

DISTRIBUTIONAL IMPACTS OF STRUCTURAL
ADJUSTMENT REFORMS ON
AGRICULTURE IN
CAMEROON

By

GARY R. MULLINS

Bachelor of Arts
Phillips University
Enid, Oklahoma
1979

Master of Arts
The American University
Washington, D.C.
1983

Submitted to the Faculty of the
Graduate College of the
Oklahoma State University
in partial fulfillment of
the requirements for
the Degree of
DOCTOR OF PHILOSOPHY
May 1989

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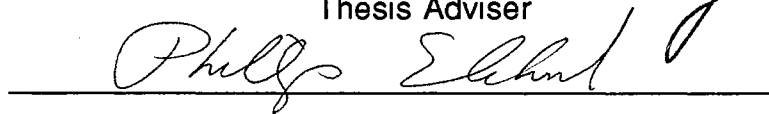
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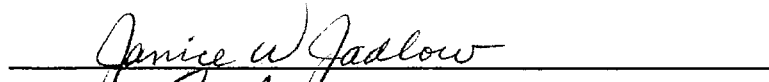
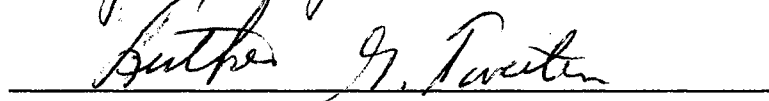
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Thesis Approved:


Thesis Adviser



Dean of the Graduate College

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LIST OF ABBREVIATIONS

CARE	Cooperative Assistance for Relief Everywhere
CDD	Condon, Dahl, Devarajan
CES	Constant Elasticity of Substitution
CET	Constant Elasticity of Transformation
CGE	Computable General Equilibrium
Development-GAP	Development Group for Alternative Policies
EAMI	Promotion des Exploitations Agricoles de Moyennes Importance (Promotion of Medium Scale Agricultural Units)
EFF	Extended Fund Facility
FCFA	African Financial Community Franc
FCNL	Friends Committee on National Legislation
GAMS	General Algebraic Modeling System
GDP	Gross Domestic Product
GNP	Gross National Product
GOC	Government of Cameroon
IMF	International Monetary Fund
I-O Matrix	Input-Output Matrix
NIC	Newly Industrialized Country
ONCPB	Office National de Commercialisation de Produits de Base (National Produce Marketing Board)
ROW	Rest of World
SAL	Structural Adjustment Loan
SAM	Social Accounting Matrix

SAP	Structural Adjustment Program
SCN	United Nations System of National Accounts
SDR	Special Drawing Right
UNICEF	United Nations International Children's Emergency Fund
USAID	United States Agency for International Development
USDA	United States Department of Agriculture

CHAPTER I

INTRODUCTION

Problematic Situation

The World Economy in Transition

In 1974, the world market price of oil quadrupled.¹ This dramatic price increase was one of the most significant economic events of the last several decades. In addition to marking the passing of an era when petroleum resources were treated more or less as infinite, it also set into motion a chain of events that redefined economic relations between the industrialized developed countries of "the North," and the Third World developing countries of "the South." One outcome of this economic realignment was the birth of a new class of international market participants, the Newly Industrialized Countries, or NICs, so called because of their rapidly mechanizing economies. More so than the developing countries, it was the NICs who forced the redefinition of relationships within the international market place. The South had for some time demanded a larger share of the international economic pie. Now, with their considerable mineral resources, they were in a position to take it.

¹Between 1973 and 1974, crude oil sales prices soared 332 percent from a weighted average of \$3.40 per barrel to \$11.30. By the end of 1980, prices reached \$30.90, marking a ten-fold increase in just seven years. Such rapid and dramatic price increases caused economic turmoil in developing and industrialized countries alike, but had their most devastating effect on developing countries which rely entirely on imports to meet domestic oil demand.

While some countries, such as Venezuela, Ecuador and Nigeria, benefited directly from oil production, others reaped indirect gains. Sudden increases in oil prices resulted in large amounts of surplus financial capital becoming available for lending. In the form of commercial credit, concessional public lending or direct grants, these readily available "petro-dollars" permitted less fortunate oil-importing countries throughout Latin America, Asia and, in particular, Sub-Saharan Africa to pursue ambitious (and expensive) development plans. Too often, easy credit allowed borrowers to implement projects and policies that were ill-conceived, financially nonviable or both. Whether unable or unwilling to bring plans in line with resource costs, many governments showed only weak response as debt burdens mounted higher and higher.

The Debt Crisis

By 1980, long-term public and private debt of all developing countries reached US \$427 billion, marking an increase of US \$264 billion, or 263 percent, over the previous five years (World Debt Tables, p. xii). Much of this capital was invested in capital-intensive infrastructure, expansion of public services and import-substitution types of manufacturing that relied heavily on imported inputs, rather than in domestic export industries which could yield foreign exchange.

A continual need for imported inputs and the inability to generate sufficient foreign exchange locally required debtor nations to borrow even more. For many, the result was chronic external account deficits and subsequent inability to meet foreign debt obligations. Figures confirmed the gravity of the situation: in 1980, 72 percent of total disbursements received by all developing countries went to service debt (World Debt Tables, 1986).

Global Economic Recession

Although abundant in the years immediately following the oil boom, credit was rapidly depleted by the heavy borrowing of oil-importing countries. Tighter money supplies left commercial lenders highly exposed. Lenders responded to these new circumstances by raising interest rates on new loans and becoming more selective in lending practices. In particular, they began to more critically evaluate loans to developing country clients who were highly leveraged and without good export growth opportunities.

To add to debtor country woes, concessional aid, which for some countries constituted up to 70 percent of net capital inflows, also waned. Behind this decline lay the economic malaise of the industrialized countries themselves. Annual growth rates had fallen by 1.5 percent from the previous decade while productivity was down 2.2 percent.² Efforts were made to reduce domestic inflation by enacting policies to curb aggregate demand. To the extent these policies were effective, they also reduced demand for the exports of many developing countries. For the developing countries, which sold as much as two-thirds of all their merchandise exports to the industrialized countries, these anti-inflationary policies meant even fewer opportunities to earn badly needed foreign exchange.

Conceptualization of Structural Adjustment Lending

Observing the plight of the developing countries, World Bank officials in February 1980 initiated discussion of a concept then referred to as "lending for

²Annual growth in the industrialized countries averaged 4.9 percent between 1960-70, but fell to only 3.4 percent during 1970-78. Productivity, which grew at an average 3.9 percent over the period 1963-73, decreased to just 1.7 percent between 1973-80. (Source: World Development Report 1979, p. 4.)

structural adjustment." It was proposed that the Bank provide funding support for policy and institutional change in those countries having persistent problems balancing their external accounts. These were to be non-project funds, devoted exclusively to reducing current account deficits of medium- to long-term nature. They were not to be used to alleviate transitory, or "once only," balance of payments deficits, such as might be caused by domestic production shortfalls or depressed world market prices. In order to qualify for a structural adjustment loan (SAL), the candidate government would be required to provide a development plan outlining the specific set of policy and institutional changes to address the root causes of the trade deficit. To assure adherence to this plan, funds would be disbursed in tranches, and then only after a review had confirmed satisfactory progress in implementing the agreed-upon plan. Officials shared the understanding that these adjustments would not be realized in the short-term, but that it might require at least five to seven years before initial impacts were observed. Therefore, it would be essential to SAL success to maintain flexibility in order to adapt programs as circumstances dictated.

It was also agreed that the Bank should coordinate its efforts to facilitate adjustment with those of the International Monetary Fund (IMF) under its Extended Fund Facility (EFF).³ To this end, the World Bank would attempt to ensure that SAL conditions were consistent with IMF policy recommendations.

The administrative framework for structural adjustment lending was in place by the end of 1980. Formally, structural adjustment lending was defined

³The Extended Fund Facility of the IMF was established in 1979 to assist members with medium term balance of payments problems. Under the EFF, qualifying countries may draw up to 140 percent of their Fund quota over a period not to exceed three years and to be repurchased within ten years. Preconditions require submission and IMF approval of detailed reform plans on a year by year basis.

as:

non-project lending to support programs of policy and institutional change necessary to modify the structure of an economy so that it can maintain both its growth rate and the viability of its balance of payments in the medium term (Michalopoulos, 1987).

Support would take the form of foreign exchange to finance needed imports. Of equal importance was the anticipation that this new lending facility would serve as a fundamental instrument for dialogue between the Bank and the recipient country on various aspects of development policy. It was also hoped that collaboration with the Bank in a disciplined structural adjustment program (SAP) might enable some developing countries to regain their lost creditworthiness among commercial lenders.

SAL Implementation

Table 1 provides an overview of World Bank adjustment lending activities from 1979 to 1987. Thirty-one SALs were approved in 1987 totalling \$4.1 billion and comprised 23 percent of total Bank lending for the year. Through the end of fiscal year 1987, the World Bank had approved 121 SALs to 50 countries with a total value of \$15.3 billion. As Table 2 indicates, primary SAL recipients have been low-income African and highly-indebted middle-income countries. In 1987, these two groups accounted for three quarters of adjustment loans by number.

Structural adjustment programs have targeted three broad areas for reform:

- 1) trade policy - with the objective of increasing competitiveness of developing country exports in international markets;
- 2) mobilization and use of resources - aimed at generating higher levels of domestic and foreign investment as well as stimulating more efficient use of scarce resources; and,

TABLE 1
WORLD BANK/INTERNATIONAL DEVELOPMENT ASSOCIATION
ADJUSTMENT LENDING FISCAL YEARS 1979-1987

	<u>FY79</u>	<u>FY80</u>	<u>FY81</u>	<u>FY82</u>	<u>FY83</u>	<u>FY84</u>	<u>FY85</u>	<u>FY86</u>	<u>FY87</u>	<u>FY79-87</u>
<u>Structural Adjustment</u>										
Number	-	3	6	6	7	6	3	7	13	51
US\$ M	-	305	717	1071	1285	1082	163	610	665	5897
% Total Lending	-	2.7	5.8	8.2	8.9	7.0	1.1	3.7	3.8	4.7
<u>Sector Adjustment</u>										
Number	1	1	3	-	8	8	13	18	18	70
US\$ M	31	65	137	-	641	1318	1475	2283	3452	9403
% Total Lending	0.3	0.6	1.1	-	4.4	8.5	10.3	14.0	19.5	7.5
<u>All Adjustment</u>										
Number	1	4	9	6	15	14	16	25	31	121
US\$ M	31	370	854	1071	1926	2400	1638	2893	4118	15300
% Total Lending	0.3	3.2	6.9	8.2	13.3	15.5	11.4	17.7	23.3	12.2

Source: "Interim Report on Adjustment Lending," Memorandum to the Executive Directors of the World Bank, January 25, 1988, p. 9.

TABLE 2
ADJUSTMENT LOAN RECEIPIENTS CLASSIFIED BY NUMBER
OF ADJUSTMENT LOANS RECEIVED, 1979-1987

<u>One Loan</u>	<u>Two Loans</u>	<u>Three Loans</u>	<u>Four+ Loans</u>
Bangladesh	Argentina	Bolivia	Ghana (6)
Burundi	Chile	Brazil	Jamaica (8)
Burkina Faso	Colombia	Cote D'Ivoire	Malawi (4)
Central Africa Republic	Costa Rica	Kenya	Morocco (5)
Dominica	Guinea Bissau	Korea	Pakistan (4)
Ecuador	Mexico	Madagascar	Philippines (4)
Gambia	Niger	Mauritania	Turkey (8)
Guinea	Nigeria	Mauritius	Zambia (4)
Guyana	Panama	Senegal	
Hungary	Sudan		
Indonesia	Tanzania		
Nepal	Thailand		
Sao Tome	Tunisia		
Sierra Leone	Togo		
Somalia	Uruguay		
Uganda	Yugoslavia		
Zimbabwe	Zaire		

Source: "Interim Report on Adjustment Lending," Memorandum to the Executive Directors of the World Bank, January 25, 1988, p. 11.

- 3) institutional reform - involving rationalization of responsibilities allocated to public and private institutions in the interest of more efficient management and reduced public deficits.

The above objectives have been pursued through a variety of measures.⁴ Although each has its own unique character, SAPs do display some common components. Typically appearing among program lending conditions are: currency devaluation, maintenance of positive real interest rates, elimination or reduction of subsidies and tariffs on producer and consumer goods, price adjustments that equate domestic prices with border prices, increased privatization of publicly operated activities, and efforts to impose greater fiscal responsibility upon public enterprises.

SAL Performance and Evaluation

While acknowledging some set-backs,⁵ World Bank reviews have generally indicated favorable economic responses to structural adjustment programs. This conclusion is substantiated by the GNP, current account balance and debt service ratio figures in Table 3. World Bank reviewers caution, however, that care should be exercised in asserting any causal relationship between reforms undertaken as part of an SAL and any subsequent improvement (or similarly, deterioration) in economic performance. Reasons for this are, first, that it is both

⁴A listing of SAP reform measures by country appears in Appendix A.

⁵SAL results fell short of expectations in at least four cases: Bolivia, Guyana, Senegal and Jamaica. In the first three instances, SAL activities were discontinued after Bank officials determined proposed government reform programs were inadequate to address prevailing economic problems and a mutually agreeable solution could not be reached. In the case of Jamaica, however, failure of structural adjustment reforms to bring about economic stability was attributed more to uncontrollable external shocks originating in international markets than to the Jamaican government's lack of political will (Source: World Bank Annual Report, 1987).

TABLE 3
MACROECONOMIC INDICATORS FOR SELECTED
STRUCTURAL ADJUSTMENT COUNTRIES
1976-1983

	1976	1977	1978	1979	1980	1981	1982	1983
<u>TURKEY</u>								
GDP Annual Growth Rate (%)	8.76	4.67	3.33	-0.91	-0.73	4.18	4.85	3.82
Current Account/BOP (US\$ Millions)	-1757	-2688	-1011	-1094	-2619	-1625	-847	-1775
Debt Service Ratio (%)	11.29	14.40	15.65	18.39	25.92	26.85	0.00	0.00
<u>KENYA</u>								
GDP Annual Growth Rate (%)	2.18	9.38	6.81	5.20	5.35	4.06	0.93	1.71
Current Account/BOP (US\$ Millions)	-109.1	22.2	-529	-387.1	-681.8	-475.1	-276	-45
Debt Service Ratio (%)	4.76	4.27	9.27	9.80	12.37	17.11	21.63	21.01
<u>BOLIVIA</u>								
GDP Annual Growth Rate (%)	6.10	4.21	3.36	-0.02	-0.56	-0.33	-5.57	-7.17
Current Account/BOP (US\$ Millions)	-46.3	-101.5	-263.4	-307.3	-4.9	-395	-157.3	-129.9
Debt Service Ratio (%)	0.00	0.00	0.00	0.00	0.00	0.00	19.14	14.46
<u>JAMAICA</u>								
GDP Annual Growth Rate (%)	-7.03	-2.76	0.43	-2.04	-6.21	2.49	0.72	2.39
Current Account/BOP (US\$ Millions)	-262.1	-36.1	-39.9	-107.5	-127.5	-285.6	-370.1	-335.5
Debt Service Ratio (%)	13.00	15.38	18.11	17.49	15.14	28.88	22.08	19.89
<u>COTE D'IVOIRE</u>								
GDP Annual Growth Rate (%)	9.76	2.49	10.91	2.30	12.21	1.39	-4.03	-4.15
Current Account/BOP (US\$ Millions)	-216	-151.9	-670.3	-1070.7	-1403.3	-1197	-921.5	-871.1
Debt Service Ratio (%)	9.10	9.86	13.42	18.49	24.55	31.25	33.62	29.82

TABLE 3 (Continued)

	1976	1977	1978	1979	1980	1981	1982	1983
<u>TOGO</u>								
GDP Annual Growth Rate (%)	-1.78	7.65	10.48	-4.92	14.53	-3.39	-3.31	-5.68
Current Account/BOP (US\$ Millions)	-23.5	-74.8	-173.6	-164.7	-73	-37.4	-78.7	-44.8
Debt Service Ratio (%)	12.61	30.94	16.11	11.35	8.51	12.04	12.76	17.60
<u>PAKISTAN</u>								
GDP Annual Growth Rate (%)	5.05	3.86	8.05	3.98	10.07	8.05	6.26	6.50
Current Account/BOP (US\$ Millions)	-676	-630	-569	-861	-705	-792	-726	17
Debt Service Ratio (%)	20.06	22.91	23.16	23.62	19.92	14.94	20.51	31.90
<u>KOREA, REPUB</u>								
GDP Annual Growth Rate (%)	13.22	10.91	10.90	7.38	-3.03	7.41	5.68	10.94
Current Account/BOP (US\$ Millions)	-266	8	-848	-3217	-4090	-3936	-2427	-1476
Debt Service Ratio (%)	10.17	10.16	12.30	14.67	13.14	13.82	14.95	14.59
<u>MALAWI</u>								
GDP Annual Growth Rate (%)	4.95	4.56	9.96	5.31	0.60	-6.18	2.51	3.78
Current Account/BOP (US\$ Millions)	-37	-52.9	-119.9	-151.4	-158.9	-75.2	-65.8	0
Debt Service Ratio (%)	8.76	9.01	18.23	17.85	22.08	27.86	23.66	23.36
<u>CHILE</u>								
GDP Annual Growth Rate (%)	3.59	9.80	8.35	8.31	7.83	5.56	-14.23	-0.67
Current Account/BOP (US\$ Millions)	128	-472	-869	-920	-1514	-4014	-2087	-1045
Debt Service Ratio (%)	30.74	32.44	38.62	26.10	21.85	31.04	21.90	18.65
<u>COLOMBIA</u>								
GDP Annual Growth Rate (%)	4.79	4.02	8.17	5.24	4.45	2.21	0.98	1.61
Current Account/BOP (US\$ Millions)	141	322	206	339	-158	-1663	-2766	-2809
Debt Service Ratio (%)	10.31	9.62	10.08	15.00	9.76	15.54	20.65	22.62

TABLE 3 (Continued)

	1976	1977	1978	1979	1980	1981	1982	1983
<u>SENEGAL</u>								
GDP Annual Growth Rate (%)	8.82	-2.57	-5.97	9.41	-3.07	-0.57	14.98	2.70
Current Account/BOP (US\$ Millions)	-80.4	-57.8	-188.3	-204.6	-297	-392	-241.5	-270.8
Debt Service Ratio (%)	6.08	6.64	15.86	14.10	23.42	13.73	4.83	6.48
<u>THAILAND</u>								
GDP Annual Growth Rate (%)	8.58	7.10	10.07	5.98	5.76	6.33	4.10	5.90
Current Account/BOP (US\$ Millions)	-382	-937	-922	-1612	-1587	-2183	-925	-2700
Debt Service Ratio (%)	2.49	3.03	3.78	4.86	5.28	6.97	8.69	10.44
<u>PHILIPPINES</u>								
GDP Annual Growth Rate (%)	7.84	6.25	5.53	6.32	5.29	3.84	2.91	1.11
Current Account/BOP (US\$ Millions)	-954	-646	-873	-1158	-1470	-1802	-2908	-2575
Debt Service Ratio (%)	8.17	8.09	14.04	13.83	8.12	11.72	15.36	19.09
<u>GUYANA</u>								
GDP Annual Growth Rate (%)	1.40	-2.67	-1.50	-2.08	1.77	1.75	-13.56	-6.62
Current Account/BOP (US\$ Millions)	-123.7	-83.5	-23.6	-64.2	-98.7	-156.5	-128.9	-147.3
Debt Service Ratio (%)	11.17	11.44	15.78	29.36	17.01	21.32	18.11	21.26
<u>MAURITIUS</u>								
GDP Annual Growth Rate (%)	12.33	8.16	5.89	5.69	-9.27	4.84	5.26	0.79
Current Account/BOP (US\$ Millions)	-31.4	-67.5	-94.9	-115	-91.2	-130.7	-38.9	-21.6
Debt Service Ratio (%)	0.98	1.59	2.44	3.77	5.80	9.49	12.05	16.22
<u>NIGER</u>								
GDP Annual Growth Rate (%)	0.68	7.76	13.48	7.14	4.84	1.19	-1.22	-1.81
Current Account/BOP (US\$ Millions)	-24.3	-81.9	-160.5	-106.5	-211.8	-153.9	-210.9	-57.8
Debt Service Ratio (%)	4.50	4.16	2.71	2.48	6.19	12.09	25.93	19.07

TABLE 3 (Continued)

	1976	1977	1978	1979	1980	1981	1982	1983
PANAMA								
GDP Annual Growth Rate (%)	1.60	1.08	9.81	4.63	15.41	4.15	5.55	0.40
Current Account/BOP (US\$ Millions)	-152.6	-133.1	-165.9	-240.7	-238.8	47.2	-46.2	388.8
Debt Service Ratio (%)	12.01	17.52	57.28	34.48	29.76	30.28	36.60	28.09
YUGOSLAVIA								
GDP Annual Growth Rate (%)	5.33	8.34	9.19	5.28	2.58	1.22	0.63	-1.14
Current Account/BOP (US\$ Millions)	156	-1153	-1026	-2837	-1779	-815	-430	257
Debt Service Ratio (%)	4.58	5.50	5.10	5.36	3.96	6.42	7.79	9.07

Sources(s): World Tables 1987, Volume I (Washington, D.C.:The World Bank and International Finance Corporation, 1987); Balance of Payments Statistics Yearbook 1987, Volume 38, Part I (Washington, D.C.: International Monetary Fund, 1987); International Financial Statistics Yearbook 1987, Volume XL (Washington, D.C.: International Monetary Fund, 1987).

