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Macroeconomic Adjustment and the Performance of the Agricultural Sector: A Comparative Study of Cameroon and Kenya

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Abstract: The interaction between macroeconomic and trade issues and agriculture is not well understood. In sub-Saharan Africa, this relation becomes critical in recent structural adjustment programmes, especially in countries where agriculture is the mainstay of the economy. This paper examines empirically examples of a non-liberalized economy and a gradually liberalizing economy in the region. It demonstrates that a sufficiently monolithic and inefficient agricultural marketing structure results in the slow transmission of foreign exchange gains to farm gate prices that constrain potential supply response. Monetary policy impacts seem to be a function of greater macroeconomic liberalization than non-liberalization, especially when, in the latter case, domestic currencies are pegged directly to foreign currencies.

Introduction

There is a general need adequately to treat the interaction between macroeconomic and trade issues and agriculture. This link is particularly critical for many sub-Saharan African economies, but is often either neglected or not sufficiently understood. The designs of recent structural adjustment facilities in sub-Saharan Africa may not adequately incorporate the implications arising from the nature of the prevailing agricultural production and marketing régimes, which may seriously hamper the long-run success of those adjustment programmes, especially when a country is very dependent on agricultural exports.

The outcome of macroeconomic adjustment programmes may depend critically on the policy framework in the agricultural sector; implying that some agricultural sector régimes may be consistent with successful macroeconomic adjustment, while others may not. An evolving agricultural policy framework subsequently becomes a necessary integral part of such adjustment. For simplicity of exposition, the World Bank's taxonomy of agricultural régimes (non-liberalized, gradually liberalizing, and fully liberalized) is used.

The primary characteristics of a non-liberalized régime are found in the major government and parastatal roles in a single-channel marketing structure, a small or non-existing private sector role in marketing, and rigid structures of controlled prices for consumers and producers. In a fully liberalized régime, there is a reduced government role, a multiplicity of marketing channels with strong private sector participation, and market-based pricing mechanisms. A gradually liberalizing régime is an intermediate level, a gradually evolving agricultural framework from a non-liberalized to a fully liberalized régime.

The focus of macroeconomic adjustment is usually exchange rate reforms, production incentives, monetary stability, and trade reforms. In sub-Saharan Africa, exchange rate reforms tend to be synonymous with currency devaluations. When complemented by reduced industrial protection, it is believed to result in a shift in internal terms of trade towards agricultural production.

A potentially perverse effect on internal terms of trade often arises under non-liberalized or gradually liberalizing régimes when the agricultural marketing structure is sufficiently monolithic and inefficient. It results in the slow transmission of exchange rate changes to farm gate prices even as imported input prices adjust rapidly to the devalued currency. The incidence of taxation on farmers poses potential barriers to production response. In sub-Saharan Africa, this raises immense challenges in slow-growing economies, especially when exacerbated by monetary instability.

Trade liberalization must be intimately related to the liberalization of agricultural marketing and prices. Yet sometimes an important industrial subsector may be massively protected under an overvalued and quantitatively restricted external trade régime. The level of protection may be reduced under trade liberalization, yet the agricultural marketing scenario remains non-liberalized, whereby protected parastatal monopolies function inefficiently.

Of the 22 sub-Saharan African countries that have been undertaking structural adjustment since 1980 through World Bank and/or International Monetary Fund auspices, Kenya fits the above profile as a gradually liberalizing economy, while Cameroon is an example of a non-liberalized economy.

Analytical Approach

A large proportion of agricultural production in sub-Saharan Africa is traded to earn sorely needed foreign exchange. Thus, the link between the external sectors and agriculture takes place through the real exchange rate (measured in units of domestic currency per US\$ foreign price index/domestic price index). The effect of commercial policy on the structure of incentives in the agricultural sector is analysed using the traded-to-non-traded goods model and abstracting from the elasticity approach to balance-of-payments disequilibria.

The analytical approach of the study of the performance of the goods, money, and financial markets follows from Garcia Garcia and Montes Llamas (1988). Whenever increases in government expenditure are financed through taxes, an excess demand for non-traded goods develops if the marginal propensity of the government to spend on non-traded goods is larger than the corresponding marginal propensity of the private sector. Thus, the prices of non-traded goods rise.

