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A General Equilibrium Analysis of the Effect of Macroeconomic Adjustment on Poverty in Africa

Paul A. Dorosh and
David E. Sahn

CORNELL FOOD AND NUTRITION POLICY PROGRAM



**A GENERAL EQUILIBRIUM ANALYSIS OF THE EFFECT
OF MACROECONOMIC ADJUSTMENT ON POVERTY IN AFRICA**

**Paul A. Dorosh
David E. Sahn**

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ABBREVIATIONS

CFA	—	Communauté Financière Africaine
CGE	—	Computable general equilibrium
GDP	—	Gross domestic product
IMF	—	International Monetary Fund
SAM	—	Social Accounting Matrix

1. INTRODUCTION

Has economic policy reform in sub-Saharan Africa exacerbated poverty? What are the effects of particular macroeconomic adjustment policies on incomes and income distribution? These questions have been the subject of considerable conjecture. In the early 1980s, researchers who were engaged in casual empiricism answered the first question affirmatively, as the belief in the harmful effects of adjustment quickly achieved widespread acceptance. Exchange rate devaluation, reduced government spending, and adherence to the principles of border prices were all viewed as harmful to the poor (Cornia, Jolly, and Stewart 1987). In this paper, we attempt to put the answer to these important questions on more solid analytical footing. In doing so, we first narrow the discussion to the analysis of the impact of policy reform on the real incomes or consumption expenditures, not an examination of other indicators of living standards. Second, we broadly define the process of reform to include both expenditure- and demand-reducing stabilization programs most often identified with the IMF, and expenditure-switching policies and related efforts to remove distortions in product and factor markets. These latter policies, designed to increase the efficiency of resource allocation and investment, are often referred to as structural adjustment and identified with the World Bank.

In theory, the dichotomy between expenditure-reducing stabilization and expenditure-switching structural adjustment is conceptually informative. Furthermore, certain conflicts arise between stabilization and structural adjustment, as illustrated by the possible worsening of short-term imbalances caused by trade liberalization. Another conflict occurs when an expansionary fiscal policy is warranted to compensate for an expected reduction in economic activity during a transition phase, and this may in fact temporarily worsen existing disequilibria. In practice, however, the two types of reforms are inextricably linked and mutually reinforcing.

The impacts of stabilization and structural adjustment on poverty will be mediated through, first, changes in the direct role of the state in collecting taxes and providing transfers and services, and thus, net assets of households and enterprises. Second, reform will affect poverty through changes in output, employment, factor payments, and market-determined prices. Thus, while the role of the state is paramount in directly determining taxes and transfers and indirectly affecting the functioning of critical factor and product markets, two essential elements must be taken into account in examining the impact of adjustment on poverty. These include external conditions and the policy framework and economic conditions prior to adjustment.

To amplify on the role of prior circumstances, most studies on the impact of adjustment neglect to incorporate fully into their analyses the unparalleled

crises that countries in sub-Saharan Africa were facing during the late 1970s and early 1980s. Two decades of the state assuming control of their economies led to virtual disintegration and collapse by the time adjustment began. Not only had official markets ceased to function, infrastructure decayed and the internal and external account fallen grievously out of balance; but incomes, particularly of the poor, had stagnated at best and often declined. The primary beneficiaries of the egregious distortions were the elite, who succeeded in creating and exploiting rent-seeking opportunities, not the poor, whose participation in official factor and product markets was negligible. Thus, the propensity to confuse the results of adjustment with the economic crises that necessitated it reinforces the importance of disentangling prior conditions from the impact of adjustment.

With this point in mind, we discuss broadly the nature and characteristics of the poor in Africa in Section 2, recognizing that the generalizations are just that, not applicable in all cases and circumstances. We are motivated by the importance of distinguishing the potential deleterious effects of adjustment on the poor from the effects on the nonpoor. Characterizing poverty thus provides the empirical basis for modeling, and context for interpreting, the impact of reform on the poor in Section 3. In particular, we present the results of counterfactual simulations from four diverse African economies — Cameroon, The Gambia, Madagascar, and Niger — for which we have constructed computable general equilibrium (CGE) models. This is followed in Section 4 by some concluding remarks.

2. AFRICA'S POOR

Ideally, data on the nature, prevalence, and depth of poverty in Africa could be summarized using some comparable index or parameter. Given the paucity of household survey data, based on a nationally representative sample, this is not possible. While we are unable to apply consistent criteria to count, characterize, or compare the poor across countries, it is nonetheless worthwhile to lay out some fundamentals about the measurement and nature of poverty in sub-Saharan Africa.

Africa's poor remain heavily concentrated in rural areas. For example, 92 percent of Madagascar's poor (Dorosh et al. 1990), and virtually all of Cameroon's poor (Lynch 1991) are in rural areas. In Côte d'Ivoire, only 4 percent of the poorest households are in urban areas (Glewwe 1988) and in Malawi only 1 percent of the poor live in urban areas (World Bank 1990). Similarly, in Ghana, 80 percent of the poor reside in rural areas, and the depth of their poverty is considerably deeper (Boateng et al. 1989).

The higher incidence of rural than urban poverty is due not only to the lower rate of urbanization than in other regions of the world, but it also reflects the fact that the share of the population that is poor is higher in rural than in urban areas.¹ It is also noteworthy that information on indicators of living standards other than incomes (e.g., nutrition, literacy, morbidity) also tend to support the conclusion that the poor are concentrated both in absolute and relative terms in rural areas (Sahn 1991).

The fact that there may be less poverty in the cities, both in absolute numbers and in proportion to the size of the population, however, does not mean that urban poverty can be ignored.² Urban poverty becomes even more pressing given the growing problems posed by rapid urbanization. Furthermore, while urban poverty in Africa has special characteristics, education and the quality of human

¹ For example, 4.8 percent of households in Abidjan fall in the bottom 30 percent of the consumption/expenditure distribution, while 42.6 percent of rural households are in the bottom three expenditure deciles; and in Ghana 40.6 percent of the rural households are in the bottom three expenditure deciles, while the comparable numbers are only 7.1 for Accra and 5.4 percent for other urban areas (Sahn 1991). The study by Lynch (1991) of Cameroon shows that virtually none of the households in Yaoundé or Douala fall in the bottom 30 percent of the income distribution.

² For example, Reardon, Delgado, and Thiombiano (1991) show that the two poorest urban deciles in Burkina Faso earned less than the rural dwellers in the Sahelian and Guinean zones of Burkina.

capital, as elsewhere, play a critical role (see Appleton, Collier, and Horsnell 1990; Van der Gaag and Vijverberg 1989; Glick and Sahn 1993). Nonetheless, problems of the poor quality sanitary facilities, overcrowding, the absence of traditional coping mechanisms including mutual assistance relationships and kinship networks, and the greater competition for money including for entertainment and other non-necessities, are the types of risks that make urban dwellers, especially new migrants, vulnerable. The changing nature of food expenditures in urban areas may also represent a risk factor.

Turning to the causes of rural and urban poverty in sub-Saharan Africa, despite the difficulty in generalizing, the overriding issue is household ownership of and/or control over productive assets and access to capital, although less is known about the effects of education and other human capital on rural, than urban earnings. In rural areas, farmers with the smallest holdings and pastoralists with the smallest herds are more likely to be poor than are the larger landholders and herd owners. This is because agriculture (and pastoralism in the Sahel) remains the most important source of income for most rural households in sub-Saharan Africa, despite the growing importance of off-farm and nonagricultural sources. However, as the link between landholding size and poverty weakens concurrent with the growth of the manufacturing and service sectors in rural areas, productive assets other than land are becoming increasingly important in rural, as well as urban areas. In addition, despite a paucity of evidence on the returns to human capital investment in sub-Saharan Africa, the few labor market studies that have been completed indicate the importance of education and training, especially in the urban economy.