Note(s): ^aGDP figures are calculated from constant price series over the time period covered and represent growth in real terms.

^bComputed as a given year's total debt service payments as a percentage of total exports of goods and non-factor services, converted into US dollars from local currency.

conceptually and empirically difficult to disentangle the impacts of a SAP from the effects of other policy measures taken by government, or even from wholly external events such as prolonged drought or changes in the global economic environment. Secondly, impacts of policy reforms may occur with varying time lags, thus making cause and effect relationships difficult to establish. It is reflective of this "attribution problem" that SAP impact evaluations have to date seldom gone beyond a general assessment of subsequent macroeconomic performance.

Unintended Social Welfare Impacts

In a number of cases, troubling negative effects have been observed on various social welfare indicators. In Kenya, higher net unemployment has been observed after implementation of SAP-mandated trade liberalization measures. For Turkish urban workers and public employees, devaluation, reduced subsidies and higher producer prices on basic consumer goods have resulted in sharp reductions in real wages. And in Cote d' Ivoire, reductions in farm gate export price spreads succeeded in narrowing terms of trade between rural and urban areas, but did so at the expense of urban populations who bore a greater share of the 23 percent decrease in per capita GDP that followed SAP implementation.

Reviewers provided no quantified estimates of these negative impacts. Nevertheless, the evidence was considered substantial enough to warrant the assessment that structural adjustment had, in a number of instances, resulted in at least short-run, frictional unemployment and lower standards of living for

some.⁶

Problem Statement

Minimizing the Social Costs of Structural Adjustment

When there were few alternatives, structural adjustment lending offered many economically depressed countries an opportunity to make the critical and oftentimes costly policy reforms needed to revive their ailing economies. But, with efforts focused so intensely on economic recovery, early structural adjustment program design gave relatively little attention to the social welfare implications of planned policy reforms. As a result, program evaluations revealed unanticipated negative impacts on a number of important social indicators such as employment and real income. These negative impacts stirred alarm because of their correlation with other issues of basic social concern, such as public consumption, nutrition, health and education - factors which weigh heavily in a country's long-term development.

Awareness of potential negative social impacts has led to more carefully planned SAPs. Economic stabilization in the short-term which comes at the expense of long-term human resource development would be not only short-sighted but ultimately self-defeating. Furthermore, in order to sustain the economic growth which SAPs endeavor to bring about, a healthy, well-educated and otherwise productive society is essential.

Structural adjustment programs intend to bring about changes in a country's infrastructure, institutions and policies to reflect changing domestic and international conditions. It is not the intention, however, that short-term

⁶As a result of these findings, in their recommendations on future SAP design, reviewers stressed the need for greater sensitivity to potential adverse social impacts and, where these were perceived, advocated incorporating appropriate forms of compensation for the ill-affected.

social costs associated with these changes should outweigh long-term social benefits. On the contrary, structural adjustment is premised upon the hypothesis that, unless change take place, a country's economic situation will further degenerate, thereby incurring even higher social costs and lower long-term net benefits. In many cases, it would seem that there is little recourse but to undertake structural adjustment. If this premise is accepted as true, then the question facing policy-makers becomes not whether to undertake structural adjustment, but rather how to do so at minimum short-run social cost.

Understanding the Distributional Impacts of Policy Reform

Addressing the short-term social costs of adjustment consists initially of analyzing how structural adjustment-related reforms affect various economic and social indicators, such as sectoral value added, employment, income and consumption. The next step then is to analyze the distributional impacts of the reforms, that is, to determine how and to what extent changes in the selected economic indicators impact different socio-economic groups. Research indicates that the impacts of SAP reforms are not evenly shared across all socio-economic classes. Rather, the distribution of the costs and benefits depends upon the particular reforms implemented, structure of the domestic economy, linkages to and dependency on international markets, income distribution, and other factors.

Understanding the distributional effects of policy reform is essential if structural adjustment is to be effective, efficient and equitable. For example:

- 1) Efforts to reduce aggregate demand might ultimately be thwarted if the elimination of a subsidy redirects income to other consumers whose marginal propensity to spend is as high or higher;

2) Where adjustment implies more efficient programming of social services, such as food aid to low-income, nutritionally-at-risk households, it first requires knowing which socio-economic groups will be most adversely affected;

3) Tax reform, land reapportionment and other forms of compensation aimed at equitably distributing the burden of adjustment rely on prior knowledge about how different socio-economic groups are economically affected by planned reforms.

In spite of the recognized need for this information, little is known about the distributional impacts of SAP- related reforms. Review of SAP evaluations indicates that analysts have to date relied primarily upon economic theory coupled with their own knowledge of socio-economic conditions to assess distributional impacts. While this approach may succeed at predicting the general direction of program impacts, it provides insufficient information regarding their magnitude, and is therefore inadequate for policy formulation leading to effective, efficient and equitable reform.

Insufficient or unreliable data are only partially responsible for this lack of understanding. Another, equally important cause is the relative paucity of appropriate analytical tools for assessing the distributional impacts of SAP reforms. Host country economic planners and policy-makers, as well as international financial institutions such as the World Bank, IMF and bilateral assistance agencies such as the United States Agency for International Development (USAID) stand to benefit from improved methodology. Benefits include:

1) a clearer understanding of the impacts of specific economic policies on selected socio-economic groups and the mechanisms by which these policy reform impacts are transmitted;

- 2) quantified measures of the welfare implications of selected policy reforms, thereby facilitating estimation of SAP social costs and benefits;
- 3) greater effectiveness in tailoring economic policy to achieve desired ends with minimum resource use (which implies more efficient resource use); and,
- 4) more effective targeting and efficient use of scarce assistance resources, e.g. grants, food aid, commodity credits, etc., made possible by improved identification of populations in greatest need of support or compensation.

An Applied Analytical Framework

Once an analytical framework is developed, it needs to be applied to empirical data. The present emphasis on distributional issues suggests that a country case study is appropriate. Country case studies permit closer analysis of economic relationships between sectors, socio-economic groups and choice variables. As noted earlier, though, obtaining sufficient and reliable data on developing countries is often difficult. An exception to this rule, however, is the Republic of Cameroon. In addition to annual national income and product accounts data, a substantial and reliably accurate cross-sectional database now exists for the agricultural sector.⁷ With 70 percent of Cameroon's total labor force employed in the agricultural sector, these data provide a substantive basis for research on a wide range of economic issues. In a tested analytical framework, a database such as that of Cameroon can yield valuable information

⁷The Cameroon National Directorate of Census, together with the Ministry of Agriculture, completed a comprehensive census of the agricultural sector in 1984. Financial and technical support were provided by USAID under its Agricultural Management and Planning Project (Project No. 631-008).

regarding effects of economic policy reform, including distributional impacts of those associated with structural adjustment.

Selection of Cameroon as the case study is also timely: the Government of Cameroon (GOC) is presently considering requesting its first SAL as it contemplates how to address the country's economic problems.

Purpose of the Study

The purpose of this study is to estimate the impacts of structural adjustment-related reforms on the Cameroon economy and on selected constituent socio-economic groups.

Objectives of the Study

The overall objective of this study is to analyze impacts on the economy of Cameroon of economic policy reforms associated with structural adjustment employing a general equilibrium framework developed for this purpose.

Specific objectives of the study are:

- 1) To develop a social accounting matrix (SAM) for the Republic of Cameroon identifying agriculture and disaggregated by -
 - a) socio-economic and institutional groups
 - b) production and commodity activities
 - c) resource and factor income payments
 - d) trade and other economic variables;
- 2) To estimate the general equilibrium results of the following SAP-related reforms on selected socio-economic groups -
 - a) reductions in government expenditure levels
 - b) elimination and targeting of specified subsidies

- c) adjustment of selected import tariffs;
- 3) To evaluate the general equilibrium results of structural adjustment-associated reforms on variables affecting social welfare e.g., consumer prices, real wage levels, employment, and government transfers to households and enterprises; and,
- 4) To use the designed general equilibrium framework to explore alternative policy reform scenarios leading to balanced external accounts, positive economic growth and equitable distribution of the social costs and benefits of adjustment.

Hypotheses

Four hypotheses tests are proposed as means of achieving the study objectives. The first of these hypotheses attempts to establish the premise upon which the overall study is based: that structural adjustment programs do have distributional impacts on socio-economic groups. Hypotheses two and three are, respectively, efforts to identify socio-economic groups likely to suffer adverse effects from structural adjustment reforms and, conversely, those most likely to benefit. The fourth hypothesis relates to the economic feasibility of balanced external accounts, growth and equity.

The four hypotheses to be tested in this study are:

- 1) through their direct and indirect effects on domestic prices, sector outputs, real income and other economic variables, structural adjustment programs such as those undertaken by many developing countries in recent years have uneven distributional impacts that differ among socio-economic groups;
- 2) the socio-economic groups most likely to suffer short-run economic losses as a result of structural adjustment-associated

policy reforms are unskilled urban laborers, producers of export crops or other tradeables, and public employees;

- 3) the socio-economic groups most likely to benefit from structural adjustment-associated reforms are producers of food crops or other non-tradables; and,
- 4) a set of conditions can be found such that balanced external accounts, economic growth and an equitable sharing of adjustment's short-term costs and benefits are mutually compatible and attainable objectives.

In order to test these hypotheses, it is necessary to model both production and consumption linkages. Analysis of these linkages yields information regarding resource ownership and factor payments, which are important determinants of income. Capturing the indirect as well as direct distributional impacts of SAP reforms requires an economy-wide analytical framework. Therefore, the appropriate tool of analysis is an applied general equilibrium model.

Organization of the Study

Study Overview

The following chapter introduces the Cameroon economy, its principal activities, actors and institutions, and defines the problems which have brought about "la crise"--Cameroon's economic crisis, and hence government consideration of a SAL. The third chapter traces the historical development and use of general equilibrium models as tools for economic policy analysis. It also discusses the incorporation of social welfare considerations into these models. Chapter IV sets forth the analytical framework and methodology used

in the study. The chapter begins with an explanation of the theory underlying the computable general equilibrium (CGE) model and its component social accounting matrix, and their combined use as a tool for policy analysis. A description of the 1984 Cameroon SAM constructed for this study precedes introduction of the Condon-Dahl-Devarajan (CDD) model of the Cameroon economy. The remainder of Chapter IV is devoted to development of the CGE model used in this study, HANABO, and covers specification of the demand and supply systems of equations.

Sectoral and distributional impacts of SAP reforms are the subjects of Chapter V. Employing the model HANABO, a series of experiments are conducted simulating the implementation of selected economic policy reforms. Analysis of the model experiment results is divided into two parts: 1) economic impacts by sector with special emphasis on agriculture, and 2) distributional impacts on specified socio-economic groups. The chapter concludes with a summary of simulation results.

Chapter VI presents the study conclusions and examines the underlying issue of compatibility between goals of economic stability, growth and equitable distribution of short-term economic gains and losses. Conditions precedent for simultaneous attainment of these goals are ventured, based upon the foregoing simulation results.

The final chapter, Chapter VII, makes recommendations for future research. The appendices which follow contain supplementary information.

CHAPTER II

THE AGRICULTURAL ECONOMY OF CAMEROON

Introduction

Agriculture is the backbone of the Cameroonian economy. Before the discovery of offshore oil in 1977, agriculture provided the principal means of livelihood for a majority of Cameroonians and was the Government's primary source of foreign exchange. Although its importance as a source of foreign exchange has been eclipsed by that of oil in recent years, agriculture's role as a provider of income and employment remains unchallenged. Near depletion of Cameroon's oil reserves underscores the enduring nature of agriculture and its long-term importance in Cameroon's economic future.

The following pages provide a short overview of the role of agriculture in Cameroon's economy today as a source of food, employment and generator of domestic income and foreign exchange. Included are descriptions of the structure of production, major crop activities, farm size and levels of technology. The policy environment and the political importance attached to agriculture by government are also addressed. Throughout the discussion, special attention is given to current problems and future prospects of the agricultural sector.

Agriculture in the Present Day Economy of Cameroon

According to 1984 census tabulations, 70 percent of all households in

Cameroon operate "traditional farms."⁸ These farms are both home and worksite for some 5.9 million of Cameroon's estimated 8.5 million citizens. In the rural areas, 90 percent of households are farm households. Beyond the rural areas, however, a notable number of urban households also engage in farming activities, tilling small urban plots or travelling to city outskirts to farm. Census data show that, nation-wide, 25 percent of urban households engage in some type of farming activity. Together these two sets of farming households have consistently contributed more than 20 percent of GNP and over one-third of total export revenues to the Cameroon economy (Cameroon Agriculture in Figures, 1986). The productivity of its agricultural sector has enabled Cameroon to be one of the few Sub-saharan Africa countries to attain near self-sufficiency in food production (World Food Indices, 1987).

This productivity has also assisted Cameroon in attaining one of Africa's highest average per capita incomes at US \$820 in 1985 (World Bank, 1986). Facilitated by a relatively stable political and social environment, annual per capita GNP has grown at a rate of 3.6 percent over the period 1965 to 1985. With growth figures such as these, it is not surprising that Cameroon is today considered one of the few "success stories" in Africa.

Cameroon is known by other names as well: "Africa in Microcosm," "Land of Diversity"-- names that refer to the country's vast range of ecological and climatic zones. From humid tropics along the coast, to high, cool mountain plateaus in the West and Northwest provinces, to sahelian desert conditions in the far north, such extremes have fostered an equally diverse and rich

⁸ Adopting the definition used by the 1984 Cameroon Agricultural Census, a traditional farm is a farming enterprise of under 5 hectares cultivated land engaged in a mixture of commercial and non-commercial production of food and export crops, and relying primarily upon household members for labor requirements.

agricultural sector. Agricultural activities of the predominantly rural population are mainly determined by environmental considerations such as climate, topography, soils and infrastructure. Broadly speaking, however, the agricultural sector may be decomposed into two sub-sectors: the "traditional" small farm sub-sector, already mentioned, and the "modern" agro-industrial sub-sector. A closer examination of these two sub-sectors begins with the commercially-oriented modern sub-sector.

The Modern Agricultural Sub-Sector

The "modern" agricultural sub-sector of Cameroon consists of large-scale (5 hectares and above) and plantation farming operations relying on imported machinery and hired labor (USAID, 1988). Although some privately owned operations fall into this category, the modern agricultural sub-sector is dominated by parastatal-managed plantations specializing in production of rubber, oil palm, banana, tea, rice and pineapple. With the exception of rice, some oil palm and tea, these crops are produced for export to generate foreign exchange. Tables 4 and 5 document production, trade and export earnings associated with these crop activities.

The 1984 Agricultural Census indicates that 20 percent of Cameroon's total cultivated land area is organized into farms larger than five hectares. Only half of these 47,900 farming operations, however, can be classified as belonging to the modern sector. Census figures estimate some 36,850 individuals employed by this sub-sector. While contributing only a moderate share to domestic food production, Table 5 shows modern agriculture generating between 12 and 19 percent of agricultural export earnings over the period 1982-85.

TABLE 4
ANNUAL EXPORT CROP PRODUCTION IN THE
REPUBLIC OF CAMEROON, 1983-1986

Crop	1983/84		1984/85		1985/86	
	Production	Area	Production	Area	Production	Area
Cocoa	109 000	421 890	120 080	424 000	118 320	426 120
Robusta coffee	47 000	204 559	119 000	205 500	76 927	206 445
Arabica coffee	16 600	129 715	20 000	132 200	19 621	134 600
Cotton	94 580	78 380	97 500	80 800	115 544	89 232
Tobacco cigar	697	(2)	950	(2)	686	- (1)
Tobacco cigarette	1 117	2 442	1 539	4 037	1 576	- (1)
Rubber	16 413	24 712	17 679	20 505	18 469	- (1)
Banana	76 600	3 407	79 200	3 600	74 000 (*)	3 410 (*)

*Estimate: The OCB state controlled non-available production was estimated according to that of 1984/85, which is 15 000 MT.

(1) Unavailable

(2) Area of Tobacco cigar included in Tobacco cigarette.

Source: L'Agriculture Camerounaise en Chiffres, 1986, Ministry of Agriculture, Department of Studies and Projects, Agricultural Statistics Division, December 1986.

TABLE 5
EXPORT OF MAJOR AGRICULTURAL PRODUCTS BY QUANTITY AND
VALUE FROM THE REPUBLIC OF CAMEROON, 1982-1985

		1982/83		1983/84		1984/85		QUANTITY IN TONS VALUE (FOB) IN MILLIONS OF F CFA
1985/86	:							
CROPS	:	QUANTITY	VALUE	QUANTITY	VALUE	QUANTITY	VALUE	
QUANTITY	:	VALUE	:	:	:	:	:	
COCOA AND BY-PRODUCTS	:	107 585	:	57 283	:	102 414	:	89 201
96 681	:	95 712:	:	:	:	:	:	108 187
	:	:	:	:	:	:	:	105 858
COFFEE & BY-PRODUCTS	:	99 944	:	71 183	:	95 616*	:	94 830
100 427*	:	112 949:	:	:	:	:	:	95 450
	:	:	:	:	:	:	:	111 201
COTTON & BY-PRODUCTS	:	27 312	:	17 794	:	22 516	:	19 988
23 256	:	12 403:	:	:	:	:	:	22 534
	:	:	:	:	:	:	:	12 983
PALM TREE PRODUCTS	:	10 836	:	1 039	:	12 133	:	1 025
11 794	:	1 113:	:	:	:	:	:	23 963
	:	:	:	:	:	:	:	2 012
FRESH BANANAS	:	52 330	:	6 907	:	52 321	:	8 092
55 764	:	6 978:	:	:	:	:	:	54 016
	:	:	:	:	:	:	:	10 819
RAW TOBACCO	:	1 224	:	3 032	:	1 167	:	3 702
1 387	:	4 429:	:	:	:	:	:	1 281
	:	:	:	:	:	:	:	5 256
NATURAL RUBBER	:	13 637	:	3 867	:	12 752	:	5 082
15 869	:	4 461:	:	:	:	:	:	19 135*
	:	:	:	:	:	:	:	6 878
RAW & PROCESSED TIMBER:	:	384 372	:	22 359	:	332 866	:	18 344
452 519	:	32 780:	:	:	:	:	:	653 460
	:	:	:	:	:	:	:	36 118

* Where exportation exceeds production, increased exportation is due to accumulated stocks.

Source: Ministère du Plan et de L'Amenagement du Territoire, Direction de la
Statistique et de la Comptabilite Nationale in "Agriculture Sector
Briefing Paper," USAID/Cameroon, January 1988.

Because of its importance as a source of foreign exchange, the modern sub-sector is closely managed by parastatal authorities operating under stringent government guidelines. The Office National de Commercialisation de Produits de Base (ONCPB)⁹ exercises complete monopoly over the internal and external marketing of all export crops, as well as over some important food commodities such as rice and palm oil. Government sets producer prices for export crops at the beginning of each crop cycle. These prices have not, however, compared well with world prices in recent years (Burfisher, 1984). Burfisher (p. 6) notes that from 1970 to 1975, producer prices were generally half the level of world prices, with domestic price adjustments following patterns of world price changes. Revenues generated by these differences have in the past gone to support an ONCPB-managed price stabilization fund, and towards financing rural infrastructure development and development in non-agricultural sectors.