These occurrences reduce incentives to produce in other tradeable activities such as agriculture and industry, which may explain the economic performance of the selected countries. So the supply responses to the agricultural (AG^s), industrial (NA^s), and service (NT^s) sectors are determined to capture the various influences in terms of the relative prices of agriculture and industry to services. It is possible that increases in the world interest rate, r^* (measured by the London Interbank Offer Rate), may have transmitted to the lean capital markets of these countries to contribute to recessions and, especially, high fluctuations in their monetary reserves.

Fluctuations in the monetary reserves (dR/M) are usually attributed to the effects of changes in the current and capital accounts. The analysis isolates the real per capita GDP ($PGDP$), the per capita value of exports ($PVEX$), or the per capita value of agricultural exports ($PAGVEX$)—including coffee exports ($COVEX$) in Kenya—and the per capita balance of payments ($PBOP$) as the determinants of the current account. The domestic-to-foreign interest rate differential, $r/r^*(1+e)$, and the difference between per capita debt and debt service ($PDBT$) are the major determinants of the capital account. This is consistent with Fleming (1962) and Mundell (1962 and 1968).

The monetary (M^d/P) specification follows Dornbusch's demand-for-money equation to determine the response to interest rate changes in a semi-open economy (Dornbusch, 1980, p. 176). The impact of certain monetary instruments on the real exchange rate is also measured, abstracting from the portfolio balance approach of the asset market and defining the real exchange rate as a logarithmic function of the real market exchange rate ($LEXCH$), lagged real domestic interest rate (r_{-1}), $PGDP$, and $PBOP$. Consistency with the terms of trade (TOT) definition is achieved by defining the real exchange rate as the ratio of the price of tradeables to the price of non-tradeables ($LPCNA$). The size of government expenditure relative to GDP ($EGDP$) and $PGDP$ are also included.

A general equilibrium framework similar to Garcia Garcia (1981), Oyejide (1986), and Tsibaka (1986) is also used in arriving at an equation that allows measurement of the incidence of governments' trade and exchange rate policy taxation on agriculture. The underlying static equilibrium approach follows Dornbusch (1974) and Sjaastad (1980) in that it demonstrates that exchange rate policies sometimes have global economic repercussions quite different from those intended by policy makers. It is also consistent with Balassa (1981), Little *et al.* (1970), and Krueger *et al.* (1981), whose studies dealt with how incentive systems and resource flows in developing countries have concentrated on the degree of protection for competing manufacturing activities by trade and exchange rate policies.

Results

The estimated equations for Cameroon and Kenya are presented in Tables 1–7. They cover the 1970–88 period, and the data are derived from World Bank, FAO (*Production and Trade Yearbooks*), and IMF (*International Financial Statistics*) sources. The *t*-values are presented in parentheses below their respective coefficients.

The static supply response equations (Table 1) for the real sector did not provide the expected signs and significance of price coefficients. However, modifications of Nerlove's (1956) partial adjustment model provided more consistent results. The own prices for Cameroon were all positive as hypothesized. However, for Kenya, the own prices for agriculture and industry were all negative, which probably suggests the potential perverse effect of agriculture in an economy that is gradually shifting its dependency towards the industrial and service sectors. However, a generally higher supply response to the previous year's relative prices in Kenya was observed. The elasticity of acreage response (*XC*) expectation to the previous year's agricultural prices (*PAG*) was higher for Kenya than for Cameroon, and conformed to the non-zero results of Grilliches (1959). Farmers in both countries, therefore, respond rationally to price incentives. For both countries, all sectors exhibited positive trend variability, even though Kenya's was more significant.

Table 1—Supply Response: Partial Adjustment

		Constant	PAG_{-1}	PNA_{-1}	AG^s_{-1}	XC_{-1}	<i>T</i>	R^2	<i>DW</i>
AG^s	C	242.05 (2.96)	174.36 (0.95)	-161.08 (1.21)	0.03 (0.10)	—	15.26 (2.29)	0.68	2.04
	K	100.93 (18.11)	-1,005.30 (0.81)	290.23 (0.24)	0.17 (1.09)	—	527.41 (5.14)	0.98	1.82
NT^s	C	268.31 (3.47)	-25.27 (0.17)	-16.02 (0.14)	—	—	41.86 (8.84)	0.92	1.18
	K	1,1096.0 (10.87)	-4,359.0 (2.44)	3,957.7 (2.41)	—	—	1,364.4 (24.97)	0.98	0.66
NA^s	C	15.61 (0.15)	7.98 (0.04)	82.43 (0.47)	—	—	51.71 (7.31)	0.89	0.36
	K	3,915.00 (6.41)	2,001.20 (1.87)	32.13 (0.33)	—	—	467.93 (14.32)	0.96	1.32
XC	C	553.46 (12.12)	111.13 (1.11)	-240.18 (2.59)	—	0.73 (5.43)	5.76 (1.18)	0.94	1.59
	K	4,7366.0 (112.88)	2,201.40 (0.20)	38,336.0 (2.48)	—	0.10 (2.03)	1,306.90 (5.67)	0.72	1.56

Note: C = Cameroon and K = Kenya. Absolute values of *t*-statistics are in parentheses.

