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The Effect of Policy Reforms on Agricultural Incentives in Sub-Saharan Africa

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INTRODUCTION

In 1981 the World Bank's report on Sub-Saharan Africa cited trade and exchange-rate biases against exports, poor macroeconomic and public sector management, and a price bias against agriculture as contributing to the Region's poor performance and slow growth (World Bank 1981, 1986a). Since then, average per capita income in the region has continued to fall, overall agricultural production has grown more slowly than population, declining food production per capita has led to rising food imports, and for many of the primary agricultural exports, Africa's share of world trade has fallen steadily from 1970 to 1985.

Many African governments now agree on the central role of agriculture and the need to strengthen incentives in the sector (United Nations). This paper assesses how reforms in macroeconomic and sector polices have affected agricultural incentives. Government polices can be broadly classified into three groups: macroeconomic policies that affect incentives in all sectors generally, agricultural sector policies that affect farm profitability directly by changing commodity and input prices, and general and sector-specific policies that may affect farm profitability indirectly by changing factor prices and influencing productivity (e.g., public expenditures on research, extension, and infrastructure).

This paper analyzes the impact on agricultural incentives of the first two groups of policies. The analysis of producer prices presented below is based on data for about two-thirds of the countries in Sub-Saharan Africa, which account for more than three-fourths of agricultural GDP (country coverage varies by indicator depending in part on whether comprehensive data are available).[2] Simple averages are used to summarize policy performance across countries, (in contrast to weighted averages commonly used to assess aggregate economic effects). The analysis of producer prices covers one to four principal export crops per country.[3]

MACRO-ECONOMIC MANAGEMENT

Domestic monetary, fiscal, and exchange rate policies affect farmers'

income in real terms and relative to other sectors (i.e., the rural-urban terms of trade) and the terms of trade between tradables and nontradables. Exchange rates are often regarded as the most important policy in structural adjustment, but successful implementation depends on sufficient fiscal and monetary restraint to prevent erosion of the devaluation-induced change in relative prices by subsequent increases in the prices of nontraded goods. (IMF 1986, pp. 2, 11). Many other policy actions are designed to help accomplish results in these two main areas.

During the late 1970s and early 1980s, substantial imbalances on external and domestic public accounts eventually compelled over half the countries in Sub-Saharan Africa to adopt macroeconomic reform programs. The IMF has classified the content of these programs (covering over 100 policy actions), based on 27 countries with 41 IMF programs during 1980-84 (IMF, 1986). About 85 percent of the programs put limits on government borrowing and restraints on government expenditures; and almost 90 percent specified reduction of government fiscal deficits as a percent of GDP. Sixteen of the programs contained provisions to reform the exchange rate; when account is taken of the CFA franc zone countries (whose exchange rate parity is fixed by convention with France), over half the programs aimed at exchange rate realignment. A smaller percentage of programs specified interest rate increases or measures designed to raise government revenues. The reform agenda also includes many other specific measures, including government wage and employment restraint, market liberalization and price decontrol, public enterprise reforms, and improved investment programming.

Improved fiscal and monetary management is a key element in macroeconomic reform programs, both to restore balance in domestic accounts and to contain inflation so that currencies can be effectively devalued. Stabilizing macro prices is considered a first step in longer term economic restructuring. The major objective of fiscal policy is to reduce government budget deficits, usually by restraining expenditures. Reducing government spending and deficits helps reduce government borrowing, both domestically and externally, which is one of the major targets of monetary

policy. Fiscal and monetary policies also affect the overall production and domestic expenditure levels in the economy through various secondary effects and multipliers. But for this analysis, their effect on inflation is most important because it affects both the real effective exchange rate and the real level of agricultural prices.[4]

By the mid-1980s, several governments had achieved some fiscal and monetary stabilization (see table 1). While the tendency has been for the average level of central government expenditures (defined as a percentage of GDP) to stabilize or decline between 1980-82 and 1986-87, in line with generally poor economic conditions in Africa, the reduction in countries with strong and sustained reform programs has been six times greater (two percentage points of GDP) than in nonreforming countries. With marginal improvements in domestic revenues as well, reforming countries have, as a result, been able to reduce their fiscal deficits (before grants) by one quarter, while other countries allowed deficits to worsen. In addition, monetary policy has become more restrictive in adjusting countries, with average central bank discount rates increasing in real terms by about five percentage points, while they have become increasingly negative in nonreforming countries.[5] The differences in performance between these two groups regarding changes in fiscal deficits and real discount rates are statistically significant at an 80 to 90 percent probability level.