The Traditional Agricultural Sub-Sector

The vast majority of Cameroon's agricultural producers are engaged in small scale, low technology agricultural activities in which labor is supplied by the owner-operator and his family members. Grouped into 1.1 million farm households, an estimated 5.9 million Cameroonians, or 70 percent of the total population, make their living on small farms in the "traditional" agricultural sub-sector. Typically under two hectares¹⁰ in size, the traditional farm usually cultivates some combination of cash and food crops. The mixture varies widely by agro-climatic region, however, as do the crops themselves. As little as 5

⁹ National Produce Marketing Board (NPMB)

¹⁰ One hectare (ha.) equals 2.471 acres.

percent cash cropping on average is observed in the north, in contrast to almost 60 percent in the central and southern regions.

In the drier northern regions, cotton dominates other cash crops with sorghum and millet comprising the basic food crops. In the northwest highlands and on the western plateau, arabica coffee is the leading cash crop and maize the preferred food staple. At lower elevations, in the hot and humid central and southern regions, cocoa and robusta coffee are the predominant cash crops. Cassava, plantains, yams and cocoyams are the principal local food crops.

Food and cash crops are marketed along two distinct channels. As with the agro-industrial crops, i.e. oil palm, rubber and banana, produced by the modern sub-sector, coffee and cocoa grown by traditional farmers for cash income also fall under the ONCPB's marketing monopoly. Farmers are required by law to market these commodities only through registered ONCPB agents at government-established producer prices. Regionally organized cocoa and coffee producer cooperatives normally act as agents.

Food crops, on the other hand, are marketed entirely through private channels, being moved either directly to final markets by producers themselves or through middlemen (who in many cases are actually middlewomen). Retail prices of locally produced foodstuffs are subject to a price system administered by the Ministry of Commerce. Adherence to the price system, however, does not appear to be strictly enforced (IMF, 1986).

Although comparatively small on an individual farm basis, the economic importance of the traditional sub-sector vis-a-vis that of the modern sub-sector is not to be underestimated. Over the period 1982-86, cocoa and coffee--traditional sub-sector crops, have consistently accounted for over 70 percent of total agricultural exports by value, and over 50 percent of Cameroon's total non-oil exports (Cameroon Ministry of Agriculture, 1986).

Through its crop activities alone, a farm in the traditional sub-sector earns on average FCFA¹¹ 166,000 (US \$380) gross cash income per year (1984 Cameroon Ag Census, p. 70). Cash income fluctuates, however, depending upon agro-climatic region, marketing opportunities, infrastructure, and cash/food crop mixture. For example, in the Extreme North province where marketing infrastructure is less developed, annual gross cash income from crops averages only FCFA 26,000 (US \$60). By contrast, gross farm income from crop sales averages FCFA 462,000 (US \$1060) in the Southwest province where climate, market conditions and transportation infrastructure are more favorable to agriculture. Table 6 details average gross farm income from crop production by province and income shares derived from cash and food crop sales.

There are indications that food production is of growing commercial importance to the traditional sector. Agricultural census data reveal that 62 percent of all food producers sell some of their production and that 30-40 percent of food crops are cultivated with commercial markets in mind. In 1984, the sale of these food crops generated an estimated FCFA 81.7 billion (US \$187 million). While food crop sales amounted to only 28 percent of the total value of food crop production, these sales represented 43 percent of the total value of all crops sold, including cocoa and coffee. Table 7 reproduces 1984 production and sales figures for cash and food crops, as well as percentages of each crop sold. These figures point out not only the relative commercial

¹¹ African Financial Community Franc. The official currency of the West African Monetary Union, the CFA franc is issued by the Banque Centrale des Etats de l'Afrique de l'Ouest (Central Bank of West African States) and is recognized legal tender in all member states. The Union affords monetary stability among the French-speaking countries of West Africa and promotes intra-zonal trade. Convertibility of the CFA franc is guaranteed by the French government at a fixed rate of 1 FCFA = .02 FF. (In 1984, the official exchange rate was US\$ 1 = 437 FCFA.) As a condition of this guarantee, however, Union members may not pursue independent monetary policies, such as unilateral devaluation.

TABLE 6

GROSS INCOME FROM CROPS IN THE TRADITIONAL AGRICULTURAL
SUBSECTOR OF THE REPUBLIC OF CAMEROON, 1984

Farms with Crops, Farms with Crop Sales, Total Value Export and Foodcrop Sales and Average Gross Crop Income per Crop Farm by Province							
Province	Farms with Crops	Farms with Crop Sales	Ratio of Selling Farms to Crop Farms	VALUE OF SALES			Average Gross Income/ Crop Farm 1/
				Export Crops	Food- crops	Total	
	(number)	(number)	(percent)	<----- 000,000 FCFA ----->			(FCFA)
Extreme North 2/	268,500	129,700	48.3	3,956.1	2,946.0	6,902.1	26,000
North	96,700	72,800	75.3	6,273.0	2,897.3	9,170.3	95,000
Adamawa	53,900	37,500	69.6	1,208.0	6,348.4	7,556.4	140,000
East	66,700	61,200	91.8	9,708.2	6,834.4	16,542.6	248,000
Central	162,000	147,800	91.2	22,100.5	14,546.2	36,646.7	226,000
South	55,000	51,000	92.7	8,276.0	2,299.5	10,575.5	192,000
Littoral	64,000	57,200	89.4	18,629.6	3,938.3	22,567.9	353,000
Southwest	73,500	66,300	90.2	17,637.3	16,291.2	33,928.5	462,000
Northwest 3/	131,200	123,500	94.1	5,672.5	18,366.5	24,039.0	183,000
West	158,700	144,800	91.2	12,814.8	7,271.5	20,086.3	127,000
Total Traditional	1,130,200	891,800	78.9	106,276.0	81,739.3	188,015.3	166,000

1/ Rounded to nearest 1,000 FCFA.

2/ Excludes rice farms/sales in Logone Et Chari and Mayo Danay Departments.
(Data for these departments included under modern sector.)

3/ Excludes rice farms/sales in Mezam Department. (Data for this department
included under modern sector.)

SOURCE: 1984 AGRICULTURAL CENSUS

TABLE 7

SELECTED CROP PRODUCTION/QUANTITIES SOLD IN THE TRADITIONAL AGRICULTURAL
SUBSECTOR OF THE REPUBLIC OF CAMEROON, 1984

Farms Harvesting and Selling, Total Production and Quantities Sold and Average Quantities Sold per Harvested Farm by Selected Crop							
Selected Crop	Farms Harvested 1/	Farms with Sales 1/	Ratio of Farms Selling to Harvested	Total Production	Total Quantity Sold	Ratio of Quantity Sold to Production	Av. Quantity Sold/Farm Harvested
	(number)	(number)	(percent)	<--- metric tons --->		(percent)	(kilograms)
Cocoa	222,200	222,200	100.0 3/	114,000	114,000	100.0 3/	513
Arabica Coffee	166,800	166,800	100.0 3/	35,400	35,400	100.0 3/	212
Robusta Coffee	173,500	173,500	100.0 3/	118,830	118,830	100.0 3/	685
Cotton	128,900	124,400	96.5	82,210	79,090	96.2	614
Tobacco	45,000	21,600	48.0	2,200	2,040	92.7	45
TOTAL EXPORT CROPS 2/	638,200	630,200	98.7	--	--	--	--
Maize	732,300	269,900	36.9	408,740	95,460	23.4	79
Sorghum/Millet	334,900	43,200	12.9	207,660	14,450	7.0	43
Rice	17,000	7,400	43.5	7,330	4,160	56.8	245
Cassava	518,300	178,900	34.5	1,385,300	418,800	30.2	806
Cocoyams/Taro	552,300	164,300	29.7	191,800	44,350	23.1	80
Yams	459,200	141,100	30.7	109,420	31,600	28.9	67
White (Irish) Potatoes	138,300	37,800	27.3	41,980	17,870	42.6	129
Beans	511,000	165,200	32.3	54,460	20,010	36.7	39
Peas	136,000	27,300	20.1	6,910	2,200	31.8	16
Groundnuts	722,200	266,700	36.9	99,180	32,100	32.4	44
Sugar Cane	182,800	57,700	31.6	122,810	56,160	45.7	307
Plantain	528,800	235,600	44.6	63,620 4/	25,220 4/	39.6	48 5/
Bananas	515,100	193,000	37.5	49,850 4/	14,960 4/	30.0	29 5/
Oil Palm	230,500	57,200	24.8	82,630 4/	27,680 4/	33.5	120 5/
TOTAL FOODCROPS 2/	1,092,900	682,400	62.4	--	--	--	--
Total Crops	1,098,900	891,800	81.2	--	--	--	--

1/ Parts may not sum to totals due to multiple counts.

SOURCE: 1984 AGRICULTURAL CENSUS

2/ Includes only farms harvested/farms with sales at date of interview for crops listed.

3/ One hundred percent of farms selling/production sold assumed.

4/ Prod./quant. sold for plantain/bananas and oil palm expressed in 000 bunches/000 liters, respectively.

5/ Av. quantities sold for plantain/bananas and oil palm expressed in bunches/liters, respectively.

importance of particular crops, but also the commercial importance of food crops to the traditional sector as a whole. Thus, in addition to being a principal source of foreign exchange, and the economy's largest employer, the traditional agricultural sub-sector also generates substantial income for rural households through domestic market sales.

Not to be forgotten is the vital contribution made by the traditional sub-sector in its production of food for national consumption. As earlier mentioned, Cameroon is one of only a handful of Sub-saharan African countries which approach self-sufficiency in food production, supplying 85 percent of its per capita food needs domestically. Table 8 documents the traditional sector's progress in keeping pace with national food demand.

Agriculture's Role in the Planned

Development of the Economy

Agriculture First: A Strategy for Economic Development

Cameroon's past ability to feed itself is the combined result of a rich natural resource base, favorable climate and "agriculture first" economic policies. Since the Republic's birth in 1961, official development policy has been to figuratively and literally cultivate the country's diverse agricultural potential as a means of increasing the economic welfare of its population. This policy was catalyzed by the Sahel drought of 1973-74 and the regional food shortages that followed. In 1974, former President Amadou Ahidjo officially initiated the "Revolution Verte" or "Green Revolution". Its objectives were three-fold: to attain national food self-sufficiency, promote growth in regional food exports, and increase export crop production to earn the foreign exchange necessary to purchase imports required for development. The programs

VALUE AND INDICES OF AGRICULTURE AND FOOD PRODUCTION BY COMMODITY IN THE REPUBLIC OF CAMEROON, 1977-1986

COMMODITY	PRICE WEIGHT	AVERAGE 1976-78	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986
	DOLLARS					-1,000 METRIC TONS-						
RICE, PADDY	277	46	43	46	38	46	51	95	97	80	114	113
CDRN	170	448	477	401	409	414	431	502	500	500	510	510
MILLET	143	375	326	409	414	441	351	423	365	400	425	425
CASSAVA	60	811	900	632	643	625	638	519	600	620	637	640
SWEETPOTATOES AND YAMS	85	402	400	417	425	421	402	355	375	375	411	415
COCOYAMS	85	805	790	815	792	776	820	658	775	800	822	825
TOBACCO	653	3	3	3	2	2	2	2	2	3	3	3
COTTON	525	19	16	23	31	33	31	28	37	38	45	47
COTTONSEED	53	30	25	37	49	51	48	44	58	60	71	73
PEANUTS, IN SHELL	315	237	284	122	164	128	132	143	103	114	125	125
SESAME SEED	146	4	4	4	6	8	10	10	10	10	10	10
BANANAS	64	81	81	78	73	55	48	51	57	65	70	73
PLANTAINS	77	2,339	2,402	2,354	2,406	2,388	2,458	1,799	1,979	2,300	2,510	2,525
PINEAPPLES	162	13	10	20	32	34	33	31	30	32	33	35
COFFEE	1,045	91	86	105	99	112	108	110	64	139	96	122
COCOA BEANS	697	100	108	107	124	120	120	106	109	120	117	120
RUBBER	740	16	18	12	17	18	17	16	16	10	17	17
SUGAR, RAW	420	44	44	57	61	60	66	68	59	55	75	80
PALM OIL	476	78	80	80	81	85	100	110	85	78	85	85
PALM KERNELS	154	31	30	34	37	44	50	52	35	47	50	50
BEEF AND VEAL	750	47	47	48	48	50	51	48	47	48	50	50
MUTTON AND LAMB	1,273	8	8	8	8	8	8	8	7	7	7	7
PORK	808	23	24	24	27	29	27	21	15	17	17	17
POULTRY MEAT	3,148	10	10	10	11	12	12	11	11	11	12	12
COW'S MILK	477	39	39	40	41	43	43	44	45	46	47	48
AGGREGATES OF PRODUCTION			MILLION DOLLARS AT CONSTANT PRICES									
CROPS		806.4	828.1	787.0	821.6	827.6	832.8	790.6	741.9	854.3	869.6	904.4
LIVESTOCK		114.0	115.0	116.2	122.2	129.4	128.6	118.8	112.4	115.1	120.3	120.8
LIVESTOCK FEED DEDUCTION=.10		-11.4	-11.5	-11.6	-12.2	-12.9	-12.8	-11.8	-11.2	-11.5	-12.0	-12.0
TOTAL AGRICULTURE		909.0	931.6	891.6	931.6	944.1	948.6	897.6	843.1	957.9	977.9	1,013.2
TOTAL FOOD		790.4	818.0	758.9	797.9	795.2	805.5	754.8	743.7	783.2	839.4	846.4
INDICES OF PRODUCTION			(1976-78 = 100)									
CROPS		100	103	98	102	103	103	98	92	106	108	112
TOTAL AGRICULTURE		100	102	98	102	104	104	99	93	105	108	111
TOTAL FOOD		100	103	96	101	101	102	95	94	99	106	107
PER CAPITA AGRICULTURE		100	103	96	98	96	94	87	80	88	87	88
PER CAPITA FOOD		100	104	94	96	93	92	84	81	83	86	85
INDEX OF POPULATION												
1976-78 POPULATION=	7,903,000	100.0	100.0	102.5	105.0	108.3	111.3	113.7	116.7	119.9	123.2	126.6

Source: USDA, Economic Research Service, World Indices of Agricultural and Food Production, 1977-86, Statistical Bulletin No. 759, Washington, D.C., March 1988.

initiated under this initiative succeeded in raising Cameroon's index of total agricultural production from 100 in 1978 to 111 by 1986 (USDA, 1988). While not dramatic progress, it is important to note that these increases occurred over a period of time when production indices for many Sub-saharan African countries were declining.

Although it has been Cameroon's earnings from mineral and energy resources that have financed the country's major capital investments, government has remained committed to developing agriculture as the foundation of the economy. The rationale underlying this philosophy is summarized in former President Ahidjo's admonishment to the people: "Cameroon had agriculture before the discovery of oil and it will have agriculture after the oil is gone" (Ahidjo in Africa Review, 1986). Officially, revenues from oil exports were to be treated by government as a windfall and not as a basis for long-range development planning. In reality, oil revenues have been used to finance large capital investments such as transportation and communications infrastructure, and to offset as necessary trade imbalances caused by low world prices for cocoa, coffee and other export crops. Cameroon's conservative approach in programming its oil revenues has been credited for its avoidance of the hyper-inflationary and destabilizing oil-boom effects experienced by its oil-exporting neighbor, Nigeria.

Preserving Food Self-Sufficiency: Emphasis on the Traditional Sub-sector

President Paul Biya, who succeeded Ahidjo in 1982, has continued his predecessor's agriculture first policies. In the Fifth Five Year plan (1981-86), and the first long-range development plan implemented under his administration, Biya oversaw agriculture's budget allocation increase from 15.3

percent to 23.7 percent . Moreover, in a significant departure from earlier plans, the Fifth Five Year Plan was the first to recommend that agricultural investment be concentrated in the traditional rather than the modern sub-sector.

Motivating this recommendation was a growing concern over maintaining national food self-sufficiency and government fears that cash crop price increases had created disincentives for food production. Studies carried out in preparation for the Fifth Plan observed that if current rural/urban migration trends continued, farm output would be required to grow 40 percent by the year 2000 in order to maintain national food self-sufficiency (Burfisher, p. 8). In a move to slow this migration, government increased agriculture's budget share by 8.4 percent and shifted its focus from the modern to the traditional agricultural sub-sector.

The Fifth Five Year Plan aimed at increasing food production 3.3 percent annually over the planning horizon. It proposed to accomplish this goal via fair and attractive farm prices, increased farm productivity through improved delivery of extension services and inputs to food crop farmers, and encouraging commercial food processing. The results of these efforts are difficult to assess due to the impacts of drought in 1982-83. Food production in the last year of the plan (1985) was 4 percent higher than that of the first year (1981). But in the three intervening years, 1982 to 1984, production was below first year levels. More importantly, on a per capita basis, the food production index fell each succeeding year of the plan period and by the end of the planning cycle had fallen from 92 percent to 86 percent of base period levels (World Indices, 1988). It is relevant to mention, however, that realized sectoral investment varied considerably from planned levels, and for some sectors fell far below amounts deemed necessary for achievement of plan goals (USAID, 1988).

Stepping Up the Pace: the Sixth Five Year
Plan (1986-1991)

Cameroon is presently implementing its Sixth Five Year Plan (1986-1991). Principle objectives of the plan are:

- 1) self-sufficiency in food production;
- 2) expansion of traditional sector export crops;
- 3) increased industrial production based on the use of domestic raw materials;
- 4) creation of an integrated infrastructural network to facilitate trade and balance regional development; and,
- 5) development of mining and energy resources.

Agriculture's 26 percent budget share reflects the GOC's continued commitment to strengthening the capacity of the agriculture sector in general, and with Plan emphasis on food self-sufficiency, the traditional sub-sector in particular.

Five priority activities are outlined under the Sixth Five Year Plan to revitalize the traditional sub-sector and maintain national food self-sufficiency:

- 1) decentralizing government action by entrusting local agricultural delegates to direct development in their respective areas;
- 2) providing extension services to farmers presently not served;
- 3) expanding the agro-industrial sector into processing;
- 4) promoting mid-size farms ("Promotion des Exploitations Agricoles de Moyenne Importance"-EAMI);¹² and,
- 5) encouraging youths to participate in the agricultural sector, preferably through the EAMI program.

¹² Promotion of Medium Scale Agricultural Units

The Sixth Five Year Plan envisages an overall annual real growth rate of 6 - 6.7 percent. Allowing for a projected 3 percent annual population growth rate, this would amount to real per capita income growth of 3 percent a year. Given that the economy's real growth rate was 7 percent from 1981 to 1985, a goal of 6 percent appears reasonable. But, according to USAID estimates, achievement of this goal would put agriculture's share of GDP at 31 percent by the end of the fifth year (USAID, p.10). In order to reach this level, agricultural output must expand at an average annual rate of 3.8 percent. It is questionable whether agriculture can meet this requirement. Historical data for the preceding decade (1973-83) show sector output grew, on average, only 1.8 percent per annum. Serious pursuit of 3.8 percent growth would entail not only substantial increases in realized investment but also greater production incentives and more efficient management of agricultural enterprises at all levels.

La Crise: Demise of the Oil Economy

Over the period 1981-85, the average export price of Cameroonian crude oil fell from US \$31 to US \$21 per barrel. By 1987, the world market price had settled at around US \$18 per barrel. The effect of these substantial price decreases was a significant reduction in Cameroon's oil revenues. Income from oil exports fell 36 percent from 1984 to 1985, and an estimated additional 40 percent from 1985 to 1986.

In 1986, only months after the Sixth Five Year Plan was publicly released, the GOC announced that government expenditures would be decreased 18.75 percent due to depressed world oil and commodity prices. Accounts designated to be cut were; Investment (58%), Operations (13%), Health (8.4%), and Education and Research (6.2%). The agriculture budget, although significantly lower than originally planned, survived with a small

increase of 3 percent. To a public that had become accustomed to annual revenue increases averaging 20 percent over the preceding four years, news of government budget cuts came as a considerable shock.

Adjusting to a New Economic Reality: Issues.