Our interest in the poor, however, is primarily in terms of their characteristics and behavior as producers and consumers, which will determine how adjustment affects their welfare. In particular, first, is the issue of how expenditure-switching, which raises the price of tradables relative to nontradables, as well as related productivity-enhancing measures associated with reform, will affect the poor. The nature of the poor's participation in markets, particularly the mix of tradables and nontradables in household production and consumption, the degree of labor intensity in tradable versus nontradable sectors, and the level of asset ownership and control of factors of production, are the essential determinants of adjustment's effects on the poor. Once again, available data, despite its limitations, provide the basis for putting together a series of stylized facts on the characteristics of the poor, and how economic reform will affect them in the short term.

Table 1 presents data on income sources of poor rural households in a few African countries. Results show that agricultural income comprises the largest share, although it varies from as low as 39 percent for households living in the plateau region of Madagascar up to 81 percent for households in the savannah of Côte d'Ivoire.

When agricultural incomes are disaggregated, the imputed value of home consumption is greater than the value of market transactions, except in Côte d'Ivoire and The Gambia. In fact, home consumption's share of agricultural income is as high as 54 percent in the savannah in Ghana, 50 percent in Tanzania,

Table 1 — Sources of Per Capita Income of Poor Rural Smallholder Households, by Country and Region

Income Source	Ghana		Tanzania	Côte d'Ivoire		Malawi	Madagascar			The Gambia	Kenya	Rwanda	Burkina Faso		
	Forest	Savannah	All	Forest	Savannah	South	Coast	Plateau	South	Regional	Regional	Regional	Sahelian	Sudanien	Guinean
Agricultural income ^a	0.57	0.68	0.73	0.76	0.81	0.51	0.42	0.39	0.48	0.57	0.54	0.45	0.49	0.59	0.56
of which:															
Home consumption	0.37	0.54	0.50	0.31	0.40	0.37	0.25	0.31	0.37	0.22	0.40	0.33	—	—	—
Agricultural sales	0.20	0.14	0.23	0.45	0.41	0.14	0.17	0.08	0.11	0.35	0.14	0.12	—	—	—
Off-farm earned income ^b	0.40	0.31	0.25	0.21	0.17	0.13	0.55	0.58	0.49	0.22	0.42	0.38	0.20	0.25	0.38
Nonearned income ^c	0.03	0.01	0.02	0.03	0.02	0.36	0.03	0.03	0.03	0.21	0.04	0.17	0.31	0.16	0.06
Total	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Sources: Ghana, Tanzania, Côte d'Ivoire, Malawi and Madagascar computed from sources mentioned in Sahn and Sarris (1991); The Gambia from Jabara et al. (1991); Kenya, Rwanda, and Burkina Faso from von Braun and Pandya-Lorch (1991).

^a Includes livestock.

^b Includes wages, salaries, and own-account.

^c Includes income from transfers, remittances, and other nonearned sources.

and as low as 22 percent in The Gambia. This does not suggest, however, that movement in farm-gate prices is unimportant. Agricultural sales still represent a significant share of the value of total income in a number of cases. Taken as a share of total income, agricultural sales reach as high as 45 percent in the forest region of Côte d'Ivoire and 35 percent in The Gambia, although they comprise less than 20 percent in Ghana's savannah, and 15 percent in Malawi, Kenya, and Rwanda. As commercialization of agriculture increases — an inevitable and positive trend that will likely be accelerated by adjustment — farm-gate prices become increasingly important. In the short term, however, the relatively low level of production for sale in the market reduces the direct positive income shock for the rural poor that would result from higher farm-gate prices. The indirect effects, as mediated by forward and backward linkages, however, are not possible to assess based on these descriptive data. Rather, a general equilibrium framework is required and will be employed in the next section.

Perhaps the most salient characteristics in terms of determining the income effects of adjustment is the degree of tradability of the agricultural incomes of the poor. Results in Table 2 suggests highly variable results concerning the importance of export crop production to the poor. In the forest region of Côte d'Ivoire, sales of tradable and nontradable foods combined comprise 15 percent of agricultural incomes, while export crop sales comprise 45 percent. In the coastal region of Madagascar, export crops comprise 31 percent of household incomes, with home-consumed rice being an additional 23 percent. In Malawi, where agricultural sales represent a relatively small share of total incomes, export crops comprise nearly three-quarters of the value of sales. This suggests that in some cases, reducing or eliminating taxes on export crops as well as on tradable food crops, which are either import substitutes or actually sold internationally or across regional borders (such as groundnuts in The Gambia), will have important effects for incomes of the rural poor.

But perhaps a more crucial point that emerges from Table 2 is that tradable goods, even when liberally defined,³ represent a relatively small share of role in home consumption and in agricultural sales in most cases. In Ghana, for example, 70 and 73 percent of agricultural incomes are from nontradables in the forest regions and the savannah, respectively, indicating the limited positive effects of short-term expenditure-switching adjustment measures on agricultural incomes. Nearly 40 and 50 percent of sales revenues are from nontradables in the two regions. All of this demonstrates that production of nontradables is generally of equal or greater importance than tradables as a source of income, both in terms of home consumption and sales.

While the above discussion of the tradable/nontradable component of agricultural incomes assists in formulating expectations concerning the scope of

³ In many instances, it is arguable that despite the classification of commodities such as maize and rice as "tradables," in practice this does not hold in certain regions or countries because of policy distortions and weak infrastructure.

Table 2 — Agricultural Income Shares of Rural Smallholders

Shares	Ghana		Tanzania	Côte d'Ivoire		Malawi	Madagascar			The Gambia	Kenya
	Forest	Savannah	All	Forest	Savannah	South	Coast	Plateau	South	Regional	Regional
Traded food ^a	0.18	0.26	0.35	0.14	0.32	0.53	0.23	0.30	0.36	0.63	0.35
Home consumed	0.09	0.16	0.27	0.08	0.18	0.52	0.23	0.28	0.33	0.19	—
Sales	0.09	0.10	0.09	0.06	0.14	0.01	<0.01	0.02	0.03	0.44	—
Nontraded food ^b	0.70	0.73	0.61	0.41	0.46	0.24	0.46	0.69	0.58	0.37	0.45
Home consumed	0.57	0.63	0.42	0.32	0.31	0.20	0.35	0.51	0.44	0.20	—
Sales	0.13	0.10	0.18	0.09	0.14	0.04	0.11	0.18	0.15	0.17	—
Export crops ^c	0.12	0.01	0.04	0.45	0.22	0.23	0.31	0.01	0.06	0.00	0.20
Total agricultural income	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Sources: Ghana, Tanzania, Côte d'Ivoire, Malawi and Madagascar computed from sources mentioned in Sahn and Sarris (1991); The Gambia from Jabara et al. (1991); Kenya from IFPRI South Nyanza data set.

^a Rice, maize, groundnuts, other traded food.

^b Millet, cassava, sweet potato, yams, other nontraded food.

^c Cocoa, tobacco, cotton, coffee, cola nuts, rubber, sugar, other exportables.

price-oriented adjustment to raise rural incomes, it is limited in a variety of ways. Most important, it fails to account for the role of nonagriculture. In particular, given the increasing importance of wage labor and small scale enterprises in rural African economies, this may indeed be an important problem. To address this issue, we developed an index of tradability for the four countries that will be included in the following modeling exercises. Table 3 shows that in all four countries, the index is higher for the poor than for the rich, although the differences across countries are greater than within a given country. This result, as will be shown below, suggests that the poor will tend to gain relative to the rich if relative prices are realigned in favor of tradeable goods.