These actions on fiscal and monetary policies have helped refroming countries lower, on average, their inflation rates since the early 1980s, while inflation has been increasing in other countries. The reduction in the domestic inflation rates makes it easier to maintain or to increase agricultural incentives in real terms, requiring fewer and smaller increases in nominal farm commodity prices. When macroeconomic reform programs increase the pressures to raise government revenues, in part through agricultural taxes, or when world commodity prices squeeze the margin between farm and export prices, the scope for raising farm prices becomes more limited. Controlling domestic inflation thus becomes an important policy tool in maintaining agricultural incentives. Other

Table 1. Indicators of macroeconomic reforms in Sub-Saharan Africa.

Reform indicator	Average levels		Average change from 1980-82 to 1986-87	
	Period	All countries	Countries with strong reform programs	Countries with weak or no reform programs
Total government expenditures as percent of GDP	1980-82	27.8	-2.0	-0.3
	1986-87	26.4	(6.7)	(4.1)
(number of countries)			10	6
Fiscal deficit excluding grants as percent of GDP	1980-82	9.2	-2.0**	1.1**
	1986-87	8.4	(3.6)	(1.4)
(number of countries)			8	5
Central bank discount rates (real percent per year)	1980-82	-7.1	5.2*	-4.5*
	1986	-4.5	(10.4)	(14.0)
(number of countries)			14	5
Consumer price changes (percent per year)	1980-82	19	-4.3	8.0
	1986	19	(18.2)	(25.2)
(number of countries)			14	8
Nominal exchange rate index (1980-82 = 1.0)	1986-87	11.4	23.1	7.9
			(58.2)	(12.1)
(number of countries)			18	11
Real effective exchange rate index (1980-82 = 100)	1986-87	78	-27	-18
			(42)	(24)
(number of countries)			16	8