Options and Trade-Offs

In addition to financing the GOC's major capital investments, oil exports have been used to compensate for revenues lost due to export crop shortfalls. Following severe drought in 1982, cocoa production fell 14 percent from the previous year's level and that of coffee by as much as 55 percent. Instead of the economic crisis one might expect, however, increased oil exports generated US \$1,160 million and a positive trade balance of US \$127 million.

The agricultural sector has been treated comparatively well by the Cameroonian government. But bail-outs and generous budget shares have not resulted in expected returns. Table 8 reveals that per capita agricultural production was lower in 1986 than in 1976. Of equal, if not greater, concern is the traditional sub-sector's inability to keep pace with Cameroon's population growth, as evidenced by a per capita food production index that has fallen from 100 in 1976 to 85 in 1986 (World Indices, p. 134.). With the exception of a few, sporadic record production years, output in the modern sub-sector has been sluggish.

With the decline of the oil economy, Cameroon has entered a new era in its economic development. The GOC faces some complex policy decisions, the effects of which are difficult to predict with accuracy and the implications possibly long-term. It must choose its course wisely in order to preserve the viability, as well as vitality, of its economy. Options are limited in the short-run. Alternatives for the medium-term are also few. Long-term possibilities,

however, do exist but these will entail trade-offs of one sort or another. In the foreseeable future, Cameroon must rely on its agricultural sector rather than oil as a primary source of foreign exchange, a role it once played in the economy and now must play again. But in order for agriculture to again become the economy's principal driving force, it will be necessary to address a number of critical issues presently hindering sector growth:

1) To increase their contribution to export earnings, modern sub-sector crops, especially cocoa and coffee, must be revitalized. In the case of tree crops, this will require at least 3-4 years until new trees begin producing. Also to be considered are market growth opportunities. For example, at present, world market growth for coffee and cocoa is estimated at about 2 percent annually (World Bank, 1988) which means that under current quota agreements Cameroon's opportunities for expanding its market share are limited.

2) In spite of the higher producer prices offered in recent years, production increases have not met expectations. A potential drawback to raising producer prices even further, however, is that higher producer prices would likely reduce the margin which accrues to the ONCPB, and this could result in less resources available for rural development projects.

3) If agriculture as a whole is to become more productive, greater capital investment need be made in it, not only by public institutions but by private sources as well. This is particularly true given government's diminishing investment budget. Agriculture (including forestry and fisheries) absorbed less than 4 percent of the increase in private investment that took place between 1981 and 1986 (World Bank, 1988). But, before greater private investment will occur, agriculture must demonstrate that it has profit potential, and this in turn depends upon government price policy. Furthermore, as an antecedent to

increased agricultural credit, the GOC will have to redefine its position vis-a-vis the private banking community since tight credit policies have been attributed to past government pressure on banks to lend funds to unproductive or non-viable parastatal enterprises (World Bank, 1988).

4) Broadening the agricultural export base through increased production of other cash crops such as rubber, oil palm, tea, banana and pineapple is another means of generating greater amounts of foreign exchange. Cameroon's previous efforts in these areas, however, have not always proven successful (World Bank, 1988). Among the reasons are increasingly competitive world markets and management problems in achieving output and profitability targets. While still a possible avenue for earning foreign exchange, before Cameroon will be able to successfully compete and expand its share in the world market, it will have to significantly improve production efficiency, marketing performance and management organization of its agro-industries.

Summary

These adjustments, as well as the initiatives necessary to achieve them, will require policy reforms that may only have effect in the medium- to long-term. In the interim, the GOC will have to implement immediate reforms to restore balance to its external accounts, hopefully doing so in a way that minimizes any loss of the social and economic gains which oil revenues of the past decade have permitted.

To facilitate this transition, it has been proposed that the GOC enter into an agreement with the World Bank for a structural adjustment loan.

Cameroon's reserve position¹³ and standing with the World Bank suggest that it would be a suitable candidate for an SAL. From a purely financial standpoint, an SAL would make the burden of adjustment easier to bear. How this burden might be shared by Cameroon's population, however, is a different question, and the central focus of this study.

¹³ As of June 1986, Cameroon's international reserve holdings equalled SDR 275.9 million (US \$251 million). Examination of Cameroon's financial position with the IMF indicates that, as of October 1986, 99.8 percent of its quota had been paid to the Fund, and that Cameroon had neither entered into any standby or extended arrangement, nor had it used any of the Fund's special facilities during the preceding four years (Source: International Monetary Fund, 1988).

CHAPTER III

LITERATURE REVIEW

Social Welfare Impacts of Structural Adjustment

Lending: The Emerging Debate

In the years following the first structural adjustment loans, a debate has arisen over the social welfare impacts of lending conditions. The debate centers on two primary issues:

- 1) the "burden" of adjustment, e.g. reductions in real income due to reform-induced price increases, are being unevenly shared across socio-economic groups with a disproportionately greater share being shouldered by the poor; and,

- 2) economic reforms mandated by lending conditions can work to increase the number of individuals living in poverty.

Arguing this case are a number of international voluntary organizations, notably, Cooperative Assistance for Relief Everywhere (CARE) and the United Nations International Children's Emergency Fund (UNICEF), joined by various grassroots-oriented development organizations, for example, the Friends Committee on National Legislation (FCNL) and the Development Group for Alternative Policies (Development-GAP).

The counterpoint position is comprised primarily of SAL lenders, among which are the World Bank and the IMF, but including national foreign assistance agencies such as USAID. While not contesting the fact that trade-offs might exist, this side argues that: 1) adjustment is imperative to restore

macroeconomic stability, 2) long-term benefits of adjustment will outweigh short-term hardships, and 3) the question is how to bring adjustment about in a managed and orderly fashion.

SAP proponents concede that adjustment will likely entail social hardship, but they have successfully refocused attention of the debate on several areas in critical need of research:

- 1) adjustment dynamics, i.e. the mechanisms that link policy reform, structural adjustment and economic performance;
- 2) the distributional effects of structural adjustment programs involving measurement of impacts on income, employment and other social welfare indicators; and,
- 3) formulation of an articulated analytical framework for SAP design and implementation.

These issues essentially outline the current research agenda on structural adjustment (Yagci, 1985).

SAP research has proceeded along two distinct lines. One line focuses on social welfare impacts, devoting itself to measuring changes in poverty, household consumption and nutrition. The other line studies theoretical and empirical linkages between policy reforms and changes in economic variables, structure, and performance. Thus, although closely related, the two lines have quite different emphases. Each, however, has made contributions towards a better understanding of the cause and effect of distributional impacts of structural adjustment. For this reason, the literature of both bodies of research is reviewed, beginning with the work on social welfare impacts.

The Human Face of Adjustment: Research on the Social
Welfare Impacts of Structural Adjustment

Poverty, poverty measurement and income redistribution are the dominant subjects of early research on the social welfare impacts of structural adjustment. The nature of this work could be characterized as exploratory, searching for apparent causal relationships between SAP implementation and unexpected changes or trends in economic well-being. One of the earliest of these efforts was sponsored by the Overseas Development Institute (UK) in collaboration with the International Development Research Center (Canada) and led by Addison and Demery (1985). Essentially a review of previous work on poverty and income distribution, Addison and Demery have as their primary objective the identification of principal mechanisms determining the distribution of income and level of poverty. They then analyze a number of often prescribed macro-economic stabilization policies - devaluation, fiscal and monetary restraint, wage and price controls, and import restrictions, in light of these mechanisms.

The study concludes that distributional impacts of stabilization policies are an empirical question best answered by in-depth case studies. This conclusion is based upon observations that 1) any single policy may affect distribution in a number of ways, not all working in the same direction, and 2) various policy instruments which constitute a stabilization package can have conflicting effects so that it may be difficult to be precise about the net effect of a program (Addison and Demery, p. 78). To unravel these contradictory effects, they suggest the use of system-wide methods, ranging from macro-models (Taylor, 1979) to full general equilibrium models (Dervis et al., 1982), noting that social accounting matrices would be especially helpful in explicitly tracing income distribution effects. Addison and Demery report that, based on their

review, income inequality is largely unaffected by stabilization policies. Evidence found within the literature, however, does indicate that such policies may influence the *composition* (italics supplied by the author) of the poor. Hence, the authors suggest future research concentrate on the linkages between *poverty* and stabilization policies, giving special attention to how policies affect specific socio-economic groups. In developing this information, they emphasize: "It is a matter of policy urgency that measures be designed to protect the most vulnerable groups against the worst effects of stabilization programmes" (Addison and Demery, p. 81).

Only months later, Kanbur (1985) obliges Addison and Demery when he releases his own research results on the subject of "Poverty: Measurement, Alleviation and the Impact of Macroeconomic Adjustment." From the outset, Kanbur emphasizes that his focus is on poverty and not inequity. He cites two reasons for this focus: 1) his belief that there exists a strong argument that, from a policy view, primary interest should be in the well-being of the poorest members of a community, and 2) the relative ease in developing a consensus around poverty alleviation as an objective versus the difficulty in reaching consensus on distributive objectives.

Assuming the overall policy objective is to minimize the "poverty gap,"--a measure of the number of individuals living below the established poverty line, Kanbur develops a poverty index with which he then derives formulae for analyzing the additive or multiplicative effects on poverty of alternative economic policies. Using the derived formulae, Kanbur shows how to calculate the impact on poverty of expenditure switching and expenditure reducing policies, two primary approaches employed in adjustment (Yagci et al., 1985). The results are qualified, however, to the extent that the methodology assumes socio-economic groups producing traded goods are mutually exclusive of those

producing non-traded goods, an assumption which the author himself notes is rather tenuous, and suggestive of areas requiring further study (Kanbur, p. 39). Concurring with Addison and Demery, Kanbur recommends that future research concentrate on empirical studies of a policy-oriented nature.

In a spirit similar to that of Kanbur, Pinstруп-Andersen (1986a) attempts to draw the international donor community's attention to the impacts of macroeconomic adjustment on human nutrition. Pinstруп-Andersen's work also focuses on poverty, but a particular manifestation of poverty--the inability to procure a nutritionally adequate diet for oneself and/or one's family. The author discusses the most common macroeconomic adjustment policies and identifies important linkages or variables through which these policies impact human nutrition. Among these variables are wages, employment, real income, prices and health care. Figure 1 illustrates how these variables join together to link economic policy and human nutrition.

Pinstруп-Andersen also summarizes the empirical evidence of macroeconomic policy impacts on food consumption and nutrition, drawing upon the work of Jolly and Cornia (1984) in Costa Rica, Brazil, Sri Lanka and Ghana, the Inter-American Development Bank in Latin America, and other independent researchers in Chile and the Philippines. Although the research fails to firmly establish a causal link between specific adjustment policies and nutritional status, the available evidence "suggests that there is a high risk of deterioration in the nutritional status as a consequence of traditional macroeconomic adjustment programs." The author adds: "Enough is known about the effect of food price increases and real wage decreases on food consumption by the poor to conclude that the status of those most at risk has deteriorated" (Pinstруп-Andersen, 1986a, p. 22).

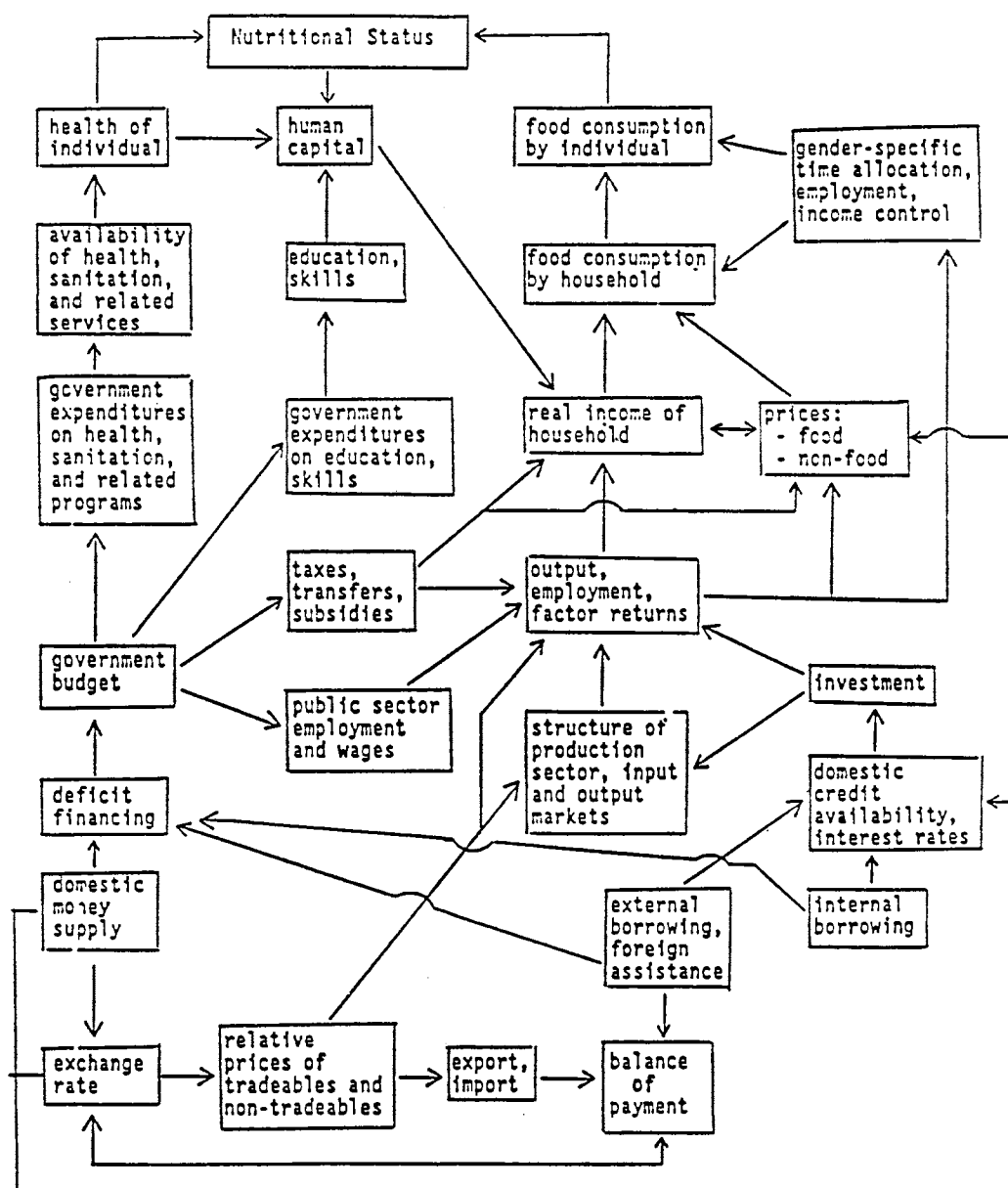


Figure 1. Schematic overview of principal relationships between human nutrition and variables influenced by economic crises and macroeconomic adjustment policies.

Reprinted from Per Pinstup-Andersen, "Macroeconomic Adjustment Policies and Human Nutrition: Available Evidence and Research Needs," April 1986.

Pinstrup-Andersen rejects the idea that the poor must necessarily suffer in the short-run for the cause of long-run macroeconomic stability. He restates the problem as one of inadequate understanding of the relevant economic processes and insufficient knowledge of the gains and losses for the poor from alternative adjustment policy measures. He urges further empirical research in the area, suggesting partial equilibrium econometric analysis, social accounting matrices and general equilibrium models as appropriate tools. Enhancement of policy-makers knowledge about the processes through which adjustment policies may adversely impact the nutritional status of the poor facilitates the design of less injurious adjustment packages, as well as the incorporation into policies of effective means of protecting or compensating the poor. (For detailed discussion of specific program and policy options for compensating the poor see Pinstrup-Andersen, 1986b.)

Whether motivated by an expanding body of negative research findings or other considerations, the World Bank and IMF are also showing concern for the potentially negative impacts of structural adjustment. Considered before only as a theoretical possibility, World Bank and IMF publications now openly discuss the social costs of adjustment (Reutlinger, 1986; Huang and Nicholas, 1987; Pfeffermann, 1987). Understandably, these discussions are more favorable in their presentation of adjustment impacts than external reviews and emphasize the transitional nature of negative effects (Huang et al., 1987).

There is general agreement, however, that because of the role played by the structure of an economy in determining the distribution of adjustment impacts, empirical studies are needed to clarify the mechanisms by which impacts are transmitted.

In the interim, lenders have clearly renewed their own efforts to remain aware of and consciously take into account the potentially ill side effects of their

economic policy prescriptions. In a World Bank policy study, Reutlinger (1986) calls attention to the implications for food security of macroeconomic adjustment programs that increase food prices while simultaneously reducing government expenditures, particularly on subsidies. Efforts to promote food security, he argues, should emphasize lending operations (and investments) that benefit the poorest people. Furthermore, when lending operations are in support of policy adjustments, project planners should consider the implications of the reforms for food security and when necessary "include cost-effective programs to safeguard the food security of the people most vulnerable" (Reutlinger, p. 11).

While the inquiry into macroeconomic adjustment and its ill effects continues, the present question to be addressed is: "What can be done about them?" This question has stirred the interest of not only international voluntary agencies such as UNICEF (Jolly et al., 1984; Pinstup-Andersen, 1986), but that of national foreign assistance agencies as well. USAID has conducted its own investigation into the social welfare impacts of structural adjustment through a series of project-related country case studies.¹⁴ Analysis has been carried out for Tunisia (Ariza-Nino and Rassas, 1987), Somalia (Goldensohn et al., 1987), Mali (Wilcock et al., 1987), Zambia (Weidemann et al., 1987), and Africa in general (Haykin, 1987). Haykin's synthesis of the impact assessments is strongly positive, indicating that reforms have resulted in significant increases in food production with concomitant higher incomes for small farmers, improvement in distributional equity, and reduced government budget and balance of payments deficits (Haykin, 1987, p. 34). In comparison with the individual country assessments, however, the synthesis appears overstated, particularly with respect to social welfare impacts. Lack of adequate

¹⁴ A number of field studies have been conducted by USAID's Office of Development Planning under Phase I of its Policy Reform Impact Assessment activities.

quantitative data is cited in at least three of the four country reports (Goldensohn, p. H-2; Weidemann, p. A-1; Wilcock, p. 33), as reason for their impressionistic and anecdotal nature of the analysis. With the exception of the Tunisia assessment, none of the studies applies a rigorous quantitative method of analysis to the problem, which is attributable perhaps to the fact that each study was allotted only one month's time for completion, including field research and writing. It is not surprising, therefore, to read statements such as the following found in the Mali case study report: "...no link has been established between increases in cereals production and policy reforms. Second, it is not possible to disentangle the incentive effects of policy reforms from improvements in the weather" (Wilcock, 1987, p. 29). Such statements and facts tend to discredit the positive assessment of the synthesis.

USAID has, however, attempted to broaden the base of its knowledge about socio-economic impacts of macroeconomic adjustment. In early 1988, results were released of a longer-term effort to develop a conceptual framework for understanding the adjustment process and its potential impacts (Hood et al., 1988). The objectives of this effort were to examine the linkages between adjustment measures and specific groups' living standards, review existing empirical studies on how income, employment and consumption have evolved during periods of adjustment, and to evaluate subsequently-formulated hypotheses about adjustment impacts using information from Sri Lanka, Morocco, Costa Rica and Cote d'Ivoire. The following are some of the study's observations:

- 1) Redistributive gain is greatest and increase in poverty the least when:
 - a) holdings are small and widely distributed;
 - b) the potential for food self-sufficiency is good;

- c) urban poverty incidence is relatively low;
- d) the proportion of the population in agriculture is high; and,
- e) the major crops are annuals and output is not highly drought-prone.

2) Devaluation:

- a) benefits export industries and those engaged in import-substitution; and,
- b) hurts urban groups more than rural. This is because imports often form a greater share of urban consumption, the rural sector exports a greater share of its output, and rural sector activities are, in general, less reliant on imported inputs.

3) Government expenditure restraint tends to:

- a) adversely affect urban poverty through increased unemployment of unskilled and semi-skilled laborers; and,
- b) have a substantial negative impact on public services, especially in health and education, through reductions in non-wage components of operating and maintenance budgets.