In the same table we also derive a similar index for urban households. The most important feature of these figures is that the index of tradability is lower in urban areas where the rich are concentrated than in rural areas where the poor predominate, which of course comes as no surprise. Highly tradable agricultural goods are insignificant to urban incomes, and most urban sector workers are engaged in construction, services, and small-scale manufacturing, much of which is in minimally capitalized enterprises. While the latter may have the potential for import substitution associated with exchange rate devaluation, there is legitimate concern that urban workers will see a compression in incomes commensurate with realignment of relative prices that accompanies reform.

Finally, on the tradable/nontradable dichotomy, it is also useful to explore this distinction in regard to the poor's participation in product markets. In fact, the most striking feature of the data available on the rural poor is the importance of consumption from own production. In fact, the share of food expenditures derived from consumption from own production ranges from 32 percent in The Gambia to 88 percent in the west and south of Madagascar (Table 4). These data reinforce the message that the poor have considerable scope for buffering not only any decline in price incentives, but any increase in retail prices. Nonetheless, the data suggest that the market is still important to the rural poor in their roles as consumers as well as producers. It is also noteworthy that the traded components of food expenditures are typically less than the nontraded components, again an important stylized fact that limits the potential deleterious consequences of adjustment on consumption. For example, in Ghana, 86 and 68 percent of the food basket is allocated to nontradables in the forest and in the savannah regions, respectively. And as shown in the previous table, generally half or more of both the traded and nontraded staples are from own production. Thus, while there is a legitimate cause for concern over the adverse impact of retail price increases for the low-income net consumers in resource-poor rural areas, it needs to be tempered by recognition of the high share of home production and the realization that price-related adjustment is an important element of any strategy to increase farm-gate prices, raise agricultural productivity, and boost off-farm incomes.^{4,5}

⁴ The actual evidence on crop-specific and aggregate response in agriculture in sub-Saharan Africa is extremely limited. Most studies generally indicated
(continued...)

Table 3 — Tradability Indices of Household Income

	Tradability Index ^a			Share of Income from Agriculture
	Aggregate	Agriculture	Nonagriculture	
Cameroon				
Urban rich	0.155	0.689	0.147	0.015
Urban poor	0.114	0.428	0.105	0.029
Rural rich	0.200	0.397	0.122	0.283
Rural poor	0.223	0.392	0.113	0.395
The Gambia				
Urban rich	0.506	0.607	0.501	0.030
Urban poor	0.546	0.537	0.546	0.055
Rural rich	0.590	0.794	0.061	0.691
Rural poor	0.570	0.797	0.065	0.723
Madagascar				
Urban rich	0.083	0.170	0.079	0.044
Urban poor	0.093	0.218	0.068	0.163
Rural rich	0.081	0.150	0.038	0.382
Rural poor	0.130	0.203	0.041	0.548
Niger				
Urban rich	0.317	0.291	0.318	0.036
Urban poor	0.152	0.290	0.063	0.392
Rural rich	0.173	0.287	0.065	0.484
Rural poor	0.222	0.289	0.105	0.637

Sources: Gauthier and Kyle (1991); Lynch (1991); Jabara, Lundberg, and Jallow (1992); Dorosh and Nssah (1991); and authors' calculations.

^a The tradability index for each household is calculated as the product of the vector of household factor income shares times the vector of the tradability index of each factor, TIF_r , where:

$$TIF_r = \frac{\sum_i (\sigma_i \beta_i) * VA_{r,i}}{\sum_i VA_{r,i}}, \quad \beta_i = \frac{(M_i + E_i)}{X_i}$$

σ_i is the elasticity of substitution between locally consumed and produced and traded goods, $VA_{r,i}$ is the value added earned by factor f in sector i , M_i , E_i , and X_i are the values of imports, exports and total supply of commodity i .

Table 4 — Expenditure Shares of Rural Poor

Shares	Ghana		Tanzania	Côte d'Ivoire		Malawi	Madagascar			The Gambia	Kenya
	Forest	Savannah	All	Forest	Savannah	South	Coast	Plateau	South	Regional	Regional
Food share	0.73	0.80	0.71	0.65	0.70	0.61	0.59	0.65	0.62	0.67	0.82
Traded	0.10	0.26	0.23	0.15	0.28	0.35	0.19	0.16	0.16	0.34	0.33
Rice	0.02	0.08	0.05	0.06	0.11	0.00	0.13	0.16	0.13	0.15	0.01
Maize	0.06	0.16	0.17	0.05	0.10	0.33	<0.01 ^a	<0.01	<0.01	<0.01	0.31
Groundnuts	0.01	0.01	0.01	0.01	0.05	0.02	<0.01	0.01	<0.01	0.02	—
Other	0.01	0.01	0.00	0.02	0.03	0.00	0.05	0.00	0.03	0.16	0.01
Nontraded	0.63	0.54	0.48	0.50	0.42	0.26	0.46 ^b	0.49 ^b	0.49 ^b	0.33	0.49
Millet	0.00	0.16	0.04	0.00	0.03	0.01	<0.01	<0.01	<0.01	—	0.02
Cassava	0.12	0.05	0.02	0.04	0.03	0.01	0.00	— ^c	—	—	0.45
Other	0.51	0.33	0.41	0.46	0.37	0.25	0.00	—	—	—	—
Nonfood share	0.27	0.20	0.29	0.35	0.30	0.39	0.41	0.35	0.38	0.33	0.18
Total	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Sources: Ghana, Tanzania, Côte d'Ivoire, Malawi and Madagascar computed from sources mentioned in Sahn and Sarris (1991); The Gambia from Jabara et al. (1991); Kenya from IFPRI South Nyanza data set.

^a <0.01 means a positive share between 0 and 0.005.

^b The data for Madagascar did not permit us to distinguish the role of cassava versus other goods in the nontraded goods share.

^c — means not available.

While the high level of home production protects the rural poor from higher consumer prices of tradables, it does not help the urban poor. However, in most cases, the share of tradables in the consumption bundle is similar for both the urban poor and the rural poor, and as shown above, is frequently low. However, there are cases such as in the Sahel, where dramatically different consumption patterns are noted. The substitution of the tradable good (rice) for nontradables (millet and sorghum) in urban areas is evidenced in, for example, Burkina Faso. Similar findings were also noted in Mali, Niger, and, to a lesser extent, Senegal (Reardon 1991). The implications of these types of shifts in consumption patterns with urbanization in the Sahel are complex and multifaceted. They suggest a differential impact of price-oriented reforms, including policies that may raise the price of importables and thus harm urban households, while having little effect on the rural poor.

This brief overview only begins to capture the complexities of poverty in Africa. It does not discuss the resourcefulness of the poor in coping with instability in their microenvironment or their ability to adapt to changing circumstances. But the paper does illustrate that the poor depend, albeit partially, on markets for wage labor, agricultural sales, and food purchases, and it begins to provide some indication as to how they will be affected by adjustment, the next issue we will discuss.

⁴(...continued)

that elasticities are low, especially for aggregate supply (Bond 1983; Lecaillon and Morrisson 1985 for Burkina Faso; Strauss 1984 for Sierra Leone; Martin and Crawford 1988 for Senegal; and Singh and Janakiram 1986 for Nigeria). Exceptions to finding low own-price elasticities, such as rice in Mali (Lecaillon and Morrisson 1986), were generally limited to single crop response, not aggregate output. It is therefore safe to assume a relatively limited increase in aggregate agricultural output as a result of price-oriented policy reforms, at least in the short term before the structural factors discussed above are addressed.