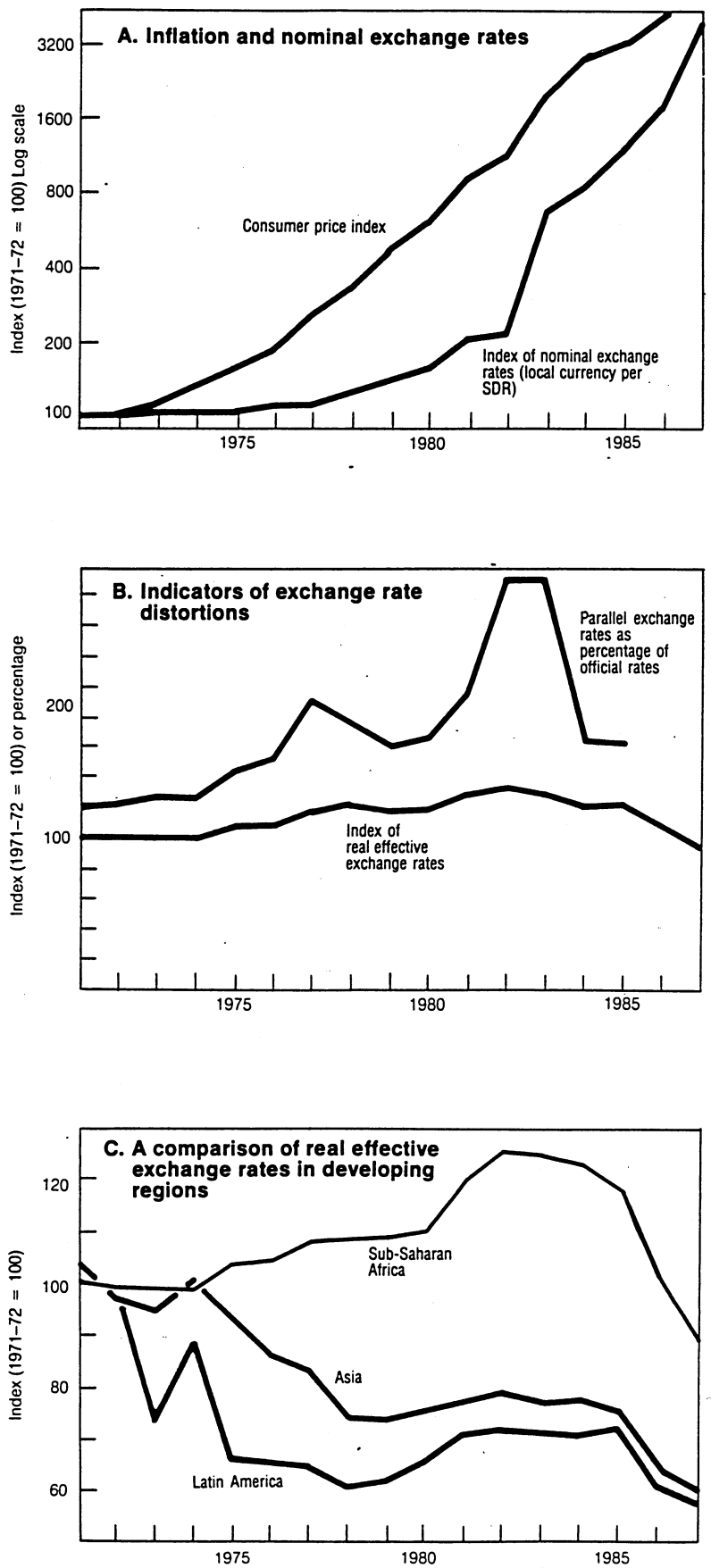
Data are from the files used to prepare International Monetary Fund publications (1988a, 1988b) and World Bank publications (1988). Group means are unweighted. In testing differences between group averages, a level of statistical significance of 0.1 or less is designated by "**" and of 0.2 or less by "*." Groups are defined as in the 1988 World Development Report (World Bank 1988, p. 28). Country composition of each group is determined on the basis of available data for the entire time series.

factors besides fiscal and monetary policies also affect domestic inflation, including weather-induced changes in domestic food prices (which fell in many countries in 1986-87), increases in international prices (dollar-denominated import prices rose on average almost 8 percent per year in 1986-87, compared to a decline of about 1 percent annually during 1980-82), and devaluation of the currency.

Inflation rates gradually increased in Africa during the 1970s and into the 1980s and remain at high levels, notwithstanding recent reforms (figure 1, panel A). Because inflation has generally been higher in Africa than in its major trading partners, and because nominal devaluation has historically been resisted in Africa, domestic currencies in Africa are widely considered to have became increasingly overvalued. One indicator of such overvaluation is the difference between official nominal exchange rates and parallel market exchange rates. In 1985, the average black market exchange rate as a percent of the official rate was about one-third higher than in the early 1970s (figure 1, panel B). A more comprehensive measure of overvaluation is provided by the real effective exchange rate index (REER), which strongly appreciated since the 1970s.[6] By the mid-1980s, Africa's REER was some 25 percent higher than before the first oil shock, while in other developing regions it had depreciated by a similar amount (figure 1, panel C). As a result of these distortions, exchange rates have emerged as a key focus of the reform agenda in Africa, and one of the areas where reform progress has been most advanced recently. By 1987, there had been substantial nominal devaluation, especially in countries with vigorous reform programs. For this group, nominal devaluation has averaged three times as much as in nonreforming countries (see table 1). Overall, nominal devaluation appears to be compensating for the high rate of inflation in Africa, with the result that the REER has declined by about a quarter, so that by 1987 Africa's REER was about 10 percent lower than in the early 1970s. (This compares with other developing countries in Asia and Latin America where the REER has also fallen by one-third over the same period, but from a much lower initial level.) Since the mid-1980s, the divergence

FIGURE 1

Selected macroeconomic variables in Sub-Saharan Africa



between real effective exchange rates in Africa and those in its competitors in other developing regions has at least ceased to widen and may be beginning to narrow. While substantial currency devaluations have been necessary to correct for high rates of domestic inflation in the past, continuation of the recent progress at slowing inflation is essential if such devaluation is to be translated into real changes in the terms of trade between tradables and nontradables.