In its conclusions, the study also makes a number of observations regarding donor assistance in support of the adjustment process. It states that it is possible ex-ante to determine which socio-economic groups are most likely to need some form of assistance during an adjustment transition, and that efforts should be made to construct profiles of these groups on a country-specific basis. Donors are also reminded that successful adjustment requires adequate

and continued flows of foreign exchange, and that programs must be designed with recurrent costs and available managerial skills in mind. To this end, projects which enhance a country's supply responsiveness to changed incentives should be accorded priority. Until supply responds, however, donors must look to other means for reducing the pain of adjustment. One alternative some donors have employed is food aid (USAID, 1986a; USAID, 1986b).

In retrospect, the inquiry into the social welfare impacts of structural adjustment has not met with abundant success. Concrete, well substantiated research findings are rare, if they exist at all. Review of the literature shows past research to be one of either two types:

- 1) conceptualizations of analytical frameworks for assessing social welfare impacts, e.g. Yagci, Kanbur, Pinstrup-Andersen; or,
- 2) short-term case studies relying on limited data and consisting of analysis that is long on intuition and short on methodology.

It is, in fact, the issue of methodology which appears to be the stumbling block. Research on adjustment's impacts on poverty is impeded by a lack of information on stabilization policy's income distribution effects (Kanbur, p. 36). At the same time, donors interested in promoting economic development are unable to adequately disentangle the impacts of adjustment from those of non-related, exogenous events (Wilcock, p. 29).

The need to develop appropriate methodological tools for discerning adjustment impacts has not gone unattended. On the contrary, substantially more research exists on this subject than on that of adjustment's social welfare impacts. The contemporary literature traces its origins to Johansen's (1960) multi-sectoral model of the Norwegian economy; however, in the interest of maintaining a focus on distributional impacts of structural adjustment, the author reviews only research with specific relevance to this subject.

Unraveling the Mysteries of Structural Adjustment
Impacts: Advancements in Methodology
and Analytical Tools

The search for appropriate methodologies and analytical tools for discerning structural adjustment impacts has been a vigorous one. Thus far, it has tended to focus on the area of multi-sectoral modeling, including both partial and general equilibrium analysis. There are exceptions to this trend, however, an example of which is Balassa and McCarthy's (1984) work using statistical analysis to test correlations between selected policy variables and performance indicators. Still, for reasons that will become clear, multi-market equilibrium remains the favored analytical framework.

Following two decades of refinement, the concepts of linear input-output modeling were displaced during the 1970's by the evolution of non-linear, multi-sectoral models. The development of these models is seen as the natural outgrowth of research on linear programming and input-output models (Robinson, 1988; Devarajan et al., 1985). Limited, however, by linear programming's assumption of linearity and its resulting difficulties in model behavior and interpretation, modelers refocused their efforts on developing a framework within which the overall workings of a market economy could be simulated, and in which market prices and quantities could simultaneously be solved. The result of these efforts was the multi-sectoral general equilibrium model. Having since been enhanced through the power of computer-based solution algorithms, these models are today known as computable general equilibrium (CGE) models.

A CGE consists of five basic components:

- 1) a set of economic actors or agents whose behavior is to be analyzed, e.g. households, producers, government, etc.;

- 2) a set of behavioral rules that reflect the motivation of each actor, e.g. producers act to maximize profits subject to technological constraints, households strive to maximize utility subject to income constraints, etc;
- 3) designated "signals" according to which actors respond. For example, in a Walrasian model, prices are the only signal which actors need;
- 4) a set of rules governing the interaction of the actors, i.e. the institutional structure. For example, specifying the economic system as one of perfect competition implies that each actor is a price-taker and that prices are flexible; and,
- 5) a set of "system constraints", also known as "equilibrium conditions."

While the system constraints are not consciously taken into consideration by agents when making their independent decisions, the decisions of all agents must collectively satisfy the equilibrium conditions in order for the model to be solved. A CGE model simulates the interaction of economic actors across markets, normally assuming that actors pursue a neo-classical pattern of optimizing behavior, essentially described in the model as first-order conditions for profit and utility maximization.

CGE models have been applied to a variety of situations, including long-term growth and structural change (Chenery, 1979), investment allocation (Condon et al., 1985), choice of development strategy (Dervis et al., 1982), income distribution (Adelman and Robinson, 1978; Lysy and Taylor, 1980), trade policy (Grais, 1984) and structural adjustment to external shocks (Gupta and Togan, 1984; Lewis, 1986). Depending on the research topic, these

models range in institutional detail from general analytical models for exploring theoretical postulates to highly specified applied models for policy analysis.

CGE's were first used to investigate distributional impacts of economic policy in the 1970's. Rapid growth and structural change in many countries had failed to reduce poverty among large groups of the poor. This phenomenon served to focus researchers' attention on the issue of economic growth with social equity. The seminal work in this area is that of Adelman and Morris (1973) in which the authors estimate income distributions in 74 countries in an effort to identify determinants of economic growth with social equity. Adelman and Morris sparked a major debate among development economists and soon other studies were launched. The following year, in their work Redistribution With Growth, Chenery et al. (1974) provided analysis which it was hoped would lead to strategies reconciling growth and equity. In 1978, Adelman and Robinson attempted to unravel the relationship between policy and income distribution using a CGE model which the pair had developed for the Republic of South Korea (Adelman and Robinson, 1978). Their use of a CGE model to investigate distributional impacts of economic growth strategies marked a watershed in applied economic research for it was after this that the CGE model gained wide acceptance as an analytical tool, as demonstrated by its increasing appearance in a broad range of economic research.

For modelers working on problems of developing countries, however, the neo-classical paradigm has proven overly restrictive. Frequently, developing economies may have a number of structural rigidities the inclusion of which may be important from an applied modeling standpoint. These rigidities may reflect imperfect markets (or even their absence altogether), fixed prices, government interventions or other institutional features which do not fit well within the

neoclassical framework. Capturing these "structuralist" features has meant modification of the neoclassical CGE model.

Three kinds of structuralist models may be distinguished within the CGE framework:

- 1) elasticity structuralist - which remains within the neoclassical framework but specifies limited substitution elasticities for a variety of relationships;
- 2) micro structuralist - which assumes various markets are either not functioning properly or are absent. Commonly, this may entail restrictions on factor markets, rigid prices, rationing, and disequilibria in one or more markets; and,
- 3) macro structuralist - wherein the focus is on issues of equilibrium among various macro aggregates, such as savings and investment, exports and imports, and government expenditure and revenue.

Applications of elasticity structuralist CGE models include: Dervis and Robinson, 1978; Dervis et al., 1982; Lewis and Urata, 1984; Michel and Noel, 1984; and, Benjamin and Devarajan, 1985. Examples of micro structuralist CGE models are the work of Dervis et al. (1982) on import rationing and Condon et al. (1985) on the Chilean economy. Taylor (1979 and 1983) is perhaps the most prolific and well-known of the macro structuralists, but others include: de Janvry and Sadoulet, 1985; Taylor and Lysy, 1979; and, Taylor, Sarkar and Rattso, 1984.

Increased energy costs during the late 1970's and the ensuing LDC "debt crisis" of the early 1980's shifted researchers' attention from matters of income distribution to those of foreign trade. Even with this different focus, CGE models proved to be useful analytical tools, allowing researchers to evaluate

alternative trade regimes as means of reducing foreign debt (Melo, 1988; Grais et al., 1986; Melo and Robinson, 1982). As the problem of LDC debt became viewed in terms of intrinsic structural problems, research emphasis again began to change and increasing effort was devoted to analyzing macroeconomic adjustment and stabilization issues. CGE models continued to play a significant role in this research, aiding economists, planners and policy-makers in disentangling the complex relationships that exist between policy, economic performance and stability (Benjamin and Devarajan, 1985; Condon et al., 1985; Dahl et al., 1986).

Debt renegotiations and structural adjustment programs have together worked to ease the crisis atmosphere which in recent years clouded the international economic environment. In the wake of these relaxed tensions, social implications of the corrective measures taken are coming to the fore. Questions concerning impacts of structural adjustment on poverty, health, consumption and nutrition are more frequently being asked, and it seems that social welfare has again become a priority on the research agenda. Given their past success in resolving both theoretical and applied problems, CGE models may be expected to play a vital role in finding answers to these questions. Already some researchers advocate SAM-based CGE models as an appropriate tool for analyzing the distributional impacts of structural adjustment programs (Thorbecke and Berrian, 1987).

In the pages which follow, a SAM-based CGE model incorporating some of the ideas previously discussed is used to explore the distributional impacts of selected hypothetical structural adjustment programs on the economy of Cameroon. In so doing, it is hoped that greater understanding will be reached not only of the potential impacts of alternative programs on various socio-

economic groups in the population, but also of the advantages and limits of this particular methodological approach.

CHAPTER IV

METHODOLOGY

A General Equilibrium Model of the Cameroon Economy

The evaluation of distributional impacts of structural adjustment-related economic policy reforms requires a framework that permits assessment of indirect as well as direct impacts. This implies the use of a multi-sectoral model. Moreover, for the purposes of comparative static analysis, it is necessary that the model provide a general equilibrium solution when subjected to experimental exogenous shocks intended to simulate policy reforms. Partial equilibrium models, while adequate for answering questions related to a single or small number of sectors, cannot address the range of issues under investigation here.

The multi-sectoral model to be used in this study builds upon the work of Condon, Dahl and Devarajan, who in 1987 constructed a computable general equilibrium (CGE) model of the economy of Cameroon (Condon et al., 1987). The Condon-Dahl-Devarajan (CDD) model belongs to a tradition of CGE models that sprang from Dervis, DeMelo and Robinson's modeling work on the Turkish economy (Dervis, et al., 1982). A characteristic common to all of these models is their use of a social accounting matrix as a framework for organizing baseline data. This study of Cameroon employs a similar SAM-based, CGE modeling approach. In due course, the specifications of the structural and behavioral equations of the model will be presented. But first, because of the

important role which the SAM plays in this model-building exercise, the underlying principles of a SAM and the SAM's relationship to various components of the model are discussed

Social Accounting Matrices: The Underlying Principles

Creation of the social accounting matrix is credited to Stone (1966) who organized economic data according to relationships and interactions between actors, institutions and production activities in an economy. Because of its emphasis on the interrelationships and flows of an economy rather than on numerical values, Stone's system is referred to as a "social" accounting matrix.

The accounting aspect of a SAM refers to the principles according to which the matrix is built. By design, the SAM is "square", meaning that for each row (income) account there is a corresponding column (expenditure) account. Data are entered according to the principle of double entry bookkeeping whereby income and expenditures of each account must balance. It follows, therefore, that the sums of corresponding rows and columns must also be equal. In addition to ensuring the squareness of the SAM, the double entry procedure forces consistency upon the data, requiring any discrepancy between income and expenditure to be fully reconciled and thereby closing any "leakages" in the system. This closed system accounts for all nominal transactions in the economy. Table 9 represents a general SAM framework and illustrates how the cells of the matrix provide information on the interrelationships between individuals, institutions and activities. In a single, comprehensive framework, a SAM captures the entire circular flow of an economy: demand→ production→ income→ demand, and is therefore said to constitute a "snapshot" of an economy at a particular point in time. Figure 2 depicts this circular flow. Consumer demand sets the wheels of production in

TABLE 9
STRUCTURE AND COMPONENTS OF A SIMPLE AGGREGATE
SOCIAL ACCOUNTING MATRIX (SAM)

ACTIVITIES	PRODUCTION	FACTORS OF PRODUCTION		INSTITUTIONS			CAPITAL ACCOUNT	REST OF WORLD
		LABOR	CAPITAL	HOUSEHOLDS	ENTERPRISES	GOVERNMENT		
ACTIVITIES	Supply of domestic goods (excluding imports)					Subsidies		Exports
PRODUCTION	Intermediate Consumption			Household Consumption		Government Consumption	Investment	
LABOR	Salaries							
CAPITAL	Returns to Capital							
HOUSEHOLDS		Distribution of Income (Returns to factors of production)			Interest/Dividends	Current Transfers		
ENTERPRISES								
GOVERNMENT	Indirect Taxes	Import Tariffs		Direct Taxes	Direct Taxes			
CAPITAL ACCOUNT				Household Savings	Retained Earnings	Government Savings		Foreign Finance (Surplus/Deficit)
REST OF WORLD	Imports							
TOTAL	Total Costs	Total Production in the Economy (Absorption)	Value Added (minus indirect taxes)	Gross Household Income	Gross Profits	Total Government Revenue	Total Savings in the Economy	Total Payments Abroad

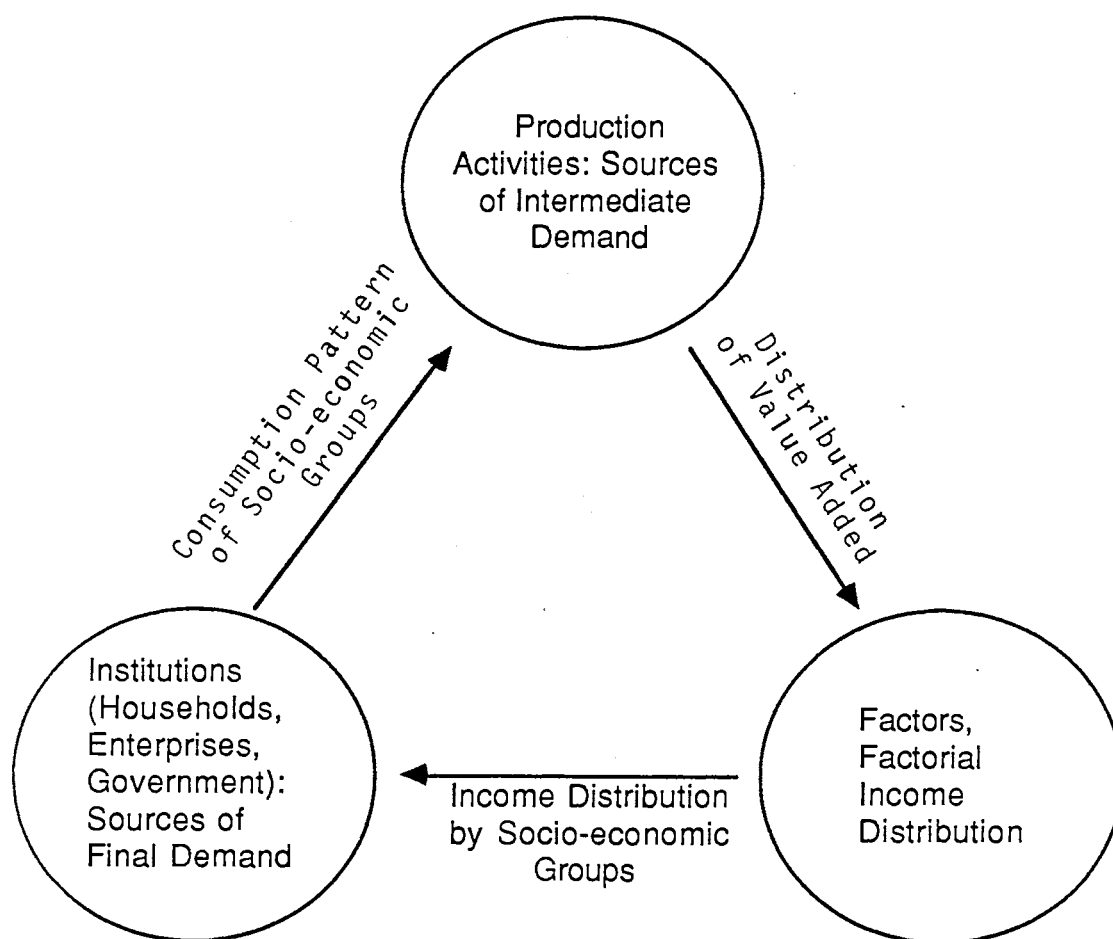


Figure 2. Representation of the Circular Flow of an Economy in a Social Accounting Matrix Framework

motion, represented in the descriptive SAM as demand for final goods. Producers respond to this demand by consuming intermediate goods which are inputs into final goods production. The demand for intermediate goods appears in the SAM at the intersection of the Activities column and Production row. From production, income accrues to capital and labor, the two factors of production. Earnings on capital may either be retained or reinvested in new capital stock. The income accruing to labor, i.e. wages, fuels yet another round of final product demand. This completes the circular flow and marks the beginning of a new cycle of activity.

In Practice: A Social Accounting Matrix of the
Cameroon Economy for 1984

Data for this study come from a variety of sources. With respect to construction of the SAM, however, the most important source is the 1984 Cameroon National Income and Product Accounts.¹⁵ Prepared by the Office of Statistics and National Accounts in the Ministry of Planning and Territorial Administration, this database provides sufficient information to permit construction of a SAM. For the purposes of this study, two SAMs are constructed, one being rather highly aggregated and the other disaggregating the 1984 Cameroon economy into 11 sectors. These SAMs appear in the order of their introduction in Tables 10 and 11. Details of the construction of the aggregate and disaggregate SAM's appear in technical notes in Appendixes B and C, respectively. Bearing in mind that the foremost objective is to develop a general equilibrium model, rather than devoting time to these technical issues

¹⁵ Comptes Nationaux du Cameroun, Version SCN: Resultats Semi-definitifs, 1984-1985.

the reader's attention is focused on the components of the individual SAMs and the relationships that link the two SAMs to one another.

The Cameroon Economy in 1984: An Aggregate SAM

As shown in Table 10, the aggregate SAM consists of six "accounts". These accounts represent the actors, institutions and activities in the Cameroon economy.¹⁶ The six accounts are:

1) Activities - referring to the activities or processes that result in the creation of a good or service, as opposed to the end product or service. Activities emphasize the production process, e.g. shoe-making versus the shoe shop.

2) Production - a good or service ready to be consumed either as an end product or as an input (intermediate good), e.g. the shoes on the shelf of the shoe shop or the leather from which the shoes shall be made.

3) Factors of production - in classical economic theory said to consist of land, labor and capital, these are elemental resources which, when combined with other material inputs, yield outputs of goods, services and more capital. Only labor and capital appear in the Cameroon SAM. The absence of land assumes that it is an unlimited resource posing no constraint on the economy and without an opportunity cost.

4) Institutions - These consist of both public and private organizations of individuals collaborating to achieve an economic goal, such as household security, firm profits or the enhanced welfare of society. Corresponding to these

¹⁶ At this level of aggregation, the SAM could well represent any number of economies. However, because the data used to construct the matrix is from Cameroon, it is more appropriately referred to as a SAM of the Cameroon economy.

TABLE 10
AGGREGATE SOCIAL ACCOUNTING MATRIX (SAM) FOR THE ECONOMY OF CAMEROON, 1984
(BILLIONS FCFA)

	ACTIVITIES	PRODUCTION	FACTORS OF PRODUCTION		INSTITUTIONS			CAPITAL ACCOUNT	REST OF WORLD
			LABOR	CAPITAL	HOUSEHOLDS	ENTERPRISES	GOVERNMENT		
ACTIVITIES		5049.261							850.877 ^d
PRODUCTION	2248.017				2538.255		345.326	955.300	
LABOR	989.508								
CAPITAL	2089.511 ^b						12.381		
Sum:	3079.019 ^a								
HOUSEHOLDS			989.508			1662.734	117.530		
ENTERPRISES				2089.511			53.587		
GOVERNMENT	573.102	174.399							
CAPITAL ACCOUNT					231.517	480.364 ^c	231.058		12.361
REST OF WORLD		863.238							
TOTAL (EXPENDITURES)	5900.138	6086.898	989.508	2089.511	2769.772	2143.098	747.501	955.300	863.238 ^d
TOTAL (RECEIPTS)	5900.138	6086.898	989.508	2089.511	2769.772	2143.098	747.501	955.300	863.238

^a Factor Payments = Gross Domestic Product (1984=3838.901) - Government Revenue 1984=759.882)

^b Returns to Capital are "subsidy-ridden", i.e. they include the value of government-paid subsidies.

^c Includes savings of financial, corporate and non-profit institutions (272.803), plus depreciation payments (194.653) variations in stocks (16.3) and miscellaneous financial transfers (3.396).

^d Includes exports and imports of goods and services (837.969 and 863.238, respectively), and miscellaneous net capital transfers (12.908).

goals three institutions are identified in the Cameroon SAM: households, enterprises and government.

5) Capital account - Referring specifically to financial capital.

6) Rest of world (ROW) - As the interface between the national economy and international markets where goods, services and resources are exchanged, the ROW account serves an important role in balancing the SAM. It is here that current account deficits or surpluses are recorded, indicating either the need for or ability to provide external financing.