⁵ Regarding off-farm incomes, increased output will likely have important forward and backward linkages, manifested in second-round and positive income effects on the poor. The limited evidence on these linkages from Africa, that they are of a smaller magnitude than in Asia (Haggblade, Hazell, and Brown 1987), should not suggest that less emphasis be given to agricultural transformation. On the contrary, we argue for investments to help increase the multipliers emanating from higher agricultural productivity.

3. COUNTERFACTUAL SIMULATIONS OF THE EFFECT OF ADJUSTMENT ON POVERTY

COUNTRY CONTEXT

We employ computable general equilibrium models (CGEs) of four African countries — Cameroon, The Gambia, Madagascar, and Niger — to gain further insight into how the process of adjustment and the policies that necessitated such reforms, affected the incomes of different functional groups of households. While the economic crisis and subsequent reforms are discussed in detail elsewhere,⁶ a very general picture of the economic structure of the four countries is presented in Table 5. Cameroon and Niger are both CFA countries with few other similarities. With its oil and overall good natural resource endowment, Cameroon is one of the wealthier countries in sub-Saharan Africa. Unlike most of the other countries in the region, the early 1980s were good years in Cameroon. However, when the price of oil fell in the second half of the decade, Cameroon had little recourse but to follow the lead of its neighbors and adopt a stabilization and adjustment program. In contrast, Niger's landlocked location in the Sahel contributes to the marked instability in rainfall, degradation of the fragile soils, and extreme dependence on uranium exports for foreign exchange and government revenues. These factors, combined with a policy of deficit spending, contributed to an economic crisis early in the 1980s as uranium prices fell and rainfall declined. In common with Niger, the economic crisis in The Gambia and Madagascar hit early and was largely attributable to the fiscal deficits that resulted from a heavy investment push at the end of the 1970s. The financial crises that ensued in The Gambia and Madagascar contributed to the need for stabilization, and subsequently set the stage for adjustment efforts to deal with the underlying impediments to growth, including reform of exchange rate and pricing policy.

Given the differences in timing of the crises and the circumstances and nature of the responses, the simulations in this paper are not intended to tell a country-specific story that traces the evolution of the crisis and the subsequent path of adjustment. Instead, we use the four models to show how external conditions and the policy framework result in different growth and distributional outcomes in the four countries with diverse economic structures and varying abilities to absorb and respond to changing external conditions. That is, we choose to simulate the same shocks and same policy responses to enable cross-country comparisons. The cost of doing so, however, is that the story of the actual nature, degree, and timing of changes in external conditions

⁶ See Blandford et al. (forthcoming) for Cameroon; Jabara (1990) for The Gambia; Dorosh et al. (1990) for Madagascar; and Jabara (1991) and Dorosh (forthcoming) for Niger.

Table 5 — Cross Country Comparisons

	Cameroon	Gambia	Madagascar	Niger
Base year	1984-85	1989-90	1984	1987
GDP - \$million ^{a,b}	10,613.30	261.70	3,078.10	2,271.70
Population (millions)	10.19	0.86	9.61	7.02
GDP per capita (US\$) - base year	1,042.00	304.00	320.00	324.00
Exports (million US\$)	799.90	146.00	222.90	483.10
Exports/GDP	7.50	55.80	7.20	21.30
Imports (million US\$)	729.90	150.40	264.00	646.00
Imports/GDP	6.90	57.50	8.60	28.40
Trade balance (million US\$)	70.00	-4.40	-41.10	-162.90
Trade balance/GDP	0.70	-1.70	-1.30	-0.72
Major export	petroleum	groundnuts	coffee	uranium
Total investment/GDP	20.40	22.20	6.90	13.30
Government expenditures/GDP	7.51	10.01	25.80	24.06
Distinguishing features	oil exports	cross-border trade in groundnuts; re-exports	tree crop exports; rice dominates	uranium exports, open border with Nigeria; live- stock as an investment good

^a At official exchange rate.

^b All figures are base-year calculations unless otherwise specified.

^c World Bank (1992b).

and policy responses does not correspond to that which actually occurred in each of the countries.

THE MODELS

The four CGEs, following Dervis, de Melo, and Robinson (1982), share many characteristics: investment is determined by total savings, prices clear markets (with the exception of import quotas on rice and manufactured goods in the Madagascar model), a nonzero labor supply elasticity is used to simulate underemployment, and imports and exports are less than perfect substitutes for domestic production.⁷ The major differences lie in the structures of the economies modeled. Production of the petroleum sector in Cameroon is not explicitly modeled since the sector uses little domestic labor and few other resources, but the influence of petroleum export earnings is seen in the capital outflow recorded in the base year Social Accounting Matrix (SAM). The large groundnut export trade, the re-export trade, small manufacturing base, and reliance on noncompetitive imports make the Gambian economy very sensitive to changes in the real exchange rate and foreign capital inflows. Rice dominates food production, consumption, and trade in Madagascar, and export crops account for 61 percent of total export earnings. In Niger, much of private investment is in the livestock sector, forging a direct link between national savings and rural incomes.

As shown in Table 5, the base year for each model is different. This was primarily a function of the availability of the data when constructing the Social Accounting Matrices. Even though in Cameroon, for example, the base year is prior to the oil shock, and the process of adjustment in The Gambia was well underway during the base year of the model, we feel that the influence of the choice of base year is minimal for the purpose of this paper. First, economic structure of the countries has, for the most part, not gone through any major changes in terms of either behavior of economic agents or economic relationships.⁸ Second, given the use to which these models are being put — to compare effects of similar shocks and policies on growth and income distribution in varying economic contexts — the lack of consistency with respect to base years is only a minor detraction.

Finally, in presenting the simulation results, we focus on GDP growth, investment, and foreign savings, as well as income distribution. To facilitate comparison, our functional income distribution distinguishes between four groups: urban rich, urban poor, rural farm rich, and rural farm poor. These groups are

⁷ The structures of the CGE models are presented in Benjamin and Lee (1991) for Cameroon; Dorosh and Lundberg (1993) for The Gambia; Dorosh (Forthcoming) for Madagascar; and Dorosh and Nssah (1993) for Niger.

⁸ The trade liberalization in 1987 and 1988, part of Madagascar's structural adjustment program, is an exception.

taken from those found in the income distribution of the underlying SAMs. Their share of the population and incomes per capita in local currency are found in Table 6.

ADJUSTING TO THE ECONOMIC CRISIS

The following simulations explore the implications of alternative responses to economic crises. In particular, we frame our analysis around the policy response to the adverse movements in terms of trade, which played a major role in the economic crises experienced by many countries in sub-Saharan Africa in the late 1970s and early 1980s. Among the four countries included, the decline in the terms of trade was most precipitous for The Gambia between the late 1970s and mid-1980s, although Niger also witnessed a large steady fall in the price of exports relative to imports (see Table 7).

Although Madagascar did not suffer a long-term decline in the terms of trade, the early 1980s was a difficult period in the wake of the oil price hikes and falling export prices. The changes in these three countries are reasonably representative of most African countries, although the average case was that of a major terms-of-trade decline in the late 1970s, followed by only small declines in subsequent years. Cameroon's experience, however, stands in sharp contrast to oil importers and parallels that of other oil exporters. The improving terms of trade during the oil boom, nonetheless, was short-lived and preceded a precipitous decline commensurate with falling oil prices in the mid-1980s.