Part of the progress on exchange rates was accomplished through discrete devaluations of fixed exchange rates. But nine African countries had introduced floating exchange rate systems as a way to ensure that exchange rates remain properly aligned without unpopular political connotations often associated with discrete adjustments to a managed or fixed exchange rate (Quirk et al.).

By changing the international price relatives through devaluation, governments can accommodate more easily the twin objectives of reducing fiscal deficits by increasing revenues and of raising real agricultural incentives. The more successful the government is at reducing inflation through fiscal and monetary stabilization, the easier it becomes to strengthen agricultural incentives. The scope for increasing agricultural price incentives is equally as great whether governments control agricultural prices or not, because devaluation creates the potential to reward the producers of tradables (which include most farm products -- food and export crops) relative to consumers of tradables (especially urban-based consumers) and producers of nontradables (especially administrative services). However, devaluation will have this desired effect only to the extent that it is not offset by increased domestic inflation, resulting not only from the higher cost of imports but also from subsequent increases in government spending to compensate for the higher costs.

Governments that have been successful in fiscal and monetary stabilization, and hence in controlling the rate of domestic inflation, have gained an extra degree of freedom in managing their exchange rates and in improving agricultural incentives through direct domestic price

measures. Because inflation is lower, incentives can be increased with less visible and direct action on agricultural prices and taxes.

AGRICULTURAL INCENTIVES

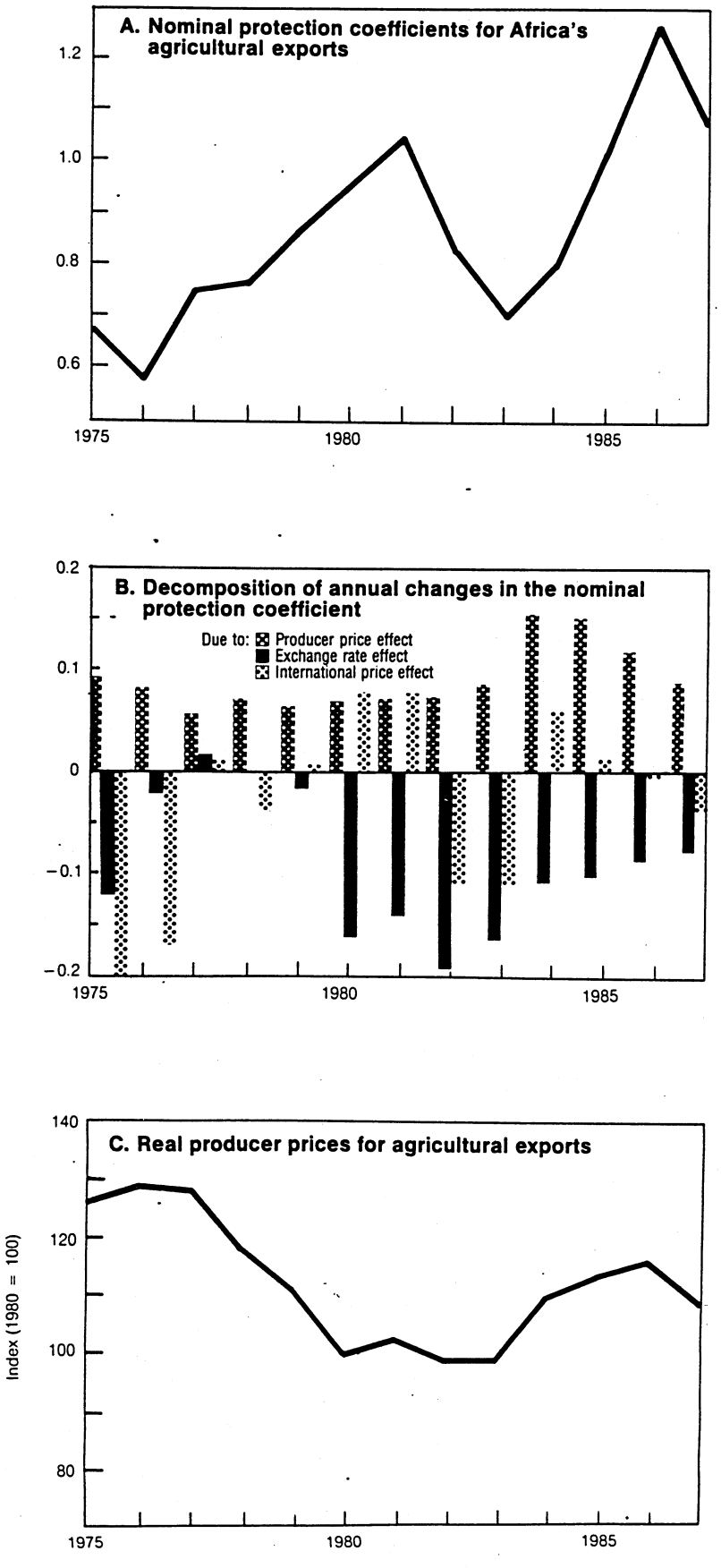
Real prices for agricultural products provide a direct, although incomplete, measure of incentives afforded agricultural producers when technology and prices for inputs are held constant. The incentives effects are felt through the cost of consumer goods as measured by the general price index and will give rise to income and substitution effects of changes in the real returns to labor. Real producer prices for major export crops in Sub-Saharan Africa fell by 25 percent between 1977 and 1980 (figure 2, panel C) due to high domestic inflation in many countries and infrequent or insufficient adjustments to officially fixed nominal prices (most African governments fix nominal producer prices and are involved in collection, marketing and export of these commodities). There was a partial recovery of real prices (15 percent) between 1983 and 1986, only to fall again in 1987.