The accounts are arranged into a 6 x 6 matrix, which, once values are filled in, yields the snapshot of the Cameroon economy mentioned earlier. Data derived from the 1984 National Income and Product Accounts constitutes the substance of the SAM, but it is the SAM framework which clarifies the flows and interrelationships in the economy. Examination of the Activities account illustrates this point. Moving down the Activities column (which is in the direction indicating expenditure), one observes that Activities "pays" to the Production account 2,248 billion FCFA. This is the value of intermediate goods consumed as inputs by all activities in 1984. Continuing down the column, the next figure is 989.5 billion FCFA, and is paid to Labor. These are the total wages paid out by activities in 1984. Activities also pays Capital 2,089.511 billion FCFA. These are the returns accruing to capital which, together with total wages, are collectively known as value added. Total value added in the economy of Cameroon in 1984 amounted to 3,079 billion FCFA.

The SAM also shows Activities as having paid to the Government account 573.1 billion FCFA. This is the sum of indirect taxes levied on the expenditures of activities. Finally, the total expenditures of all activities in the economy in 1984 appears at the bottom of the column--5,900.1 billion FCFA.

This figure is significant because it represents the value of total domestic production in Cameroon in 1984.

How is the income generated to meet these expenses? The answer is found by reading along the Activities row, which records the account's revenues. Here it is seen that in 1984, activities sold finished goods valued at 5,049.2 billion FCFA. In addition, 850.8 billion FCFA worth of goods and services were exported. The sum of activities' revenues for 1984 was 5,900.1 billion FCFA--the same as its expenditures. This demonstrates how the double entry procedure discussed above functions to maintain a square SAM. The same procedure holds for the remaining five accounts, hence they are not discussed here. The reader is referred to the technical notes in Appendix B for their details. More important is that, because the same principles apply, the overall sums of total income and expenditure balance and the aggregate SAM is square. It shall become clearer why this is important as the model develops. The next step, however, is to move beyond this very general SAM to one more detailed and where distributional impacts of policy reforms become evident.

The Cameroon Economy in 1984: A Disaggregate SAM

In theory, disaggregation of a SAM may be carried out to any level desired. In practice, however, data availability may pose a limitation. This is particularly true for developing country data. Cameroon, however, appears to be an exception. Data available for 1984 is both adequate and sufficient to allow disaggregation of the economy into 11 distinct sectors. These are: Agriculture-Food Crops, Agriculture-Cash Crops, Forestry, Food Processing, Consumer Goods, Intermediate Goods, Construction Materials, Capital Goods, Construction, Services-Private and Services-Public. Grouped within these 11

sectors are 31 activities as identified at the SCN¹⁷ two-digit level. Appendix B lists the specific activities included under each of these sectors.

Disaggregation of the data is based upon the objectives of the research and distinguishing economic characteristics. In the primary sector, food and cash crops have different demand structures. Furthermore, in looking at distributional issues in Cameroon's agriculturally-based economy, it is desirable to isolate policy impacts according to these two distinct production orientations. Forestry is set apart from the rest of the agricultural sectors by its production structure. In the secondary sector, food processing is easily differentiated by its pattern of intermediate consumption. Construction materials--cement and basic metals, are important to distinguish for reasons of industrial policy analysis. In the tertiary sector, private and public services differ in their demand structures and, as Condon points out, separating these two services permits analysis of competition in factor markets between government and the private sector (Condon et al., p.20).

The complete disaggregate SAM appears in Table 11. In contrast to its aggregate counterpart, the disaggregate SAM is based upon sectoral data. For each of the 11 sectors, values appear for imports, value added, tariffs and taxes, household consumption, government final demand, gross fixed capital formation, changes in stocks, and exports. (Appendix B explains the derivations of these numbers).

It is instructive to examine the functional relationships between the two SAMs. Figure 3 indicates three major "blocks" of data within the disaggregate SAM. Block A1 is an 11 x 11 input-output matrix (I-O matrix) that traces the inter-sectoral movement of goods and services as inputs from one sector flow into other sectors for conversion into final products. Underlying the values of

¹⁷ SCN - United Nations System of National Accounts

TABLE 11
DISAGGREGATE SOCIAL ACCOUNTING MATRIX OF THE
REPUBLIC OF CAMEROON, 1984-1985
(MILLIONS FCFA)

Sector	1	2	3	4	5	6	7
1 Agriculture - Food	83903	0	0	42844	258	0	0
2 Agriculture - Cash	0	51562	0	19801	9861	5906	0
3 Forestry	0	0	0	15178	0	120242	0
4 Food Processing	5378	1752	0	90862	5598	2340	0
5 Consumption Goods	0	0	0	724	83540	1337	0
6 Intermediate Goods	8518	27564	10584	15213	82224	183650	33899
7 Construction Materials	2	3	48	24076	9861	15490	49819
8 Capital Goods	242	907	5114	1552	1852	8024	4670
9 Construction	3382	158	912	23664	3746	11032	175
10 Services - private	2295	32883	84987	19525	45845	40786	10538
11 Services - public	181	186	1792	1035	947	1114	812
Intermediate Consumption (Total)	83898	115018	83438	254475	223534	389922	99712
Intermediate Consumption (Local)	83898	104430	83438	222337	170523	215270	45885
Intermediate Consumption (Imported)	0	10588	0	32138	53010	174652	54047
Indirect Tax	3564	18969	28448	20580	90961	47877	7893
Subsidy	7867	2505	0	803	448	283	403
Net Indirect Tax	-4302	16463	28448	19757	90514	47594	7490
Value Added	500870	179358	55168	47654	101046	716230	22302
Total Production	580486	310837	167051	321886	415094	1153746	129504
Total Imports	9153	9592	0	18979	26925	125323	52099
Tariffs and Taxes	936	2940	0	9173	16511	25966	18285
Imports + Taxes	10089	12532	0	28152	43436	151309	70384
Total Absorption	590556	323369	167051	348038	458529	1305054	199889

TABLE 11 (Continued)

8	9	10	11	Total	Household Consumption	Government Consumption	Gross Fixed Capital Formation	Change in Stocks	Exports	Total
0	0	23728	0	130733	548517	0	5363	-98872	4815	590556
0	0	0	0	87130	40358	0	0	-36626	232507	323369
0	0	0	0	135420	0	0	0	6714	24917	167051
0	0	1868	25982	133778	170317	0	0	28108	15835	348038
0	0	1308	3536	90446	387084	0	0	-38033	19033	458529
3541	55110	15133	43700	459135	526942	0	0	107030	211948	1305054
14156	37437	187	0	151080	0	0	0	12886	35923	199889
5530	4109	2816	0	34615	0	0	403437	-111898	20646	346800
576	3681	3550	650	51524	9899	0	530200	-207789	0	383835
10817	57253	623268	55392	963389	840162	0	0	306269	285253	2395073
629	908	3363	0	10769	14976	345326	0	48511	0	419582
35249	158497	675020	129259	2248017	2538255	345326	939000	16300	850877	6937775
9217	158497	433146	129259	1655678						
26032	0	241873	0	592339						
4588	29920	331993	710	585483						
73	0	0	0	12381						
4514	29920	331993	710	573102						
16237	195417	955124	289613	3079019						
56001	383835	1982137	419582	5900138						
190231	0	432936	0	863238						
100568	0	0	0	174399						
290799	0	432936	0	1037837						
346800	383835	2395073	419582	6937775						

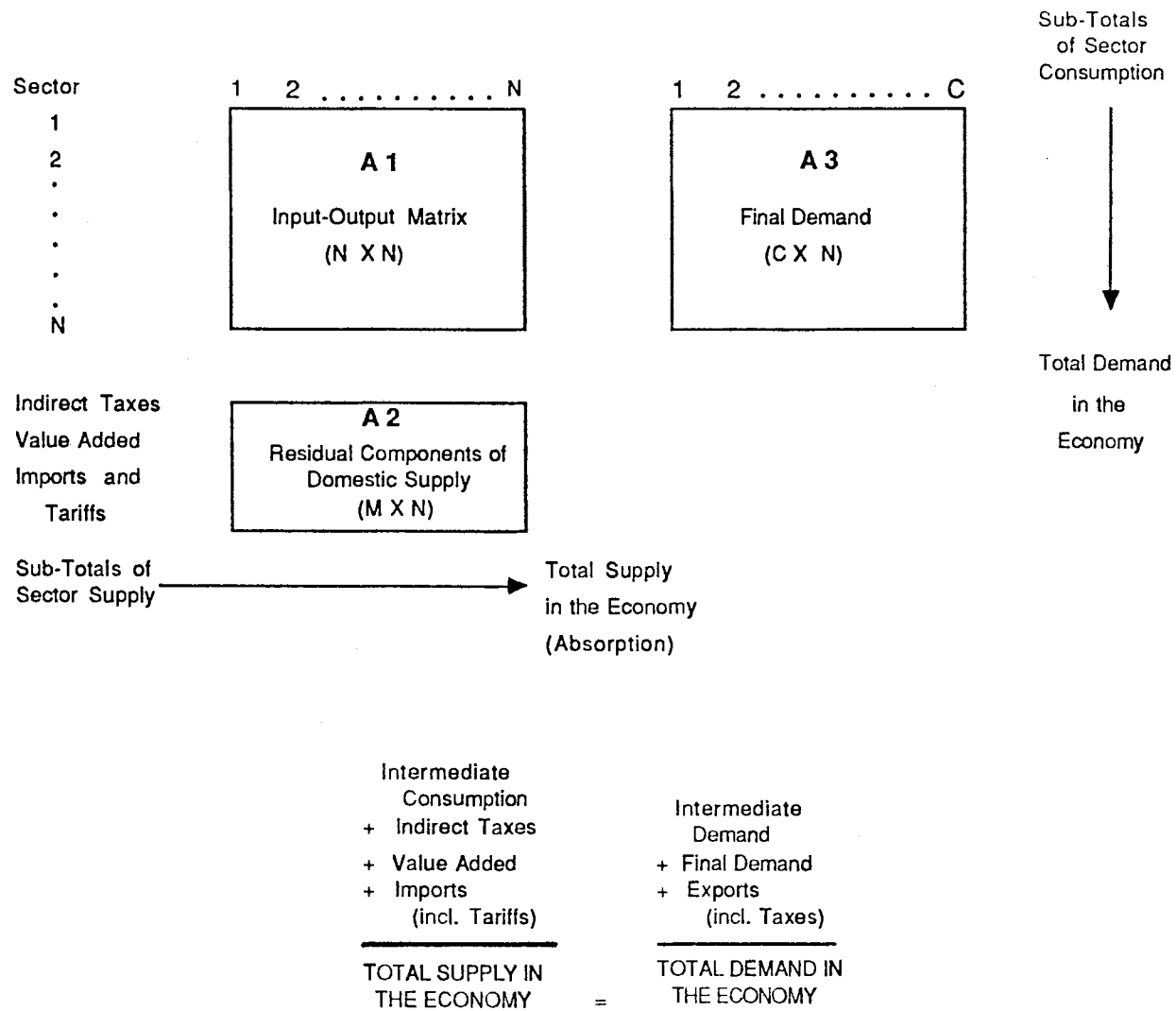


Figure 3. A Representative Disaggregate Social Accounting Matrix

the I-O matrix are coefficients which relate the inputs and outputs of the various sectors. More will be said about the role of these input-output coefficients in the model later. For now it, suffices to note that it is from the I-O matrix that the coefficients are derived.

Examination of the actual I-O matrix reveals that the total value of inputs corresponds to the value of intermediate demand as it appears at intersection of the Activities column and the Production row in the aggregate SAM. In fact, they are one and the same; they merely represent intermediate consumption at different levels of the economy.

Appended at the base of the I-O matrix is a sectoral breakdown of value added, production, total imports and taxes. Collectively, the components of this block, A2, complete the production, or supply, side of the economy. The sum of the sectoral values of these accounts, plus that of Intermediate Demand, is equal to the value of total supply in the economy, or as it is otherwise referred to, Absorption. This figure, 6,937.7 billion FCFA, differs from the total in the Production column of the aggregate SAM by the value of exports. Values for imports, taxes and tariffs appear in the Production column as subtotals. Careful observation reveals that the sum of Intermediate Demand, Value Added and Net Indirect Taxes in the disaggregate SAM--5,900.1 billion FCFA, is the same figure as the Activities total in the aggregate SAM.

Also appended to the I-O matrix, but opposite block A2, is block A3. In this block are the remaining components of total consumption; Household Consumption, Government Final Demand, Gross Fixed Capital Formation, Changes in Stocks, and Exports. The subtotals of these columns are easily located in the aggregate SAM as one moves across the Production row from left to right. The exception is total exports, which is found in the Activities row. This

placement assumes that exported goods move directly from the factory to the foreign market.

Thus, by adding across the rows of the disaggregate SAM one obtains subtotals of sectoral output; adding down columns results in subtotals of sectoral consumption. As with its aggregate counterpart, the disaggregate SAM is also square, the sum of its rows being equal to the sum of its columns. Total production in the economy is therefore equal to total consumption, or in other words, total supply equals total demand.

One final observation: the figures which appear in the Capital account row of the aggregate SAM do not appear explicitly in the disaggregate SAM. This set of values represents savings accumulated by households, enterprises, government and foreign entities. The total value of these savings is distributed over the sectoral shares of value added, in the case of households and enterprises, and indirect taxes and tariffs in the case of Government. Foreign Savings is subsumed in sectoral imports. Hence, savings appear only implicitly in the disaggregate SAM.

The preceding paragraphs are intended to familiarize the reader with the aggregate and disaggregate SAMs used in this study. Having provided this information, the stage is now set for development of the general equilibrium model.

How and Where to Begin: The Role of the Social Accounting Matrix in Model Formulation

During the extensive discussion of the aggregate and disaggregate SAMs, it is noted that the SAM plays an important role in model development. In addition to forcing the reconciliation of inconsistent data, the SAM framework also facilitates the modeler's conceptualization of the structure of the economy,

the correct specification of which is the modeler's fundamental objective. In the case of the Cameroon economy, development of the aggregate and disaggregate SAMs resulted in identification of labor and capital as constraining factors of production. SAM construction also led to conclusions about the major institutions at work in the economy, the sectors within which they are most active, and the interactions which these institutions have with one another and the world at large. Two of the more obvious examples of these interactions are the subsidies and transfer payments which government makes to households and enterprises. Thus, in the course of building the SAM, the underlying structure of the economy begins to emerge. Against this developing snapshot, the modeler may reevaluate previously held concepts about the economic structure as well as gain new insights. The next step is to move beyond the realm of ideas to actual specification of the model by translating these observations into equation form.

Breathing Life Into Form: Model Specification

Only a general equilibrium model is capable of capturing the full range of direct and indirect impacts of SAP-related economic policy reforms. Sectoral models employing partial equilibrium analysis may suffice to assess policy impacts on a narrowly defined set of activities, but they are inadequate for evaluating the impacts of policy reforms whose effects are economy-wide.

This study relies on a computable general equilibrium model to conduct policy reform simulations.¹⁸ These simulations, in turn, generate information for evaluating reform impacts. The model used is a modified version of the Condon-Dahl-Devarajan model of the Cameroon economy. This model was

¹⁸ For a discussion of general equilibrium models in theory and in practice, see Dervis et al. (1982). An extensive bibliography of general equilibrium models is presented in Devarajan et al. (1986).

first applied by Benjamin and Devarajan in 1984 to evaluate impacts on the Cameroon economy of several different scenarios: an oil boom, the use of protective tariffs to promote food self-sufficiency, and an industrial growth strategy based on taxation of imported intermediate goods and construction materials (Benjamin and Devarajan, 1984). In 1987, Condon et al. successfully employed the Benjamin-Devarajan model as a prototype to demonstrate how practical difficulties of implementing applied CGE models could be overcome using the General Algebraic Modeling System (GAMS). Both efforts were based on 1980 data which had been organized within a SAM framework.

Like its predecessors, the CGE model used in this study, HANABO,¹⁹ relies upon a SAM for needed data. In this case, however, the SAM has been updated to 1984. The 1984 SAM also contains more detail, identifying subsidies to producers, and government transfer payments to households and enterprises. The original model equations have been modified to reflect these added details. Having already discussed the 1984 SAM at considerable length, the reader's attention is directed to specification of the model equations. Specification begins with the demand side of the economy.

Consumer Demand

HANABO operates under the assumption of a single representative household in the economy. The household buys consumer goods according to fixed expenditure shares. If C_i is demand for consumption good i , then,

$$C_i = \frac{\beta_i C^{\text{tot}}}{P_i} \quad (1)$$

¹⁹ A common salutation exchanged by Cameroonian Pidgin-speakers, "Hana, bo?" means, "How are you, my friend?"

where C^{tot} is total consumption and β_i is the percentage share of household income spent on good i . P_i is the price of "composite" good i and implies that the consumption good may be either domestically produced or imported.

Total consumption, C^{tot} is in turn assumed to be a fixed share of disposable income Y :

$$C^{tot} = (1 - s)Y \quad (2)$$

where s is equal to the marginal propensity to save (MPS) and $(1 - s)$, therefore, the equivalent of the marginal propensity to consume. Under the assumption of a single representative household, disposable income (Y) is simply total factor income, i.e. value added, minus total depreciation (DEPR) plus government transfers to households and enterprises (GTHH and GTE, respectively):

$$Y = \sum_i P_i^{VA} X_i^D - DEPR + GTHH + GTE \quad (3)$$

P_i^{VA} being the value added price of good i , or in other words, that component of price which accrues to value added.²⁰ X_i^D represents the value of domestically produced good i .

Government transfers to households as well as transfers to enterprises are assumed fixed percentages of government revenues. Depreciation of fixed

²⁰ All domestic prices in the model are initialized at a base year value of 1.0, thus permitting the X_i^D component of value added to be expressed in value terms.

capital, DEPR, is a constant share of the value of capital stock in each sector:

$$DEPR = \sum_j D_j \sum_i P_i k_{ij} \bar{K}_j \quad (4)$$

where D_j is the fixed share of depreciation in sector j , K_j the value of capital in sector j (exogenously determined in this model), and k_{ij} the fraction of capital good i in sector j 's capital stock.

As stated earlier, consumption demand may be satisfied either with domestically produced goods (X_i^{XD}) or imported goods (M_i). Classical trade theory holds that domestically produced good i is a perfect substitute for the same good offered in the world market and that, under perfect market conditions, the two tradables will be priced the same. This assumption poses some problems in the case of a country like Cameroon. First, quality differences are frequently observed between domestically produced and imported items. Second, due to the level of aggregation used in the model, each sector represents a group of goods rather than a single commodity. For example, the capital goods sector includes some goods which are produced domestically, such as hand tools, but also includes others, like road building equipment, which are not. Hence, the perfect substitution postulate must be modified.

In order to describe the Cameroon economy more realistically, HANABO operates on the premise that domestically produced goods are instead imperfect substitutes for like imported goods. Consumers are allowed to maximize their utility over the two goods, X_i^{XD} and M_i , according to a constant elasticity of substitution (CES) function:

$$X_i = A_i^C \left[\delta_i M_i^{-\rho_i} + (1 - \delta_i) X_i^{XD-\rho_i} \right]^{-1/\rho_i} \quad (5)$$

where A_i^C and δ_i are constant shift and share parameters, respectively, and σ_i , the elasticity of substitution, is given by $\sigma_i = 1/(1+\rho_i)$. This specification implies that the two goods may now diverge in price and that demand for imported versus domestically produced goods is based upon relative prices.

The consumption bundle is now a composite equal to:

$$P_i X_i = P_{D_i} X_i^{XD} + P_{M_i} M_i \quad (6)$$

where P_{D_i} and P_{M_i} are the prices of the domestically produced and imported goods, respectively. The composite good is defined as X_i and P_i is its price.

Consumers minimize the cost of obtaining a "unit of utility" from this bundle, subject to their CES utility constraint (5). This yields the utility maximization rule:

$$\frac{M_i}{X_i^{XD}} = \left(\frac{P_{D_i}}{P_{M_i}} \right)^{\sigma_i} \left(\frac{\delta_i}{1-\delta_i} \right)^{\sigma_i} \quad (7)$$

The composite commodity price, as well as the domestic good price, is determined endogenously by the model. Cameroon is assumed to be a price-taker in the world market, however, and therefore the import good price, P_{M_i} , is fixed exogenously. It is linked to the world price in dollars for good i , PW_i , by the equation:

$$P_{M_i} = PW_i (1 + tm_i) ER \quad (8)$$

where ER is the exchange rate between US dollars and CFA francs (fixed parametrically in the model) and tm_i is the import tariff rate on sector i .