Given that all four countries confronted external shocks similar to those that precipitated the need for adjustment in many countries of sub-Saharan Africa, i.e., declines in the terms of trade and reductions in foreign capital inflows as world capital markets tightened in the early 1980s, we frame the simulations as a response to these adverse external conditions. In particular, in order to facilitate comparison between countries, the same terms-of-trade shock — a ten-percent decline in the world price of major export good — is modeled for each country. In addition, foreign capital inflows are reduced by an amount equal to 10 percent of base year exports.⁹

SIMULATING ALTERNATIVE POLICIES

The first policy option considered is the one actually chosen by many African countries in the early stages of confronting an economic crisis: adjustment by default, which we refer to as *de facto* adjustment. In the absence of policy reform, nondiscretionary adjustment will occur to bring the economy closer to a sustainable balance between supply and demand. To capture the *de facto* adjustment, we follow a standard practice employed by nonreforming African

⁹ For The Gambia, where exports are a large share of GDP, a foreign exchange shock of 5 percent of base exports is modeled.

Table 6 — Characteristics of Households

	Percent of Population	Income Per Capita in Local Currency
Cameroon		
		<u>1,000 FCFA (1985)</u>
Urban (Yaoundé and Douala)		
High income	10.4	795
Low income	0.7	232
Rural		
High income farmers (north and south)	33.8	500
Low income farmers (north)	10.3	260
Low income farmers (south)	20.8	314
High income non-farm	15.6	490
Low income non-farm	8.2	294
		<u>Dalasis (1990)</u>
Gambia		
Urban		
High income	8.6	6,802
Low income	20.1	2,554
Rural		
High income farmers	21.4	2,061
Low income farmers	49.9	1,013
Madagascar		
		<u>1,000 FMG (1984)</u>
Urban		
High income	2.2	877
Middle income	11.7	181
Low income	3.0	126
Rural		
High income farmers	18.5	271
Low income farmers		
Plateau	19.9	103
East Coast	20.8	105
West and South	14.0	118
Non-farm rural poor	4.9	103
Niger		
		<u>1,000 FCFA (1987)</u>
Urban		
High income	3.2	415
Low income	6.4	160
Semi-urban	4.9	60
Rural		
High income (north)	10.4	116
High income (south)	23.7	68
Low income (north)	31.2	49
Low income (south)	20.2	49

Sources: Gauthier and Kyle (1991); Lynch (1991); Jabara, Lundberg, and Jallow (1992); Dorosh et al. (1991); and Dorosh and Nssah (1991).

Note: Per capita expenditures are presented for Cameroon.

Table 7 — Budget Surplus/Deficit, Terms of Trade, and Real Exchange Rate, 1975-1979 to 1990

	Budget Surplus/Deficit (% GDP)	Terms of Trade (1980=100)	Real Exchange Rate (1987=100)
Cameroon			
1975-79	0.8 ^a	99.3	—
1980-83	-1.5	104.8	76.3
1984-85	1.1	104.8	79.0
1986-87	-1.5	69.0	94.7
1988-89	-3.4	68.2	92.8
1990	—	68.2	92.5
The Gambia			
1975-79	-8.0	110.0	—
1980-83	-16.1	86.8	129.9
1984-85	-13.0	75.5	126.3
1986-87	-22.0	63.0	97.4
1988-89	-7.0	66.4	105.8
1990	—	66.4	97.2
Madagascar			
1975-79	-5.6	125.0	—
1980-83	-9.7	94.0	181.8
1984-85	-3.6	102.0	159.7
1986-87	-3.4	122.0	102.0
1988-89	-5.6	115.0	84.7
1990	-0.8	108.5	87.5
Niger			
1975-79	-4.8	133.0	—
1980-83	-12.0	112.0	138.5
1984-85	-8.3	115.0	120.3
1986-87	-9.5	92.0	105.1
1988-89	-10.1	80.0	90.9
1990	—	77.7	84.8

Sources: World Bank (1992a); World Bank (1991); IMF (various years).

^a 1977-79 only.

countries in crisis: The tightening of import quotas to cope with growing account imbalances (Simulation I).

The alternative to both de facto, unguided adjustment, and to leaving the process to the next government or generation is to undertake an economic recovery program in which policy is reformed with the intent of making the adjustment process orderly. The argument in favor of adjusting through reforming economic policy is that it sets the stage for restoring macroeconomic stability and represents a necessary, albeit not always sufficient condition for placing the country in a position to realize substantial growth.

In particular, we focus on the most prominent mechanism for addressing the current account deficit: real exchange rate devaluation. In Simulation II, we allow the countries to adjust solely through realignment of the exchange rate. Next, we examine variants on Simulation II by allowing the real exchange rate to adjust while reducing government spending (Simulation III). A second variant involves imposing taxes on foreign trade to help maintain government revenues in the face of weakening world prices for exports (Simulation IV). Finally, we model the subsidizing of food imports while allowing the exchange rate to adjust to bring the current account balance back into line with the conditions that existed prior to the onset of the economic crises (Simulation V). In both these last two simulations, no exogenous change is made in government expenditures.

In reporting the results, the values derived for the adjustment through devaluation (Simulation II), are reported relative to the de facto adjustment (Simulation I). Since Simulations III through V are variants of the exchange rate simulation, these results are presented relative to Simulation II. This allows us to highlight not only the value of adjustment through devaluation relative to de facto adjustment and increased foreign borrowing, but also facilitates comparisons of the relative effects of policies that are often undertaken in conjunction with exchange rate reforms.

In all cases, the results are anchored to the same macroeconomic constraint: the balance of payments deficit is held constant across the simulations. Each of the simulations are comparable across countries in terms of the policies undertaken, and within a country in terms of the macroeconomic target that the adjustment process will achieve. Thus, the relative outcomes of each simulation, in terms of aggregate growth, income distribution, and various other outcomes, including investment and government revenues and expenditures, can be compared since they are designed to meet the same macroeconomic adjustment objectives.

Simulation I: De Facto Adjustment

The first simulation is designed to examine the effects of the deteriorating economic imbalances with no strategic policy response. As indicated above, the real exchange rate is not permitted to adjust (depreciate) freely, nor are changes in fiscal or trade policies modeled. Instead, de facto adjustment occurs by imposing quotas on imports in response to the decline in foreign exchange

availability. De facto adjustment is modeled by putting an implicit tariff on all imports, with the quota rents accruing to high income urban households.^{10,11}

Table 8 shows the effects of the external shocks with de facto adjustment. Not surprisingly, real GDP falls sharply in all countries (3.3 to 6.2 percent) as lower export earnings and foreign capital inflows reduce aggregate demand and incomes. Imports fall by 8.4 to 17.5 percent, and lower trade tax revenues along with real incomes result in a decline in real government revenues by 2.1 to 11.0 percent. With no change in real government expenditures, government deficits increase and combine with the drop in foreign savings (foreign capital inflows) to reduce the total pool of savings and total investment by 14.4 percent (Cameroon) to 42.9 percent (Madagascar).

By constructing the simulations, there is little change in the real exchange rate. Output of the services sector falls sharply in all countries, largely because investment demand for construction services declines. The decline in the agricultural sector is smallest in Niger since the terms-of-trade shock modeled in this case is a fall in the world price of uranium, not in the price of an agricultural export.

Nearly all household groups suffer as the effects of reduced export earnings and lower foreign capital inflows reverberate through the economy. The urban high income households suffer least (and actually see a rise in their real incomes in Cameroon, The Gambia and Niger) because they collect the rents associated with the import quotas. Of course, in practice, it is likely that only a small number of the urban elite would gather the lion's share of the rents. The real incomes of many households in this group would be expected to decline. Incomes of the urban poor decrease sharply in percentage terms in all countries because of the decline in the output of the service sectors (in part because of the drop in investment). Rural households also suffer from the overall decline in economic activity and the decline in prices of export crops (except for Niger).