The potential impact of agricultural price incentives becomes very apparent in both non-liberalized and gradually liberalizing examples. An increase in agricultural price should reduce the supply of non-agricultural tradeables in the short-run as resources (including human capital) are transferred to agriculture. This resource movement effect, however, is expected to create an excess demand for all tradeables (since industrial tradeables depend on agricultural inputs in both countries) and, hence, should reduce the price of non-traded goods. On the demand side, increases in agricultural prices also increase income and subsequently expenditures, which drive up the demand for non-agricultural tradeables. Thus, the prices of industrial tradeables go up, thereby driving down the prices of non-traded goods in the long run. Such scenarios have strong implications in narrowing the rural/urban terms of trade—a necessary expectation in any adjustment scheme.

In Cameroon, increases in both agricultural and industrial tradeable prices do indeed reduce the supply of non-tradeable goods. In Kenya, however, agricultural prices reduce the supply of non-tradeables more significantly, but industrial prices significantly increase non-tradeable goods supply.

The demand for money equation (Table 2) provided consistent results as expected for both countries, except for the negative sign on per capita income in Cameroon. For Kenya, the marginal propensity to spend out of increased income is 0.002, which is very small compared to that obtained for the USA by Alexander (1952). Thus, locally induced investment is very small in Kenya. For Cameroon, the negative marginal propensity probably suggests the potential existence of monetary quirks—an adjunct to the Cameroon-Francophone monetary alliance.

Table 2—Demand for Money

		Constant	PI	r	$(M^d/P)_{-1}$	TOT	R^2	DW
M^d/P	C	0.47 (0.60)	-0.001 (0.71)	0.30 (2.53)	0.52 (3.83)	0.006 (0.75)	0.88	1.35
	K	-46.48 (0.69)	0.002 (0.08)	4.67 (2.49)	0.56 (2.90)	0.46 (1.67)	0.75	1.93

The interest rate equation (Table 3) shows the expected signs for all variables, except for the rate of devaluation in Cameroon. While it is possible that Kenya's domestic interest rate follows the parity rate (and, thus, allows for flexibility in capital mobility), the negative value of the rate of devaluation (e) and the non-significant parity rate in the second real interest rate equation for Cameroon seem to suggest that the domestic interest rate may depend on external factors but not on internal factors. Domestic monetary policy may, therefore, have no impact on Cameroon's economy; however, it does have an impact on Kenya's economy.

Table 3—Interest Rate

		Constant	r^*	e	$PGDP$	$PBOP$	$r^*(1+e)$	R^2	DW
r	C	1.33 (1.63)	0.02 (0.33)	-1.10 (1.38)	0.04 (5.15)	0.03 (0.74)	—	0.87	1.92
	K	-0.45 (0.10)	0.41 (2.70)	5.40 (8.17)	-0.005 (0.40)	0.009 (0.18)	—	0.75	1.93
r	C	0.96 (1.45)	—	—	0.03 (5.07)	0.002 (0.06)	0.02 (0.64)	0.84	1.35
	K	2.67 (0.36)	—	—	-0.004 (0.18)	0.008 (1.12)	0.37 (4.03)	0.57	1.04

The changes in international reserves equation (Table 4) provides the customary mixed results for small countries. For example, the signs on $PVEX$ and $PCOVEX$ were negative for Kenya. For Cameroon, $PAGVEX$ was negative, demonstrating agriculture's weak role as an export sector in the economy's reserve accumulation. Also, $PDBT$ was positive for Cameroon but negative for Kenya. Generally, Kenya's relatively greater debt-to-debt service ratio negatively affects its reserves.

For both countries, the parameters on the interest rate differential were positive but insignificant, which suggests some international mobility of capital into the countries. However, real income and the value of exports play weak roles in the current account portion of the balance of government reserves.