The pattern varies widely between countries, however. In some countries where producer prices are fixed, official prices have been raised much faster than inflation, by reducing taxation, by taking advantage of rising world prices, or by passing on the effects of devaluation (Burkina, Ghana, Madagascar). Liberalization of marketing and pricing mechanisms has also resulted in rising real producer prices (Niger, Nigeria, Zaire). But high domestic inflation continues to erode the purchasing power of producers' income despite agricultural price policy changes in some countries (Sierra Leone, Somalia, Sudan, Tanzania).

Real price trends present only a partial picture of the complex interactions of sector and macro polices on agricultural incentives. To provide a more complete view of policy distortions the nominal protection coefficient (NPC) can be used to assess both the level of discrimination against (or subsidization of) agriculture and the potential for increasing incentives without subsidies.

FIGURE 2

Agricultural price incentives in Sub-Saharan Africa



The NPC addresses the issue of producers' incentives in a relative sense, comparing producer prices to the maximum that could be offered to producers (border price less processing and marketing costs), or the taxation rate. In this sense the measure provides an indication of the scope for increasing farmers incentives.

Other objectives such as stabilizing producer prices will at times conflict with the desire to raise incentives. Because controlled prices are often adjusted with a lag, they tend to favor more taxation rather than less and may even destabilize incomes.

For the principal export commodities from 30 countries, the NPC rose and fell twice between 1975 and 1987 but the causes in each case are different (figure 2, panel A). In 1976 the average NPC for this sample of countries was less than 0.6. The NPC rose to 1.25 in 1986 before falling to 1.1 in 1987. This followed a low in 1983 of 0.7, and represents a substantial reduction in the taxation of agricultural exports.

The surprisingly high average level of the NPC in 1981, 1986, and 1987 points out the inability of this measure to take account of currency overvaluation, which will produce a significant upward bias in the NPC. This is especially the case in Africa where a large number of currencies remain overvalued. Moreover, because the extent of overvaluation has declined in Africa since the early 1980s (figure 1 panel B), the rise in the NPC understates the actual reduction in discrimination against agriculture.