Intermediate Demand

The input-output coefficients underlying the production processes in the Cameroon economy are assumed fixed in the short-run. As a result of this assumption, intermediate demand for material inputs, r_i , is derived as follows:

$$r_i = \sum_j a_{ij} x_j^D \quad (9)$$

where a_{ij} represents a fixed coefficient of input from sector i required to produce a unit of sector j output.

Government Demand

The Cameroon government's level of expenditure on commodities, G^{tot} , is assumed fixed. Government demand for commodity i is given by:

$$G_i = \Gamma_i^G \bar{G}^{\text{tot}} \quad (10)$$

It is furthermore assumed that government expenditure is zero for all commodities except that of public administration, for which $\Gamma_i^G = 1$.

Investment Demand

In the comparative static experiments conducted in this study, capital stock remains fixed at 1984 levels. Hence, investment does not augment

capital stock as might otherwise be expected. Nevertheless, model accounting requirements necessitate the specification of investment size and composition.

Following classical economic theory, investment is held to be a function of the level of savings in the economy. Total savings, which is the sum of private, public and foreign savings plus depreciation, is expressed as:

$$S = s \sum_i P_i^{VA} X_i^D + R^G - \sum_i P_i G_i + DEPR + \overline{FSAV} \cdot ER \quad (11)$$

where \overline{FSAV} is the level of foreign savings (expressed in US dollars) and R^G , government revenues, are equal to:

$$R^G = \sum_i tnd_i P_i^{VA} X_i^D + tm_i PM_i + te_i PD_i E_i \quad (12)$$

In the preceding equation, tnd_i represents the "net" indirect tax rate on sector i (net of government subsidies to producers) and tm_i and te_i , the tax rate on sector i imports and exports, respectively.

It is necessary to determine not only the level of investment in the economy but its composition as well. Beginning with the level of savings available for investment, S , it is assumed that a fixed fraction of these funds, \bar{V}_j are invested in sector j . The investment funds are deflated by the price of a unit of capital in that sector, $\sum_i P_i k_{ij}$, where k_{ij} is the (i,j) element of the capital coefficients matrix. Investment by sector of origin, I_i , may then be

calculated using the formula:

$$I_i = \sum_j k_{ij} \frac{V_j S}{\sum_i P_i k_{ij}} \quad (13)$$

Inventory Demand

The demand for inventory, ST_i , is also assumed as a fixed proportion, v_i , of output:

$$ST_i = v_i X_i^D \quad (14)$$

Export Demand

In addition to the consumption demand of its own population, Cameroon also faces demand for its domestic production in international markets. Under classical trade theory's small country assumption, this export demand is perfectly elastic. This assumption has two implications: 1) Cameroon is a price-taker in the international market place; and 2) if willing to sell at the given world market price, Cameroon may dispose of as much of its domestic commodity as it desires without impacting the world market price.

While theoretically satisfying, in reality, the small country assumption of perfectly elastic export demand does not always hold. Increased domestic prices can result in countries such as Cameroon losing some of their international market shares. In view of this fact, Cameroon's exports are

portrayed as facing a constant elasticity demand (CED) function:

$$E_i = E_o \left(\frac{\pi_i}{PE_i} \right)^{\eta_i} \quad (15)$$

where π_i is a weighted average of world prices for good i , E_o is a constant, and η_i is the elasticity of demand. PE_i is the price of exports which is linked to the world market dollar price, PWE_i , via the exchange rate as follows:

$$PE_i = \frac{PWE_i \cdot ER}{1 + te_i} \quad (16)$$

Export Supply

On the supply side, the domestic price increases mentioned can result in excessive export supply response. Higher domestic prices encourage producers to increase output while simultaneously discouraging local consumption. The result can be dramatic increases in excess supply. In reality, this increase may not be as dramatic as anticipated and, in fact, may not occur at all. Again, the reason is the high level of aggregation in the model. Tradables and non-tradables are found within the same sector, such as electricity (a non-tradable) and wood pulp (a tradable), both of which are intermediate goods. In addition, quality differences between products consumed domestically and those designated for export may dampen export response.

To handle this issue, a constant elasticity of transformation (CET) function between domestically consumed, X_i^D , and exported goods, E_i , is specified:

$$X_i^D = A_i^T \left[\gamma_i E_i^{\phi_i} + (1 - \gamma_i) X_i^{XD\phi_i} \right]^{1/\phi_i} \quad (17)$$

where X_i^D is domestic output, A_i^T and γ_i are shift and share parameters (calibrated by the model), respectively, and the elasticity of transformation, Ψ_i , is given by $1/1 - \phi_i$.

Supply, therefore, encompasses not only goods sold domestically, but also those destined for export markets. This is expressed as:

$$P_i^X X_i^D = P_{D_i} X_i^{XD} + P_{E_i} E_i \quad (18)$$

Producers allocate their production between the domestic and international markets in such a way as to maximize their revenue, $P_i^X X_i^D$, from a given output, subject to the constraint posed by the CET function. Working through this problem yields the maximization condition:

$$\frac{E_i}{X_i^{XD}} = \left(\frac{P_{E_i}}{P_{D_i}} \right)^{\Psi_i} \left(\frac{1 - \gamma_i}{\gamma_i} \right)^{\Psi_i} \quad (19)$$

where $X_i^{XD} = X_i - E_i$ and Ψ_i is the elasticity of transformation. As a result of this specification, export price, P_{E_i} , and domestic price, P_{D_i} , now may differ.

Domestic Goods Supply

Production in Cameroon is specified using a constant-returns Cobb-Douglas production function comprised of three categories of labor (L_{1i} , L_{2i} , L_{3i}) and sector-specific capital, K_i :

$$X_i^D = A_i L_{1i}^{\alpha_{1i}} L_{2i}^{\alpha_{2i}} L_{3i}^{\alpha_{3i}} K_i^{\alpha_{4i}} \quad (20)$$

where A_i is a constant and $\alpha_{4i} = 1 - \sum_j \alpha_{ji}$. $i = 1, 2, 3$.

In order for the model to be able to generate an equilibrium, it is necessary that X_i^D be functionally related to prices. In this case, it is the price of labor, i.e. wages, in conjunction with goods prices that determine domestic output through the production function. Clarification of this relationship requires introducing the labor market.

The Labor Market: Demand and Supply

The demand for labor, as with any other commodity, is in part a function of price. The "net price" of labor in sector i is defined as the unit value added in that sector:

$$P_i^{VA} = PD_i - \sum_j P_j a_{ji} - tnd_i \quad (21)$$

where a_{ji} is the input-output coefficient derived from the disaggregate SAM, and tnd_i , the net indirect tax rate on sector i .

Under perfect competition, profit maximization requires that the wage of each factor be equal to the value of its marginal product. That is;

$$P_i^{VA} \frac{\partial X_i^D}{\partial L_{li}} = \theta_{il} W_l \quad (22)$$

$$l = 1, 2, 3$$

where W_l is the average wage rate of labor category l , and θ_{il} is the wage proportionality factor, defined as that proportion of the average wage earned by

workers in sector i and labor category l . Equation 22 implicitly defines the demand for labor in terms of its price, and through equations 20-22 the dependence of X_i^D on wages and prices is established.

The supply of labor, \bar{L}^S , is assumed fixed in the short run. The labor market clears when total labor demand (summed over all i sectors) for labor category l equals the supply of labor in that category.

$$\sum_i L_{li} = \bar{L}_l^S \quad (23)$$

Foreign Savings

Walras' Law²¹ allows foreign savings, FSAV, to be expressed as follows:

$$\sum_i PW_i M_i - \frac{PD_i E_i}{ER(1 + te_i)} = \text{FSAV} \quad (24)$$

essentially defining the trade deficit as being equal to the level of foreign savings.

Equilibrium Conditions

Finally, in order for all markets to clear and a general equilibrium to obtain, the following equilibrium conditions must hold:

$$X_i = r_i + C_i + G_i + I_i + ST_i$$

$$i = 1, \dots, 11 \quad (25)$$

²¹ Walras' Law states that, given a set of m aggregate excess demand functions representing m markets, only $m-1$ of which are independent, if equilibrium is attained in the first $m-1$ markets, the m th market is also in equilibrium.

A "solution" to the model is obtained when a set of endogenous prices is found that permits all 25 of the specified equations to hold simultaneously. Clearly, finding the solution to such a large model would be an intractable problem without the assistance of a computer and appropriate software. Fortunately, these tools exist and the model may be solved. HANABO appears in its GAMS program form in Appendix D.

CHAPTER V

IMPACTS OF STRUCTURAL ADJUSTMENT-RELATED REFORMS ON THE ECONOMY OF CAMEROON

Goals, Options, Hard Choices: Selecting Among Alternative Economic Policy Reforms

The gravity of Cameroon's present economic situation mandates decisive action on the part of the GOC if it is to prevent economic stagnation and minimize any loss of the social and economic gains Cameroon achieved during the prosperous oil boom years. The problem situation which Cameroon faces is of a dual nature. There is, on the one hand, a set of short-term adjustments that demand immediate attention. Among these are reducing government expenditures and balancing the external accounts. On the other hand is a set of long-term adjustments capable of being resolved only through careful and coordinated planning within an extended time frame. These modifications center on investment strategies and regional development.

Before the process of finding solutions can begin, needed adjustments must be assigned priority. Drawing upon the overview of the Cameroonian economy presented in Chapter II, the following paragraphs set forth the most critical long- and short-term adjustments confronting the GOC.

Long-term Economic Adjustments

The long-term adjustments which Cameroon faces are numerous. Some

of the most critical are:

- 1) revitalization of the food and cash crop sectors of the agricultural economy to increase output and efficiency;
- 2) diversification of the economy to reduce dependence on petroleum exports as the primary source of foreign exchange;
- 3) expansion of Cameroon's industrial base to permit domestic production of some presently imported goods;.
- 4) allocation of scarce investment resources to those sectors of the economy yielding highest net returns, not only in terms of financial capital, but also in creating linkages that will facilitate sustained economic development;.
- 5) stemming the flow of rural migrants to urban centers where employment opportunities are fast becoming scarce; and,.
- 6) development of the indigenous human resource base in those sectors which will contribute most to Cameroon's long-term economic development.

Economic Adjustments of Immediate Concern

Priority areas of needed economic reform are:

- 1) managed reduction of Government expenditure in order to control budgetary deficits;.
- 2) a growing import bill which, due to increased stress on the country's foreign exchange reserves, will become increasingly difficult to pay; and,
- 3) the loss of foreign exchange reserves due to rapidly diminishing petroleum reserves.

Weighing the Unknowns: Evaluating Alternative Policy Reforms

Such dramatic modifications imply more than mere fine-tuning of Cameroon's economy. They require structural adjustments of a basic and enduring nature. These structural adjustments may be effected via a number of policy reform measures. Selecting among these many alternatives is a complicated and inherently risky task. The two primary risks involved are: 1) failure to realize the intended objective(s); and, 2) indirectly causing unintended, detrimental impacts.

In their attempts to bring about desired structural adjustments, policy-makers must carefully weigh the policy tools at their disposal against the potentially negative impacts each may produce. It would be of great advantage if policy-makers had prior insight into the economic and social impacts of policy alternatives upon which to base their selection. SAM-based CGE models can provide such insight. The simulations which follow are intended to demonstrate this capability.

Policy Reform Simulations

The SAM-based CGE model, HANABO, is employed to conduct three policy reform simulations. The simulations are designed to explore the economic and social impacts of alternative policy reform packages which may potentially effect the structural adjustments determined most critical for Cameroon. Reforms to be simulated are selected based upon the adjustments of both short- and long-term concern to the Cameroon government outlined above. For example, managed reduction of government expenditure is cited as an immediate priority for the GOC. It is with this priority in mind that the first

reform simulated is a 25 percent reduction in government expenditure. The succeeding experiments, which involve selective import tax increases and targetted subsidies, follow from the identified need to balance Cameroon's external accounts and revitalize the country's agricultural sector. Levels of expenditure reduction or tax and subsidy increases are chosen arbitrarily, but reflect announced GOC intentions, World Bank and IMF recommendations, and current political realities in Cameroon.

The listing in Table 12 presents the reform packages simulated and describes the structural adjustments they are designed to accomplish. Also indicated are the time horizons within which the anticipated adjustments are expected to take place. Technical notes describing how these simulations are conducted using GAMS and HANABO are found in Appendix D.

Simulation Results and Analysis

Results and analysis of the simulation experiments are divided into eight areas of principal concern: production, consumption, foreign savings, private GDP, government revenue, wages, employment and private consumption. Production and consumption are sub-divided into domestic production, export and import components.

Part I of the analysis focuses on economic impacts of the simulated reforms. Part II of the analysis examines the reforms from a social welfare perspective, evaluating impacts on wages and employment by sector and socio-economic group, and household consumption. Finally, each reform package is assessed in terms of its balanced achievement of structural adjustment goals with equitable distribution of costs and benefits.

TABLE 12
LISTING OF SIMULATED REFORMS, ADJUSTMENT GOALS
AND ASSOCIATED TIME HORIZONS

Simulation	Adjustment Goal	Time Horizon
1) Reduction of government expenditures	Immediate reduction in government budget deficits	Short-term
	Reduced import demand	Short-term
2) Increased import taxes on consumption goods (luxury tax) and food processing	Balance current account deficit	Medium-term
	Save foreign exchange	Short-term
	Increase domestic savings	Medium-term
	Generate higher levels of domestic investment	Medium-term
	Encourage import substitution in consumption goods and food processing sectors	Medium-term
(3) Lower indirect taxes on both agricultural sectors	Encourage increased agricultural production	Medium-term
Eliminate subsidies in non-agriculture sectors	Encourage increased use of capital inputs	Medium-term
Double subsidies to food processing and agriculture sectors	Encourage increased investment in agriculture sectors	Medium-term
	Increase rural incomes, savings and employment opportunities	Medium-term

Experiment 1: 25 Percent Government Expenditure Reduction

Table 13 reports the CGE model results of a 25 percent reduction in government expenditure. Analysis of the impacts of this reduction on selected economic variables and sectors of the Cameroon economy follows.

Economic Analysis

Domestic Output (X^D). The reduction of government expenditure acts through the products market to reduce the demand for goods and services. This decline exerts downward pressure on domestic prices to which output responds by contracting. Food crops production falls as does that of food processing. The mild decline of food crops versus the more notable decline in food processing is explained by the fact that, in Cameroon, many food producers are also consumers, and the demand for food tends to be price inelastic. As a result, basic food crops output would be expected to remain more stable than that of a more expensive processed food item.

Cash crops are little affected by the Government's expenditure reduction since, as exports, these are not items generally consumed by households. Rather, cash crops are more important for the income which they yield to households. In light of the decline in private GDP which results from the Government's expenditure reduction, it seems rational that producers would increase cash crop output.

Significant increases in output occur in the Construction, Capital Goods and Construction Materials sectors. This increase is explained by way of the Investment-Savings identity: reduced government spending (with household and enterprise transfers fixed) implies government savings accumulate. This

TABLE 13

EXPERIMENT 1 RESULTS: 25 PERCENT GOVERNMENT EXPENDITURE REDUCTION

	VALUE (Bill FCFA)	CHANGE FROM BASE MODEL (Bill FCFA)	PERCENTAGE CHANGE FROM BASE MODEL	DOMESTIC PRICE (UNITY)	DOMESTIC EXPORT PRICE (UNITY)	WORLD EXPORT PRICE (UNITY)	DOMESTIC IMPORT PRICE (UNITY)	WORLD IMPORT PRICE (UNITY)
I) PRODUCTION								
a) DOMESTIC OUTPUT								
Food Crops	578.5487	-1.9154	-0.003	0.9968				
Cash Crops	311.0929	0.2551	0.001	0.9912				
Forestry	167.3472	0.2955	0.002	0.9802				
Food Processing	311.9351	-9.9487	-0.031	0.9975				
Consumer Goods	418.431	3.3302	0.008	0.9983				
Intermediate Goods	1159.0615	5.315	0.005	0.9991				
Construction Materials	141.2321	11.7146	0.090	1.0257				
Capital Goods	70.6322	14.6325	0.261	1.068				
Construction	476.38	92.5445	0.241	1.1748				
Private Services	1988.9344	26.7936	0.014	0.91				
Public Services	324.902	-94.6725	-0.226	0.8677				
Sum	5948.4971	50.2598						
b) EXPORTS								
Food Crops	4.82	0.0049	0.001		0.9997	2.2877		
Cash Crops	233.1282	0.6207	0.003		0.9993	2.2868		
Forestry	25.1145	0.1974	0.008		0.998	2.2838		
Food Processing	15.4923	-0.3427	-0.022		1.0055	2.3009		
Consumer Goods	19.4544	0.4212	0.022		0.9945	2.2758		
Intermediate Goods	212.9054	0.9569	0.005		0.9989	2.2858		
Construction Materials	38.2994	2.3739	0.066		0.9841	2.252		
Capital Goods	25.2651	4.6195	0.224		0.9508	2.1757		
Private Services	290.5901	5.3361	0.019		0.9954	2.2777		
Sum	865.0694	14.1879						

TABLE 13 (Continued)

	VALUE (Bill FCFA)	CHANGE FROM BASE MODEL (Bill FCFA)	PERCENTAGE CHANGE FROM BASE MODEL	DOMESTIC PRICE (UNITY)	DOMESTIC EXPORT PRICE (UNITY)	WORLD EXPORT PRICE (UNITY)	DOMESTIC IMPORT PRICE (UNITY)	WORLD IMPORT PRICE (UNITY)
II) CONSUMPTION								
a) DOMESTIC PRODUCTION								
Food Crops	573.7287	-1.9204	-0.003	0.9968				
Cash Crops	77.963	-0.3674	-0.005	0.9912				
Forestry	142.2313	0.0967	0.001	0.9802				
Food Processing	296.4422	-9.6066	-0.031	0.9975				
Consumer Goods	398.9751	2.9075	0.007	0.9983				
Intermediate Goods	946.1561	4.3582	0.005	0.9991				
Construction Materials	102.9148	9.3228	0.100	1.0257				
Capital Goods	45.3236	9.9695	0.282	1.068				
Construction	476.38	92.5445	0.241	1.1748				
Private Services	1698.3337	21.4468	0.013	0.91				
Public Services	324.902	-94.6725	-0.226	0.8677				
Sum	5117.4296	35.9995						
b) IMPORTS								
Food Crops	10.0076	-0.0812	-0.008				1	2.0759
Cash Crops	12.3743	-0.1578	-0.013				1	1.7515
Forestry	0	0	0.000				1	0
Food Processing	25.2504	-0.9013	-0.034				1	1.4857
Consumer Goods	42.8288	-0.6081	-0.014				1	1.4185
Intermediate Goods	151.9403	0.6317	0.004				1	1.8953
Construction Materials	78.8896	8.4947	0.121				1	1.6938
Capital Goods	382.7252	91.9336	0.316				1	1.497
Construction	0	0	0.000				1	0
Private Services	435.119	2.1831	0.005				1	2.2883
Public Services	0	0	0.000				1	0
Sum	1139.1352	101.5759						

TABLE 13 (Continued)

	VALUE (Bill FCFA)	CHANGE FROM BASE MODEL (Bill FCFA)	PERCENTAGE CHANGE FROM BASE MODEL	DOMESTIC PRICE (UNITY)	DOMESTIC EXPORT PRICE (UNITY)	WORLD EXPORT PRICE (UNITY)	DOMESTIC IMPORT PRICE (UNITY)	WORLD IMPORT PRICE (UNITY)
III) FOREIGN SAVINGS (M-E)	159.754	131.468	4.648					
IV) GROSS DOMESTIC PRODUCT	2564.8045	-33.8247	-0.013					
V) GOVERNMENT REVENUE	793.7569	46.2566	0.062					
	VALUE (FCFA)	CHANGE FROM BASE MODEL (FCFA)	PERCENTAGE CHANGE FROM BASE MODEL					
VI) WAGES								
Rural-Unskilled	149400	400	0.003					
Urban-Unskilled	373700	-10800	-0.028					
Urban-Skilled	3604500	-241000	-0.063					

TABLE 13 (Continued)

VII) NET CHANGE IN EMPLOYMENT

SECTOR	SOCIO-ECONOMIC CLASS (Number of Laborers)			
	Rur-Unsk	Urb-Unsk	Urb-Skil	SUM
Food Crops	-15686.3	3273.2	0	-12413.1
Cash Crops	-742.4	2495.2	133.3	1886.1
Forestry	-222.8	12.2	30	-180.6
Food Processing	-1935.5	-1060.1	-167.6	-3163.2
Consumer Goods	-1263.8	-145.5	564.4	-844.9
Intermediate Goods	53.5	745.5	789.1	1588.1
Construction Materials	283.4	319.8	197.7	800.9
Capital Goods	1477.4	1469.2	723.6	3670.2
Construction	19063.6	25919.1	6922.9	51905.6
Private Services	-1027.1	3050	3894	5916.9
Public Services	0	-36078.7	-13087.3	-49166

TABLE 13 (Continued)

	VALUE (Bil FCFA)	CHANGE FROM BASE MODEL (Bil FCFA)	PERCENTAGE CHANGE FROM BASE MODEL	DOMESTIC PRICE (UNITY)	DOMESTIC EXPORT PRICE (UNITY)	WORLD EXPORT PRICE (UNITY)	DOMESTIC IMPORT PRICE (UNITY)	WORLD IMPORT PRICE (UNITY)
VIII) PRIVATE CONSUMPTION								
Food Crops	545.6094	-2.9116	-0.005	0.9968			1	
Cash Crops	40.3258	-0.0322	-0.001	0.9912			1	
Forestry	0	0	0	0.9802			1	
Food Processing	169.2832	-1.0336	-0.006	0.9975			1	
Consumer Goods	389.8045	2.7234	0.007	0.983			1	
Intermediate Goods	522.9245	-4.017	-0.008	0.9991			1	
Construction Materials	0	0	0	1.0257			1	
Capital Goods	0	0	0	1.068			1	
Construction	8.3557	-1.5435	-0.156	1.1748			1	
Private Services	845.9028	5.7413	0.007	0.981			1	
Public Services	17.1134	2.1375	0.143	0.8677			1	
Sum	2539.3193	1.0643	0.0004					

additional savings generates sizeable amounts of investment capital which, according to model specification, are directed to designated investment sectors, construction and capital goods. The increase in construction materials output is derived from the demand for these goods as inputs to construction services.