Simulation II: Adjustment Through Real Exchange Rate Depreciation

The second simulation focuses on the effects of real exchange rate depreciation on poverty and income distribution. Table 7 shows the actual

¹⁰ Alternatively, this simulation could be viewed as a premium on exchange paid by all importers.

¹¹ For The Gambia and Niger an implicit tariff of 10 percent is sufficient to bring about equilibrium in the balance of payments without a significant real exchange rate depreciation. For Cameroon, a higher implicit tariff of 30 percent is necessary, given the magnitude of the shock and the rather price-inelastic import demand and export supply. For Madagascar, a reduction in the import quotas on manufactured good and rice by 25 percent accompanies 10 percent reduction in the implicit tariff.

Table 8 — Simulation I: De Facto Adjustment - Impose Import Quotas

	Cameroon	Gambia	Madagascar	Niger
Real GDP	-5.17	-3.95	-6.21	-3.31
Consumption	-5.66	-3.35	-5.36	-1.94
Total investment	-14.37	-23.01	-42.95	-28.62
Government expenditures (current)	0.00	0.00	0.00	0.00
Government revenue	-11.03	-6.62	-10.35	-2.13
Exports	-5.88	-2.49	-10.66	-4.99
Imports	-17.48	-8.44	-17.44	-11.21
Change in foreign savings/base-year exports	-10.00	-5.00	-10.00	-10.00
Real exchange rate	0.24	-3.67	0.00	2.08
Real incomes				
Urban rich	14.07	10.68	-3.47	9.20
Urban poor	-9.07	-10.23	-7.40	-5.63
Rural rich	-10.44	-9.16	-6.37	-4.42
Rural poor	-9.79	-7.28	-5.96	-3.69
Small farm - export-oriented			-7.08	-3.45
Total	-5.72	-4.00	-5.91	-2.04

Note: Percentage change relative to base SAM.

changes in the real exchange rates among the four countries included in this paper. With the exception of Cameroon, substantial progress has been made toward realizing exchange rate adjustments, including in Niger, where the real exchange rate has depreciated, despite the nominal rate being fixed.¹² As intimated above, however, much of the early writing on the deleterious impact of adjustment focused on the harmful effects of exchange rate adjustments on the poor, who were assumed to be net consumers of tradable staple foods and net suppliers of labor, and for whom a combination of greater unemployment and lower wages would have adverse consequences. While some of the descriptive data presented above would challenge such assumptions, the simulations on exchange rate devaluation provide a more complete picture.

In practice, most nominal devaluations are accompanied by changes in fiscal policies (such as cuts in government spending) or trade policies (reductions in import tariffs and elimination of import quotas). These accompanying changes in real policy instruments enable the change in a nominal price (the exchange rate) to affect relative prices (the real exchange rate) and real variables in the economy. The simulations presented in Table 9, however, show the effect of a 10 percent depreciation of the real exchange rate, with no changes in government real expenditures or trade policy. Actual trade tariffs and taxes are unchanged; imports are no longer constrained by quotas or a foreign exchange premium but are market determined.

Although nominal exchange rates vis-à-vis the French franc are fixed for CFA countries (such as Cameroon and Niger), changes in real exchange rates can occur through differential rates of inflation between a CFA country and its trading partners, as well as through changes in the nominal exchange rate between the French franc and other currencies. Moreover, a combination of import tariffs and export subsidies can substitute for a nominal exchange rate devaluation in changing the relative price of tradables and nontradables in the economy.

Compared with the de facto adjustment simulation (Simulation I), under structural adjustment the required real exchange rate depreciation is 9.7 percent in Cameroon, 8.8 percent in The Gambia, 6.6 percent in Niger, and 3.3 percent in Madagascar (where the quotas on manufactured goods and rice are increased). Real GDP is also slightly higher (by 0.3 to 3.3 percent) in all countries except The Gambia which shows a small decrease of less than 0.1 percent. The depreciation of the real exchange rate spurs exports by 2.3 and 2.9 percent in Niger and The Gambia, respectively, and by 8.2 percent in Cameroon and 14.0 percent in Madagascar. This increase in export earnings permits a higher level of imports as well.

With the removal of the quota rents, the urban rich households lose real incomes (by 8.4 to 14.5 percent), despite the overall increase in economic activity and an increase in real wages for skilled labor. Urban poor households

¹² These exchange rate indices do not take into account changes in tariffs, quantitative restrictions, export taxes and tariffs which are important determinants of the actual incentive structure faced by importers and exporters.

Table 9 — Simulation II: Devaluation

	Cameroon	Gambia	Madagascar	Niger
Real GDP	3.00	-0.03	0.67	0.34
Consumption	3.17	-0.62	0.47	-0.41
Total investment	4.06	2.44	6.37	6.40
Government expenditures (current)	0.00	0.00	0.00	0.00
Government revenue	10.97	5.25	2.61	-1.38
Exports	8.20	2.95	2.25	2.30
Imports	10.08	2.94	2.05	1.85
Change in foreign savings/base-year exports	0.00	0.00	0.00	0.00
Real exchange rate	9.67	8.81	3.27	6.56
Real incomes				
Urban rich	-14.53	-12.77	-6.12	-14.46
Urban poor	7.50	7.44	2.25	1.94
Rural rich	8.56	5.88	1.39	1.91
Rural poor	7.94	4.47	1.41	1.78
Small farm - export-oriented			1.66	1.76
Total	3.22	0.53	0.38	-1.21

Note: Percentage change relative to Simulation I.

benefit from the increase in total investment and demand for unskilled labor. The largest percentage gains in real incomes in Cameroon and Madagascar are enjoyed by rural households who benefit from higher prices of agricultural traded goods because of the depreciation of the real exchange rate. Real incomes of small farmers who cultivate export crops in Madagascar increase by 6.0 percent compared to the average countrywide increase of only 1.25 percent.

The result that households who lose rents derived from import quotas suffer under adjustment is no surprise. Similarly, the finding that real incomes increase overall with the removal of price distortions (import quotas) is also not unexpected. More important, though, is that the average real incomes of the poor, including the rural poor who have lowest per capita incomes, are higher when the real exchange rate depreciates, compared to the nonadjustment through quotas scenario.