Assessing how much the nominal exchange rate is overvalued, or its divergence from the equilibrium or "shadow" exchange rate, is beyond the scope of this study. However, its magnitude can be appreciated by examining trends in both the real effective exchange rate and the parallel market exchange rate. While black market exchange rates are likely to overstate the difference between official rates and market determined rates (due to risk premiums and other factors), both the parallel market exchange rates and the REER suggest that in 1985 the NPCs understate the level of taxation of exports by about 25 percent, on average. Thus, a "protection

coefficient" which takes account of exchange rate distortions would show a steeper rise during the late 1970s, and the average NPC of 1.1 in 1987 would actually be about 0.8.

These limitations on interpreting the NPC notwithstanding, the effect on the NPC of changes in international prices and nominal exchange rates is determined by the government's pricing mechanism. In some countries where these mechanisms are more responsive or automatic (coffee in Kenya), domestic prices fluctuate with the market and the NPC is fairly stable at about 0.9. In many other countries, however, the mechanism is much less responsive to market signals, and stable domestic prices may lead to wide variations in the NPC in the absence of discrete, explicit policy actions.

The underlying causes of annual changes of the NPCs may be analyzed by a simple decomposition. Three major variables affect agricultural incentives: first, agricultural policymakers and sector advocates affect the formation of nominal producer prices; second, finance and planning ministries, as well as the resolution of competing sector demands' and influences affect general macro policies including the exchange rate; and third, policies and demand and supply conditions in the rest of the developed and developing world affect international prices for Africa's primary agricultural exports. The NPC is decomposed using a difference equations which for small changes approximates the total derivative of the NPC's three components or sources of change: nominal producer price, the international price, and the exchange rate.[7] Examining these changes in combination with trends in real price changes helps explain the underlying pattern of changing agricultural incentives.

In figure 2 (panel B), each set of three bars represents the decomposed annual change in the NPC due to the three principal variables. The three will sum to the actual annual change in the NPC from the previous year (panel A). The decomposition indicates that in all years changes in nominal producer prices have helped raise the NPC, with a larger magnitude during 1984-86. Rising international prices lowered the NPC during 1975-76 and 1982-83 while declining international prices raised the NPC in 1980, 1981,

and 1984.

The largest impact, however, on annual changes in the NPC has been due to exchange rates, where devaluation makes international prices appear higher in domestic currency terms, thus automatically lowering the NPC. From 1980 to 1987, nominal devaluation led to a substantial decline in the average NPC. Only beginning in 1984 did the larger increases in nominal producer prices begin to outweigh the downward exchange rate effect, thus passing the benefits of devaluation on to farmers. Rising producer prices are expected with devaluation where prices are not controlled, but this occurs rarely. In most cases governments adjust official prices with a lag or by a lesser amount than the full extent of the devaluation. As a result, farmers have benefitted less from devaluation than they might have given a more responsive pricing mechanism.

High inflation accounts for the pattern during the late 1970s when the NPC rose substantially while at the same time real prices fell by nearly 25 percent (figure 2, panel C). The divergent directions of the two indicators have resulted from the higher domestic inflation among African countries relative to their trading partners.

Not until 1984, with continued devaluation and larger increases in nominal producer prices, did both the NPC and real producer prices begin to rise. However, in 1987 producer price increases slowed and, along with renewed inflation in some countries, real prices dropped and the changes in the NPC leveled off. This may be due in part to the direct effects of falling international prices for some commodities which have been passed through to producers, or the result of the inflation that is almost certain to follow -- with a lag -- devaluation. In a number of cases the realignment of exchange rates (to correct the effects of past high inflation) has not been fully passed on to producers of export commodities.