Table 4—Changes in International Reserves

		Constant	PGDP	PBDP	$r/r^*(1+\epsilon)$	PVEX	AGVEX	PCOVEX	PDBT	PBOP	R^2	DW
dR/M	C	0.04 (0.16)	-0.001 (0.45)	—	0.23 (0.66)	0.005 (0.08)	—	—	0.009 (0.38)	-0.03 (0.08)	0.29	2.21
	K	-0.09 (0.27)	—	-0.008 (0.79)	0.22 (0.80)	-0.002 (0.08)	—	—	-0.001 (0.18)	0.01 (4.98)	0.77	1.82
dR/M	C	0.30 (3.07)	0.09 (3.08)	—	0.28 (1.12)	—	-0.09 (1.97)	—	—	0.004 (1.00)	0.48	2.95
	K	-0.12 (0.34)	—	-0.004 (0.44)	-0.26 (0.87)	-0.003 (0.3)	—	-0.001 (0.25)	-0.003 (0.4)	-0.02 (4.58)	0.77	1.86

The real exchange rate equation (Table 5) provides consistent results for Kenya, except for *PGDP*. However, the results of the second equation provide a better fit for Kenya. As a result of its pegged exchange rate with the French franc, it is possible that the level of real output and prices of tradeables do not positively affect real exchange rate movements in Cameroon. In other words, an improvement in terms of trade towards tradeables and an increase in government expenditure would tend towards an increase in the relative price of non-traded goods. The negative effects of government expenditure on the relative price of tradeables also suggest that Cameroon's propensity to spend on non-traded commodities is higher than that for traded commodities.

Table 5—Exchange Rate

		Constant	r_{-1}	$\ln PGDP$	$\ln PNAG$	$\ln PNA$	GBOP	$\ln EGDP$	R^2	DW
LEXCH	C	5.64 (23.2)	0.16 (2.5)	-0.39 (1.8)	-0.26 (0.63)	0.93 (1.2)	-0.51 (0.23)	—	0.48	1.43
	K	2.69 (22.7)	0.04 (4.1)	-0.11 (2.3)	0.10 (0.3)	0.54 (1.6)	0.57 (0.5)	—	0.63	0.85
LPCNA	C	0.72 (16.2)	0.02 (1.5)	-0.10 (2.7)	-0.42 (5.6)	0.33 (2.8)	—	-0.007 (0.28)	0.82	1.65
	K	0.82 (26.7)	0.005 (1.2)	0.04 (3.2)	0.46 (5.6)	0.14 (1.4)	—	-0.02 (0.8)	0.76	2.52

Note: All variables are lagged.

A key observation for both countries is that the interest rate has a positive effect on the price of traded goods. So policies that increase real interest rates lead to an increase in the real exchange rate, *ceteris paribus*. This relationship is in agreement with the presumption that increases in the interest rate also generally increase relative prices of tradeables. Nevertheless, the relative prices of agricultural and non-traded outputs equation (Table 6) seems to suggest that increases in the interest rate decrease the relative price of agriculture (logarithmically) in Kenya but not in Cameroon. An improvement in the terms of trade of agriculture and industry, real income, and government expenditure (biased towards agriculture) should, therefore, increase the relative price of agriculture in Kenya. Indeed, this is a cardinal imperative in any gradually liberalizing marketing régime.

The commercial policy equations (Table 7) yield excellent results for the incidence of taxation on the agricultural sector. Highly significant levels of taxation of 64 percent and 83 percent, respectively, were obtained for agriculture in Cameroon and Kenya. These results are similar to earlier results obtained for Nigeria (Oyejide, 1986) and for Colombia (Garcia Garcia, 1981). The results confirm the slow transmission mechanism of price incentives to agricultural producers, especially in a gradually liberalizing economy such as Kenya. Unfortunately, data unavailability poses a binding constraint on the examination of sector-specific policies, in terms

of the direct and indirect effects on the main agricultural export sectors (coffee and tea) in Kenya.