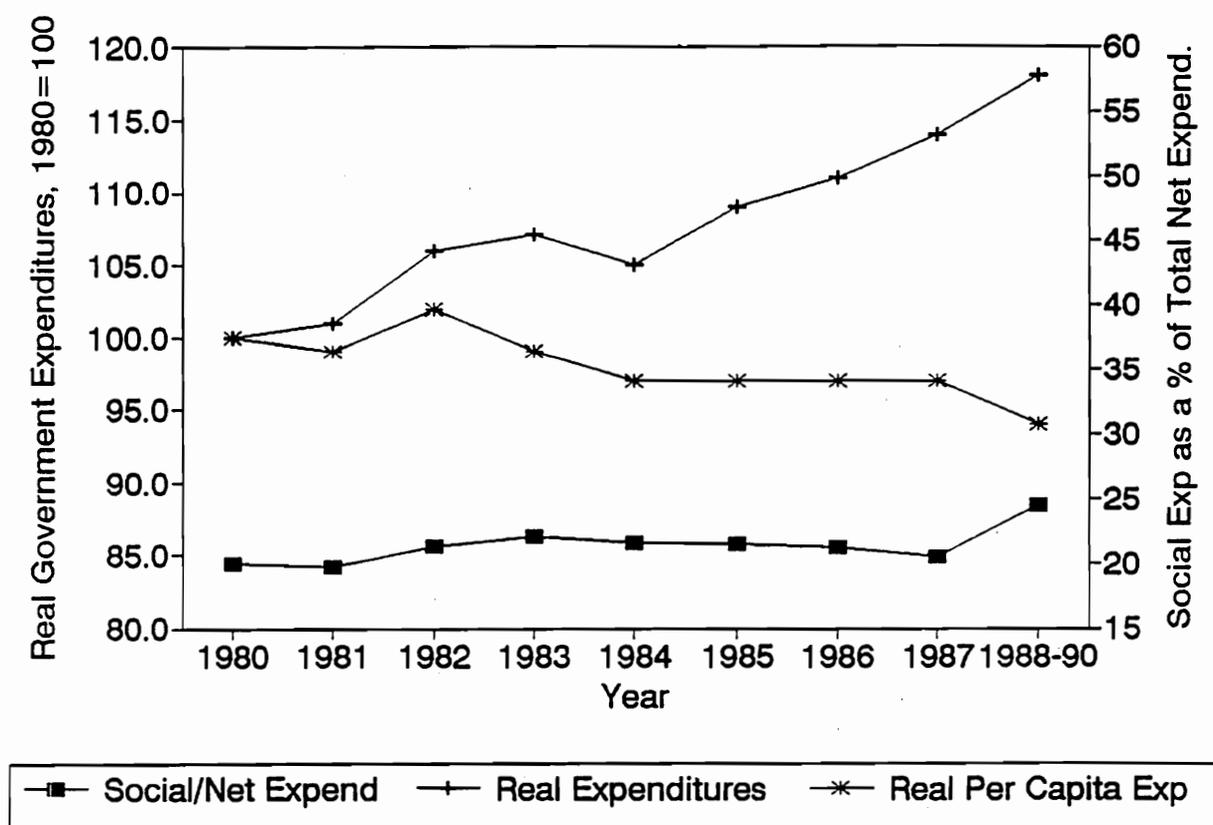
Simulation III: Reductions in Government Spending

In Simulation III, real government expenditures are cut in order to increase government savings (reduce the government deficit) and permit an increase in private investment. The policy of reducing spending is, at least in theory, a centerpiece of most reform programs, along with exchange rate adjustment. In practice, however, many governments have been reluctant to reduce government spending, and in turn, the pressures from the donors to do so are clearly not strong. To illustrate, in Figure 1 we present an unweighted average of the index of real government expenditures, as well as expenditures as a share of GDP for 23 countries for which we could gather consistent data, including the four countries for which we have models. The numbers show clearly that not only has the size of the state relative to GDP not gotten smaller during the 1980s when most countries were undergoing adjustment, but real government expenditures have actually been on the rise.

Although fiscal contraction has not been a centerpiece of adjustment, we nonetheless run a simulation with a 10 percent reduction in real government expenditures. In reducing government spending, the real exchange rate is also allowed to adjust without an imposition of quotas. Results of this simulation are thus compared with the results of Simulation II. The biggest effect of reducing the size of government is that it allows investment to increase by 4.1 percent in Cameroon, to 19.7 percent in Niger (Table 10). Recurrent government expenditures are very large relative to private investment in Madagascar and Niger, so the change in investment is greater in these two countries. Real GDP falls slightly in The Gambia, Madagascar and Niger, and the rate of inflation is slowed in all but Madagascar.

In general, urban households are hurt more by the decline in government expenditures since government employment is concentrated in urban areas. The increase in investment spending tends to help offset this decline, however. In most cases, rural households benefit slightly from this policy as the small depreciation of the real exchange rate tends to boost incomes for producers of tradable commodities.

Figure 1 — Index of Real Total Government Expenditures and Social Expenditures (percent of total)



Sources: International Monetary Fund (data tapes), Government Financial Statistics; World Bank (database) Africa Tables; and World Bank (1991), World Tables.

Notes: Country coverage includes Botswana, Burundi, Cameroon, Congo, Ethiopia, Gabon, The Gambia, Ghana, Kenya, Lesotho, Liberia, Madagascar, Malawi, Mauritius, Niger, Nigeria, Somalia, Swaziland, Tanzania, Togo, Uganda, Zambia, and Zimbabwe.

Table 10 — Simulation III: Devaluation with Reduction in Government Spending

	Cameroon	Gambia	Madagascar	Niger
Real GDP	0.01	-0.53	-0.11	-0.61
Consumption	0.02	-0.56	-0.14	-1.81
Total investment	4.05	7.72	16.24	19.71
Government expenditures (current)	-10.00	-10.00	-10.00	-10.00
Government revenue	-0.05	0.40	0.98	-0.48
Exports	0.29	0.10	0.08	0.15
Imports	0.36	0.10	0.08	0.12
Change in foreign savings/base-year exports	0.00	0.00	0.00	0.00
Real exchange rate	0.16	0.43	-0.19	0.77
Real incomes				
Urban rich	0.08	-0.96	-0.79	-7.68
Urban poor	-0.24	-1.16	-1.55	-1.63
Rural rich	0.01	0.14	-0.06	-0.66
Rural poor	0.01	0.06	0.35	-1.27
Small farm - export-oriented			0.48	-1.24
Total	0.02	-0.48	-0.18	-2.13

Note: Percentage change relative to Simulation II.

Simulation IV: Maintaining Government Revenues Through Increased Trade Taxes

In Simulation IV, in addition to allowing the real exchange rate to adjust, taxes on foreign trade are increased uniformly by 10 percent in an attempt to maintain government revenues in spite of the shock of lower world prices for exports and reduced foreign capital inflows.

In light of the removal of gross distortions in the exchange rate and the difficulty of taxing incomes, explicit taxation of trade finds some justification. On the other hand, there is cause for concern that such a policy will have deleterious distributional effects, which may not be offset by growth in GDP that is spurred by the higher revenues and investment spending of the state.

Greater trade taxes in this simulation raise real tax revenues by 25.5 to 56.6 percent, thus increasing the pool of total savings in the economy (Table 11). Real investment increases sharply in all four economies. Taxing trade, however, distorts the economy by reducing incentives for both exports and imports and leads to shifts in resources from production of exportables and toward importables and, to a lesser extent, nontraded goods. Real GDP thus falls by 0.3 to 2.5 percent in this simulation.

Real incomes of all household groups also fall despite the increase in investment spending. In all cases, the urban rich suffer a slightly larger decline in real incomes than do other household groups, partly because of declines in returns to capital as the economy contracts. Real incomes of small farmers producing export crops in Madagascar fall more than real incomes of other small farmers because of the decline in the real domestic price of export crops associated with the appreciation of the real exchange rate.

Simulation V: Subsidies on Imported Food

Next we present the results of a 30 percent subsidy on food imports (rice in The Gambia and Madagascar, cereals in Niger, all food imports in Cameroon).¹³ Food subsidies are one way for governments to enhance food security and increase the real incomes of the urban poor. In practice, food subsidies in Africa have primarily benefited urban households, which have access to the official distribution systems. Within urban areas, the better-off households have generally been most successful at capturing the rents associated with subsidies. Enormous leakages and other inefficiencies characterize urban distribution systems. Also common in sub-Saharan Africa are implicit subsidies on food through low import tariffs, overvalued exchange rates, and marketing and distribution subsidies.

¹³ In the Madagascar simulation, the rice import quota remains unchanged; in the other three models, rice imports are endogenously determined.