Ghana, Zaire, Madagascar, and Zambia, where NPCs are quite low (between 0.3 and 0.7 in 1986) illustrate the weak link between devaluation and producer incentives. In Madagascar, officially controlled prices have been kept low. These were raised by 50 percent in 1986, but this coincided with

a devaluation of 100 percent during 1986-88 so that the NPC actually fell. In Zaire, official controls on export crop pricing were abolished in 1984. Heavy export taxes, however, keep producer prices at under 40 percent of their value in international markets. And in Ghana producer price increases have not kept pace with the large devaluations.

Controlled pricing mechanisms that are not responsive to market signals can result in very high -- as well as very low -- NPCs. Currently in many of the francophone countries of West Africa -- where currencies are tied to the French franc -- exchange rate movements have led to recent appreciation of their currencies vis-a-vis the U.S. dollar, in which most agricultural commodity prices are denominated. Under these conditions, governments have been faced with the choice of either reducing producer prices or subsidizing them. In many cases they have chosen the latter, resulting in NPCs greater than one (more than 2 in Senegal and Niger). Some of these policies are explicit, such as schemes to accomplish effective depreciation without changing nominal exchange parities.

For countries and commodities with more responsive pricing mechanisms -- such as coffee in Kenya and Ethiopia -- producer prices automatically follow international prices. This has the disadvantage of greater price variability (some of which can be dampened by progressive ad valorem taxes, as on Kenya's coffee exports) but results in more rapid adjustments to changing relative prices as price signals are transmitted to producers. In the case of Kenya this responsiveness coincides with a very high NPC (about 0.9) with marketing costs and a small export tariff accounting for the 0.1 percent. In Ethiopia, however, the NPC is 0.6 and even at that low level is misleadingly high because the Ethiopian Birr is highly overvalued (parallel market exchange rates are roughly double the official rate).

The scope for African governments to raise incentives to agricultural producers depends on a number of factors including exchange rate policies and macroeconomic management. A comparison of two groups of countries -- those where real producer prices have increased versus those where they have fallen -- shows patterns consistent with this argument. By 1986, the

average annual rate of domestic inflation had been reduced by 11 percentage points since 1980-82 in those countries where real producer prices have risen, compared to a reduction of less than 7 percentage points in countries where real producer prices have fallen. Similarly, the index of nominal exchange rates (1980-82 base) for the former group had been devalued by a factor of 45 by 1986-87, while in the latter group by only a factor of 1.1. Due to wide variation among countries, the differences between the group means are not statistically significant. The pattern, however, is broadly consistent with expectations; those countries which have made more progress in controlling inflation and devaluing their currencies since the early 1980s have been able to raise real producer prices.

CONCLUDING COMMENTS

Whereas taxation of exports is an important source of revenue for many African governments, applying high tax rates (direct or indirect) can, in the long run, result in a loss in total tax revenue due to declining market share over time. This can arise when a country's high rate of taxation reduces the incentives for its own producers and -- depending on market share -- raises world prices and encourages shifts by other producers to increase production (Imran and Duncan). In Africa, the rate of taxation has been high, and its share of the world market has declined steadily since 1970 for nearly all its major agricultural exports.

While direct policies affecting agriculture such as fixing prices or trade tariffs give rise to significant taxation of agriculture in Sub-Saharan Africa, the effect of indirect taxation through overvalued currencies appears to be larger in magnitude and more widespread.

Appropriate macro-economic policies can provide substantial latitude for improving agricultural price incentives. Real effective depreciation -- which reflects the combined effects of nominal devaluation and adequate fiscal and monetary stringency to avoid offsetting domestic inflation, facilitates the task of agricultural policy makers to maintain and increase

real producer price incentives in agriculture.[8] In Sub-Saharan Africa, the potential for increasing agricultural incentives appears to be substantial, especially taking into account currency misalignments. For example, the policy problem of Rwanda described in the companion paper by Weber et al. -- large, informal imports of beans, which undercut the government's pricing objective to raise incomes of beans producers, and the constraints on raising domestic coffee prices because of the need to maintain tax revenues from coffee exports -- could be substantially alleviated through a devaluation of the Rwandan franc, which has appreciated in real terms by over 30 percent since 1980.

