there is nothing to buy then money becomes worthless. The important issues then appear to be:

- 1 A healthy export programme, whether agricultural or manufacturing based.
- 2 Foodcrops need to find their own competitive niche. The history of maize in Africa shows it be highly complementary to other cash crops.
- 3 Subsidies ought to be spent on technological means that effectively move the supply curve to the right.
- 4 Small-scale farmers are very sensitive to price movements and are smart enough to grow a food crop if the margin is right.
- 5 Where government is in control of both inputs and outputs it is in the unique position of determining the margin to growers.
- 6 A grower will not produce by decree. He must identify his own labour and the returns to his own labour. The moment he loses the clear definition of his inputs and is forced to operate at the lowest common denominator he is not interested and begins to subsist.