Table 11 — Simulation IV: Devaluation with Tax on Exports and Imports to Maintain Government Revenues

	Cameroon	Gambia	Madagascar	Niger
Real GDP	-2.49	-0.26	-1.23	-0.85
Consumption	-6.09	-9.82	-2.69	-3.90
Total investment	9.41	42.35	16.04	20.94
Government expenditure (current)	0.00	0.00	0.00	0.00
Government revenue	25.46	56.56	12.26	44.38
Exports	-7.01	-5.06	-3.02	-5.57
Imports	-8.69	-5.17	-2.79	-4.48
Change in foreign savings/base-year exports	0.00	0.00	0.00	0.00
Real exchange rate	1.98	-1.05	-2.09	-2.98
Real incomes				
Urban rich	-6.50	-10.92	-4.20	-6.31
Urban poor	-5.59	-10.05	-3.36	-4.39
Rural rich	-6.26	-9.09	-2.88	-3.61
Rural poor	-5.71	-8.79	-2.58	-3.72
Small farm - export-oriented			-3.03	-3.75
Total	-6.16	-9.71	-3.00	-4.18

Note: Percentage change relative to Simulation II.

In the simulation found in Table 12, imports are explicitly subsidized at 30 percent, having the effect of a universal, untargeted subsidy. This policy directly benefits households who have access to the lower-priced food as their consumption and real incomes increase. In the model simulations, all households in Cameroon and The Gambia gain in real income from the subsidy, as do all but the urban rich in Madagascar. The urban poor tend to benefit more than the urban rich (in terms of percentage change in real income) in part because food comprises a larger share of their total expenditure.

Since only imports are subsidized, the overall magnitude of the income effects is largely determined by the share of imports in total consumption. For example, in Madagascar, where imports are only a small share of domestic consumption and where imported rice is not a perfect substitute for domestically produced rice, the 30 percent subsidy on imported rice has only a small effect on household incomes. In contrast, in The Gambia, where most rice is imported, the subsidy on imports has a much larger effect.

Money spent by the government on the food subsidy also reduces funds available for investment, and investment falls by 0.5 to 10.9 percent. There is thus an economywide tradeoff: the increased consumption is made possible by the food import subsidy and lower investment (and potentially lower future consumption). The urban rich in Madagascar and Niger suffer most (and gain least in The Gambia) even in the static simulations, since the food subsidy makes little difference to their costs, and the reduction in investment spending lowers their incomes. In Niger, the decline in investment spending even leads to a slight reduction in real incomes for the urban poor.

By depressing domestic food prices, food subsidies can potentially reduce farmer incomes. Macroeconomic effects prevent a decline in rural household incomes in the model simulations, however. The food import subsidy increases import demand, but reduces demand for nontraded goods. The real exchange rate thus depreciates by 0.3 to 4.5 percent, restoring external equilibrium by discouraging import of nonfood items and encouraging exports.¹⁴ Since most farmers produce a mix of crops and not just export foods, the benefits arising from the real exchange rate depreciation outweigh the losses incurred because of the reduced price of imported food. Moreover, small farmers are either deficit food producers or produce only a small surplus compared with large farmers, so a fall in food prices hurts larger farmers more than small farmers. For example, in Madagascar, incomes of the rural poor (who produce little surplus rice) increase by 0.44 percent, while incomes of the rural rich increase by only 0.31 percent.

¹⁴ The real exchange rate depreciation in Cameroon is smaller because food imports make up a small share of total food supply in the base year. Because imports are not modeled as perfect substitutes for domestic production, the import subsidy has little effect on domestic food prices overall, the level of imports, or the real exchange rate.

Table 12 — Simulation V: Devaluation with Food Subsidy

	Cameroon	Gambia	Madagascar	Niger
Real GDP	0.00	-0.11	0.05	-0.31
Consumption	0.13	2.26	0.43	0.51
Total investment	-0.52	-10.86	-4.94	-6.79
Government expenditure (current)	1.74	12.64	3.94	5.70
Government revenue	0.48	3.49	0.24	1.35
Exports	0.54	1.09	0.14	1.60
Imports	0.65	1.11	0.13	1.29
Change in foreign savings/base-year exports	0.00	0.00	0.00	0.00
Real exchange rate	0.52	4.48	0.31	4.44
Real incomes				
Urban rich	0.15	0.08	-0.32	-1.02
Urban poor	0.18	1.56	0.31	-0.07
Rural rich	0.12	2.88	0.56	0.30
Rural poor	0.14	3.40	0.64	0.35
Small farm - export-oriented			0.60	0.17
Total	0.13	1.98	0.44	0.05

Note: Percentage change relative to Simulation II.

4. CONCLUSIONS

The impact of economic reforms on growth and income distribution has been keenly debated in the past decade. In order to contribute to this debate, we began this paper by discussing the characteristics of the poor and the evolution of the state and markets during the process of adjustment, and we set the stage for conducting a counterfactual analysis of the effects of exogenous shocks and adjustment policies using CGEs for four African economies.

The simulations support a number of general conclusions about the effects of stabilization and structural adjustment policies on the poor in sub-Saharan Africa. First, the terms-of-trade shocks that were so pervasive in Africa reduced real incomes for most household groups, especially the producers of commodities with falling world prices. However, the failure to reform policy and allow the exchange rate to adjust, and to employ rationing and quotas to cope with imbalances in the external accounts, instead was clearly detrimental to the poor. The beneficiaries of maintaining an overvalued exchange rate and related policy distortions were the urban rich. The political economy of distortion favoring the urban elite, the most influential interest group, without doubt, explains why such policies prevailed for so long without being challenged, even in the face of obvious economic decline.

In contrast, adjusting to distortions through real devaluation, even in the absence of concessional capital inflows, is favorable to the poor, at least relative to the alternative of adjusting through imposing quotas and related means that contribute further to market distortions and rent seeking. Nonetheless, the fact remains that poverty is endemic, and there is an important question as to how to further increase the real incomes of the poor in the short term. One approach investigated is through subsidizing food imports. The results of the simulations suggest that not only do the urban poor benefit more than the urban rich, but the latter actually witness a decline in their incomes in Madagascar and Niger. Similarly, the rural poor (who are net food purchasers) also benefit from the subsidy, in part because of the exchange rate depreciation that is associated with the reduction in demand for nontraded goods. Nonetheless, with the exception of The Gambia, the magnitude of the income effects is small. This suggests that the long-term costs of lower investment and future growth may outweigh the small, short-term, positive income and distributional benefits. However, to the extent that this fall in investment is offset by donor financing, the results indicate that a general food subsidy will have favorable distributional outcomes.

More generally, the models show considerable latitude for achieving welfare objectives without compromising macroeconomic stability and long-term growth. First, the continued availability of concessional financing is important in

maintaining aggregate incomes. However, this financing must be offset by macroeconomic and trade policies to limit any real exchange rate appreciation from increased foreign exchange inflows. By preventing a drop in the relative price of traded to nontraded goods, incentives for agricultural production can be maintained and rural incomes enhanced. In this way, incomes of small farmers will generally be shielded from adverse movements in relative prices. While avoiding appreciations of the real exchange rate is a very indirect way of affecting income distribution, it is potentially the most effective and most far-reaching economic policy for raising real incomes of the large numbers of poor in sub-Saharan Africa in the short to medium run.

Second, the composition of investment goods is critical to the income distribution effects when total savings and investment in the economy changes. In most countries, investment goods are predominantly imported or produced in urban areas, so that rural households enjoy little direct benefit from investment booms. More labor-intensive construction methods, for example, utilizing especially unskilled labor, would be one way of steering the benefits of investment spending toward the poor. And of course, the destination of investment by sector, as well as the factor-intensity of the production technology, will affect income distribution once the new capital is in place.

Finally, as expected, most of the results of the counterfactual models correspond broadly to our prior expectations. However, the magnitude of the effects and the differential impact of policies on various income groups in the four countries illustrate the importance of proper country-specific policy analysis. Likewise, the indirect effects of certain policies often outweigh the direct, or expected, effects, further increasing the importance of examining policies in a general equilibrium framework.

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