However, improved fiscal, monetary, and exchange rate policies may not automatically lead to improved agricultural incentives. Macro-economic policies, and those designed to raise agricultural incentives, need to be closely coordinated if they are to provide maximum benefit to agricultural producers. Although coordination can be assured administratively, the evidence from Sub-Saharan Africa indicates significant lags in adjusting agricultural prices to changing conditions and to different macro-economic policies. More flexible arrangements, such as linking agricultural prices to market conditions, would reduce these lags. Liberalization of agricultural marketing, adopted in several countries during the mid-1980s, is a step in this direction.

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Footnotes

1. Economist and Senior Economist, respectively, World Bank. The views expressed herein are not necessarily those of the World Bank. Research for this paper was supported in part by funds provided by the UNDP under project RAF 86/058. The authors acknowledge the significant assistance of several other researchers, including Marcus Corbin, Maria-Cristina Germany, Katharina Katterbach, and James Tefft.

2. The full sample of countries includes Benin, Botswana, Burkina Faso, Burundi, Cameroon, Central African Republic, Chad, Congo, Cote D'Ivoire, Equatorial Guinea, Ethiopia, Gambia, Ghana, Guinea, Guinea-Bissau, Kenya, Liberia, Madagascar, Malawi, Mali, Mauritania, Mozambique, Niger, Nigeria, Rwanda, Senegal, Sierra Leone, Somalia, Sudan, Tanzania, Togo, Uganda, Zaire, Zambia, and Zimbabwe.

3. Time series data for official and open market prices have been compiled from a variety of sources including World Bank, IMF, and FAO. Transport costs per-kilometer-ton have been estimated from existing studies and are applied to distances from the major producing and comsuming region for each commodity via the most commonly used mode. Historical data are estimated by extrapolating on the basis of the domestic CPI. Processing costs have been estimate similarly. Ocean freight costs are estimated based on World Bank figures. For each country a weighted average of the major commodity NPCs has been used, weighted by value of total production.

4. Expenditure restraint could significantly impair programs to enhance agricultural productivity or otherwise support agriculture. For example, 15 percent of the IMF-supported adjustment programs in sub-Saharan Africa during 1980-84 contained measures to cap or reduce fertilizer subsidies and 30 percent to cap or reduce food subsidies. However, potential negative effects can be minimized by improving the composition and efficiency of remaining public expenditure and by targeting aid resources more carefully, which is also one of the objectives of reform programs supported by the World Bank.

5. While the discount rate can be viewed as an indicator of government

monetary policy, it may have a relatively limited impact on economic results in these countries because of their relatively undeveloped banking sectors. The real growth in government domestic borrowing can be considered another indicator.

6. The real effective exchange rate index measures the evolution of a country's prices relative to those of its trading partners, adjusted for nominal exchange rate changes. Prices are measured by the average annual consumer price index, with indices of partner countries averaged by using import weights, and exchange rates are measured by an imported-weighted index of average annual exchange rates (IMF 1985, p. 39.).

7. The annual changes in the nominal protection coefficient can be decomposed into its component parts using a difference equation:

$$NPC_t = P_{dt}/(R*P_{wt})$$

where: P_{dt} = official producer price for given commodity

R_t = official exchange rate

P_{wt} = international reference price for commodity

The total derivative for the above is,

$$dNPC = dP_d/(R*P_w) - P_d dR/(P_w*R^2) - P_d dP_w/(R*P_w^2)$$

which, for small changes, is approximated with first differences, the difference equation being;

$$NPC_t - NPC_{t-1} = (P_{dt} - P_{dt-1})/(R*P_w) - (R_t - R_{t-1})*P_d/(P_w*R^2) - (P_{wt} - P_{wt-1})*P_d/(R*P_w^2)$$

8. The possible negative impact resulting from the higher cost of imported agricultural inputs should be contrasted with the costs of over-valued exchange rates, including substantial implicit taxation of agricultural output, the scarcity of both inputs and consumer goods for farmers caused by chronic foreign exchange shortages, and distortionary effects on factor prices (leading, for example, to over-capitalization).