Table 6—Relative Prices of Agricultural and Non-Traded Output

		Constant	$\ln (PGDP)_{-1}$	r_{-1}	$\ln TOT_{-1}$	$BGDP_{-1}$	R^2	DW
\ln PAG/PNT	C	-0.25 (1.81)	0.15 (0.68)	0.03 (0.65)	-0.19 (1.04)	1.60 (0.84)	0.48	2.10
	K	-0.19 (2.16)	0.27 (2.73)	-0.01 (1.21)	-0.37 (2.54)	2.13 (2.26)	0.54	1.47

Table 7—Commercial Policy Impacts

		Constant	$\ln (PNA/PAG)$	$\ln PGDP$	$PBOT$	R^2	DW
$\ln PNT/PAG$	C	0.27 (0.52)	0.64 (6.23)	-0.40 (0.40)	-0.005 (1.61)	0.89	0.98
	K	-4.13 (2.38)	0.83 (8.39)	0.50 (2.36)	0.0004 (0.65)	0.91	2.08

Conclusion

The possibility that a successful macroeconomic adjustment process in a sub-Saharan African country may not necessarily translate into a good performance by the agricultural sector is provided by the Kenyan example. In the medium to long term, there may be negative repercussions on the economy-wide adjustment process, especially when the slow transmission mechanism of relative prices does not allow better price incentives to farmers. Farmers in both countries respond rationally to price incentives. The high incidence of taxation on agriculture seem to suggest that, in the gradually liberalizing régime, the agricultural sector is not liberalized enough. In any case, the gradually liberalizing régime demonstrated a higher propensity for production growth than the non-liberalized régime.

Monetary policy has no impact on the Cameroon economy, but does on the Kenyan economy. But the monetary sector's performance in Cameroon may reflect not the non-liberalized nature of its régime but rather its monetary relationship with France. Capital flows into both countries are not very significant, even though flows into Cameroon may be constrained by its relationship with France. Increases in interest rate in the medium run translate into increases in the prices of tradeables, including agricultural goods for Kenya. However, government policy seems to delay price incentives to farm producers. Faced with a volatile international commodities market, it is imperative that a gradually liberalizing economy that is dependent on agriculture reduce the incidence of taxation on agriculture to allow for rapid domestic production response.

The study also demonstrates the possibility that, for an non-liberalized economy whose export sector does not depend heavily on agriculture, formal macroeconomic structural adjustment may not be a necessary requirement in effecting efficient performance in the agricultural sector. Furthermore, it proves that a more diversified export sector may offer other alternatives that reduce the high incidence of taxation on agriculture.

Note

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Discussion Opening—*Timothy O. Williams* (International Livestock Centre for Africa)

Economic theory and experience both suggest that in sub-Saharan African countries, where agriculture accounts for a substantial share of GNP and trade, macroeconomic adjustment programmes will impinge on the agricultural sector. Indeed, the success of such adjustment programmes depends largely on improved performance of the agricultural sector. By assessing the impact of adjustment programmes on the performance of the agricultural sector in two sub-Saharan African countries, this paper addresses a topic that is of relevance not only to the countries studied but also for other developing countries currently undertaking structural adjustment programmes.

However, in assessing agricultural sector performance, the paper uses an eclectic framework that requires further elaboration in places. First, in estimating the response of agricultural production to adjustment policies, the approach used ignores the importance of non-price variables in determining supply response. There is ample evidence that weather, infrastructure, and extension services together affect aggregate agricultural output more than prices alone. Incorporation of these structural variables into the framework employed would produce different comparative results, given that Kenya has relatively better infrastructure and extension services than Cameroon.

Second, the framework used concentrated entirely on the performance of agricultural exports. To the extent that macroeconomic adjustment programmes are executed to promote growth and efficiency in the agricultural sector as a whole, the performance of other aggregates (such as domestic food production) needs to be evaluated as well. Available evidence suggests that net exports respond quickly to higher prices induced by adjustment policies, but domestic food supply may not increase as rapidly. Further empirical evidence on the response of these two aggregates is needed in order to improve the design of structural adjustment programmes.

Another point to note is that there is little discussion of the effects of agricultural sector-specific reforms on production incentives in the two countries. Yet the conclusions reached in this paper and the results of other studies have shown that macroeconomic adjustment policies (involving devaluation, fiscal austerity, and reduction in industrial protection) alone are unlikely to have a significant impact on aggregate agricultural output unless accompanied by a number of sectoral reforms, including elimination of export taxation, reduction of subsidies to agricultural marketing boards, and improvement in services.

On a more general note, a careful interpretation of some of the estimated parameters reported in the paper produces results that are difficult to reconcile with available data on the countries studied.

Nonetheless, I share the authors' concern for a better understanding of the links between macroeconomic policy changes and agricultural incentives. I consider the approach used in this paper as a useful first step which, with elaboration, can produce results that could be used to improve the design of structural adjustment programmes.

[Other discussion of this paper and the authors' reply appear on page 306.]