Public services fall as a direct result of government budget cuts. Why then does public services output not fall the full 25 percent of the expenditure reduction? The rationale offered is that some efficiency gains result from removing less productive personnel and equipment, hence, the less than 25 percent loss of service output.

Exports (E). Reduced income leading to lower consumer demand brings about greater excess supply of food crops. Together with the need to regain lost household income, this brings about a rise in food crop exports. The income motive also lies behind the increase in cash crop exports as well as the growth in consumer goods exports. Such items would tend to be consumed by households holding excess cash reserves, which is not the case here.

Capital goods and construction materials, whose outputs have increased more than the domestic economy can absorb (or afford) are then routed to export markets.

Notably, only food processing sector exports decrease. Lower food crop production (as input to the food processing sector) as well as reduced demand for processed foods causes the sector to contract. Hence, domestic supplies are diminished and exportable surpluses shrink, thereby sending prices higher.

Consumption of Domestic Production (X^{XD}). Lower domestic production with its concurrent dampening effects on household income, serves to suppress domestic consumption. This is reflected in lower levels of consumption for food crops, cash crops and processed foods. In fact, consumption of these goods

falls in spite of domestic price reductions, signifying that income effects are stronger than the demand response which might normally be expected to be positive for such goods.

Sizeable injections of investment capital into the economy lead to substantial increases in consumption of domestically produced investment goods and services from the construction, construction materials and capital goods sectors. Substantial price increases for these products reflect the levels of their excess demand.

Public services consumption, a non-tradable sector, decreases the same amount as domestic output for this sector. This is logical since what is no longer being produced (and which cannot be imported) can no longer be consumed.

Imports (M). When looking for explanations of import behavior, it is important to keep in mind two principal factors: domestic prices (which in turn reflect domestic output and demand relationships) and world market prices. Relative prices play a vital role in import behavior. For example, in the case considered, domestic prices fall for food crops, cash crops, processed foods and consumer goods. World prices for these goods, however, remain constant, implying that relative price changes favor domestic goods consumption. In accordance with the principle of relative prices, imports for each of these sectors falls. But, knowing that consumption of domestic production from these sectors also falls (except for consumer goods), this suggests that lower income is the more likely reason for reduced imports. For consumer goods, however, lower imports may be attributed to relative price effects, since consumption of domestically produced consumer goods increases.

With domestic production, consumption and exportation of construction materials and capital goods simultaneously expanding, it is less clear what lies behind import growth in these sectors. When increases in exports and imports

occur within the same sectors at the same time, there are at least two possible explanations: 1) the sector is importing and then re-exporting the same good, or, 2) the domestic good and the imported are imperfect substitutes. At the level of aggregation in this study, logic tends to favor the latter explanation, although the reader is well-advised to keep the former possibility in mind.

Import response for these goods as well as domestic supply and consumption responses implies that investment demand is price and income elastic: changes in either the price of investment goods or income spark observable changes in the demand for these goods.

Foreign Savings (FSAV). Defined as imports minus exports (M-E), positive foreign savings of US\$ 159 million indicates imports by Cameroon from the rest of the world (ROW) exceed the value of goods which Cameroon exports to the rest of the world. Furthermore, the US\$ 131 million increase in foreign savings under the government expenditure reduction scenario denotes a worsening of its balance of trade position with the ROW.

Although under this scenario Cameroon does manage to increase exports of some sectors, e.g. food and cash crops, consumer and capital goods, these increases fail to compensate for increased imports. Even if Cameroon were to increase its food and cash crop exports significantly, these might not be enough to balance its capital goods imports. The reason is due to the predominance of primary commodities - coffee, cocoa, and cotton among Cameroon's exports. The consumer goods which it exports may also be relatively basic items such as baskets, tin pots and enamelware. By comparison, these types of items embody significantly less value added than the types of consumer goods which Cameroon imports - heavy machinery, automobiles, chemicals, electronics, etc. Hence, terms of trade weigh against Cameroon, hampering the country's efforts to balance its trade accounts.

Private GDP (Y). Under the government expenditure reduction scenario, private GDP falls by 33.82 billion FCFA. As specified in the model equations, private GDP is equal to domestic output, calculated at its valued-added price, minus depreciation. Although overall domestic output increases, so does the value of depreciation (defined in the model as savings by enterprises), thereby acting to reduce private GDP.

Replacement capital is not the only factor acting to diminish GDP, but also lower value added prices in the various sectors of the newly restructured economy. As the increase in depreciation (20 billion FCFA) does not fully account for the drop in GDP (33 billion FCFA), it implies that the value added content of overall domestic output has fallen.

Government Revenue (GR). Government revenue increases by 46 billion FCFA as a result of expenditure reductions. The sources of this increase are higher intakes of import tariffs (+33 billion FCFA) and indirect taxes (+13 billion FCFA). Much of these revenues arise from tariffs assessed on consumption of imported capital goods and construction materials which bear effective tariff rates of 52 percent and 35 percent, respectively.

Social Welfare Analysis

Wages (W). Reductions in government expenditure, if perceived as permanent, can lead to changes in the structure of an economy. In theory, this new structure reflects society's desired mixture of goods and services. Derived from the demand for these products is the demand for labor. As with other resources, labor, if perfectly mobile, will respond to changes in economic structure by moving to those sectors where its marginal productivity, reflected by factor price, is greatest. Wages are the price signals that guide labor to its most

productive use. Wage shifts, therefore, indicate changes in the derived demand for labor.

In this experiment, reduced government expenditures result in increased wages for rural-unskilled labor (0.3 percent); wages for urban-unskilled and urban-skilled labor decrease (2.8 percent and 6.3 percent, respectively). These shifts indicate that in the economy as it has been restructured, the marginal productivity of and the demand for rural-unskilled labor has increased relative to those of the other labor categories.

Employment (L^D). These wage shifts induce labor movements between sectors. (Note: under the closure specification of the model, two labor/sector combinations are designated mutually exclusive: urban-skilled labor working in the food-crops sector, and rural-unskilled labor employed in the public service sector). In accordance with decreased sectoral output, labor demand and wages, labor moves out of public services (-49,166), food crops (-12,413) and food processing (-3,163). Corresponding to growth sectors, there is a net inflow of labor to construction (51,905), private services (5,916) and cash crops (1,886).

Movements within labor categories reflect improvements (or deterioration) of relative wages. Rural-unskilled workers shift out of food crops and food processing and into construction. Urban-unskilled labor migrates out of public services and food processing, and into construction. Urban-skilled workers are driven out of the public services sector by government spending cuts and find employment in the construction and private services sectors. Close examination shows all of these moves to be in correspondence with the structure of the post-reform economy.

Private Consumption (C^D). Through their impacts on wages and employment, SAP reforms ultimately may affect household consumption patterns. It is at the household level that social welfare impacts may best be assessed. HANABO reports private, i.e. household, consumption as it is distributed across the eleven sectors of the disaggregate Cameroon economy. Consumption shifts indicate how different economic reforms may impact social welfare of the Cameroonian household.

Government expenditure reductions lead to decreased household consumption of food crops (-2.9 billion FCFA) and processed food items (1 billion FCFA). These changes correspond with decreases in domestic output, consumption of domestic production and imports for these sectors. Reductions in food consumption occur despite falling domestic prices. This suggests that lower household income rather than prices lies behind these consumption shifts. (The reader will recall that under the government expenditure reduction scenarios, private GDP falls 33 billion FCFA. Moreover, simulation experiments in this study have shown food crop consumption to be income elastic.)

Government expenditure reductions have their greatest impact on private consumption in the construction sector. Household consumption of construction services falls by 15 percent (1.5 billion FCFA). This decline is attributed to decreased household savings, which is a fixed proportion of private GDP.

Lower domestic prices result in increased household consumption of consumer goods (+3 billion FCFA). Similar increases occur in consumer goods output, consumption of domestic production and exports. From the lower volume of consumer goods imports, it may be inferred that increased household consumption is comprised of domestically produced consumer goods.

Increased household consumption of consumer goods is notable because it occurs at a time when food consumption by households is falling. Reductions of such a basic necessity as food would suggest that households also attempt to minimize consumption of all non-essential commodities. Two possible explanations for increased consumer goods are offered:

(1) Domestic prices fall for both intermediate and consumer goods, but the price for consumer goods falls further. In keeping with these relative price changes, it is observed that household consumption of intermediate goods decreases by 4 billion FCFA, whereas consumption of consumer goods increases. It is plausible that behind these figures lies the decision by households to replace old or broken goods with new ones rather than restoring or repairing them. This is analogous to the decision to buy a new hoe, now that it has become relatively cheaper, rather than purchasing a replacement blade which has become relatively more expensive.

(2) An alternative explanation is conditional upon Cameroonian household food consumption being above its minimal requirements. That is, Cameroonian households are consuming more food than they need. If this were the case, then policy reforms that result in lower household income (such as the one being examined) might force households to reallocate expenditures away from goods perceived as in excess and towards those perceived as scarce. This scenario is analogous to the food surplus household which aspires but cannot afford to purchase new clothes. Following economic policy reforms, the household finds that it has less income, but clothing is now more affordable. The household accommodates its new economic reality by reducing its food consumption and purchasing new clothing.

While both explanations are plausible, it is difficult to accept an assumption of surplus food supplies in view of Cameroon's failing food crop

production. Therefore, greater weight must be given to the first explanation for increased household consumption of consumer goods.

Government cutbacks reduce prices of public services. These price decreases result in a 14 percent increase (2 billion FCFA) in household consumption of these services. Consumption of private services also increases by 0.7 percent (6 billion FCFA).

The overall effect of reduced government expenditures on household consumption is mixed and therefore difficult to assess. Food items comprise a smaller share of the household consumption bundle, with consumer goods, public and private services expanding their shares. As a whole, however, the household bundle in the post-reform period is smaller than before and in this context less food consumption could have serious implications for household well-being.

Experiment 2: Additional 50 percent "Luxury Tax" On Imported Consumer Goods and Processed Foods

Table 14 reports the CGE model results of an additional 50 percent import tariff on consumer goods and processed foods. The economic and social welfare impacts of this policy reform are as follows.

Economic Analysis

Domestic Output (X^D). The impact of a luxury tax on imported consumer goods and processed foods has only mild effects on Cameroon's domestic prices and output. Domestic prices shift less than 1 percent for all sectors except food processing, which increases only a little over 1 percent.

TABLE 14
EXPERIMENT 2 RESULTS: ADDITIONAL 50 PERCENT IMPORT TAX
ON CONSUMER GOODS AND PROCESSED FOODS

	VALUE (Billion FCFA)	CHANGE FROM BASE MODEL (Billion FCFA)	PERCENTAGE CHANGE FROM BASE MODEL	DOMESTIC PRICE (UNITY)	DOMESTIC EXPORT PRICE (UNITY)	WORLD EXPORT PRICE (UNITY)	DOMESTIC IMPORT PRICE (UNITY)	WORLD IMPORT PRICE (UNITY)
I) PRODUCTION								
a) DOMESTIC OUTPUT								
Food Crops	580.4809	0.0168	0.000	0.9999				
Cash Crops	310.9117	0.0739	0.000	1.0019				
Forestry	167.2916	0.2399	0.001	0.9996				
Food Processing	325.8479	3.9641	0.012	1.0124				
Consumer Goods	415.3102	0.2094	0.001	1.0088				
Intermediate Goods	1153.8197	0.0732	0.000	0.9986				
Construction Materials	129.4673	-0.0502	0.000	0.9983				
Capital Goods	55.4457	-0.554	-0.010	0.9941				
Construction	380.2151	-3.6204	-0.009	0.9907				
Private Services	1962.6766	0.5358	0.000	0.9986				
Public Services	419.5541	-0.0204	0.000	1.0004				
Sum	5901.0208	0.8681						
b) EXPORTS								
Food Crops	4.8156	0.0005	0.000		1	2.2883		
Cash Crops	232.4674	-0.0401	0.000		1	2.2884		
Forestry	24.9528	0.0357	0.001		0.9996	2.2875		
Food Processing	15.805	-0.03	-0.002		1.0005	2.2894		
Consumer Goods	18.8878	-0.1454	-0.008		1.0019	2.2927		
Intermediate Goods	212.0674	0.1189	0.001		0.9999	2.288		
Construction Materials	35.9439	0.0184	0.001		0.9999	2.288		
Capital Goods	20.4821	-0.1635	-0.008		1.002	2.2929		
Private Services	285.4538	0.1998	0.001		0.9998	2.2879		
Sum	850.8758	-0.0057						

TABLE 14 (Continued)

	VALUE (Bill FCFA)	CHANGE FROM BASE MODEL (Bill FCFA)	PERCENTAGE CHANGE FROM BASE MODEL	DOMESTIC PRICE (UNITY)	DOMESTIC EXPORT PRICE (UNITY)	WORLD EXPORT PRICE (UNITY)	DOMESTIC IMPORT PRICE (UNITY)	WORLD IMPORT PRICE (UNITY)
II) CONSUMPTION								
a) DOMESTIC PRODUCTION								
Food Crops	575.6653	0.0162	0.000	0.9999				
Cash Crops	78.4442	0.1138	0.001	1.0019				
Forestry	142.3388	0.2042	0.001	0.9996				
Food Processing	310.0417	3.9929	0.013	1.0124				
Consumer Goods	396.4219	0.3543	0.001	1.0088				
Intermediate Goods	941.7522	-0.0457	0.000	0.9986				
Construction Materials	93.5233	-0.0687	-0.001	0.9983				
Capital Goods	34.9634	-0.3907	-0.011	0.9941				
Construction	380.2151	-3.6204	-0.009	0.9907				
Private Services	1677.2227	0.3358	0.000	0.9986				
Public Services	419.5541	-0.0204	0.000	1.0004				
Sum	5050.1427	0.8713						
b) IMPORTS								
Food Crops	10.0879	-0.0009	0.000				1	2.0759
Cash Crops	12.5712	0.0391	0.003				1	1.7515
Forestry	0	0	0.000				0	0
Food Processing	18.9332	-7.2185	-0.276				1.3246	1.4857
Consumer Goods	31.3648	-12.0721	-0.278				1.3099	1.4185
Intermediate Goods	151.1985	-0.1101	-0.001				1	1.8953
Construction Materials	70.2487	-0.1462	-0.002				1	1.6938
Capital Goods	286.8971	-3.8945	-0.013				1	1.497
Construction	0	0	0.000				0	0
Private Services	432.7758	-0.1601	0.000				1	2.2883
Public Services	0	0	0.000				0	0
Sum	1014.0772	-23.5633						

TABLE 14 (Continued)

	VALUE (Bill FCFA)	CHANGE FROM BASE MODEL (Bill FCFA)	PERCENTAGE CHANGE FROM BASE MODEL	DOMESTIC PRICE (UNITY)	DOMESTIC EXPORT PRICE (UNITY)	WORLD EXPORT PRICE (UNITY)	DOMESTIC IMPORT PRICE (UNITY)	WORLD IMPORT PRICE (UNITY)
III) FOREIGN SAVINGS (M-E)	-6.1383	-34.4243	-1.217					
IV) GROSS DOMESTIC PRODUCT	2594.4316	-4.1976	-0.002					
V) GOVERNMENT REVENUE	755.1943	7.694	0.010					
	VALUE (FCFA)	CHANGE FROM BASE MODEL (FCFA)	PERCENTAGE CHANGE FROM BASE MODEL					
VI) WAGES								
Rural-Unskilled	149000	0	0.000					
Urban-Unskilled	383800	-700	-0.002					
Urban-Skilled	3836100	-9400	-0.002					

TABLE 14 (Continued)

VII) NET CHANGE IN EMPLOYMENT

SECTOR	SOCIO-ECONOMIC CLASS (Number of Laborers)			
	Rur-Unsk	Urb-Unsk	Urb-Skil	SUM
Food Crops	-129.7	239.3	0	109.6
Cash Crops	600.8	208.3	6.1	815.2
Forestry	22.6	8.8	3.4	34.8
Food Processing	502.2	388.3	104.2	994.7
Consumer Goods	-28.5	44.4	24.4	40.3
Intermediate Goods	-25.3	13.1	12.9	0.7
Construction Materials	-5	-1.7	-0.4	-7.1
Capital Goods	-70	-56	-23.4	-149.4
Construction	-751.3	-883	-211	-1845.3
Private Services	-115.9	93.3	82.4	59.8
Public Services	0	-54.6	1.6	-53

TABLE 14 (Continued)

	VALUE (Bill FCFA)	CHANGE FROM BASE MODEL (Bill FCFA)	PERCENTAGE CHANGE FROM BASE MODEL	DOMESTIC PRICE (UNITY)	DOMESTIC EXPORT PRICE (UNITY)	WORLD EXPORT PRICE (UNITY)	DOMESTIC IMPORT PRICE (UNITY)	WORLD IMPORT PRICE (UNITY)
VIII) PRIVATE CONSUMPTION								
Food Crops	548.0779	-0.4431	-0.001	0.9999			1	
Cash Crops	40.2581	-0.0999	-0.002	1.0019			1	
Forestry	0	0	0	0.9996			0	
Food Processing	164.6625	-5.6543	-0.033	1.0124			1.3246	
Consumer Goods	373.8708	-13.2103	-0.034	1.0088			1.3099	
Intermediate Goods	527.0925	0.151	0	0.9986			1	
Construction Materials	0	0	0	0.9983			1	
Capital Goods	0	0	0	0.9941			1	
Construction	9.9828	0.0836	0.008	0.9907			0	
Private Services	840.3699	0.2084	0	0.9986			1	
Public Services	14.9559	-0.02	-0.001	1.0004			0	
Sum	2519.27	-18.9846	-0.0074					

Food processing shows the greatest increase in output, but only of 1.2 percent, followed by the consumer goods sector, which expands 0.9 percent. Food and cash crops production remains virtually constant, an interesting phenomenon given the potential backward linkages between the agricultural sector and food processing.

Primary investment sectors, construction and capital goods, experience declines in production of 0.9 percent and 1 percent, respectively. These declines are linked to weakened investment demand which traces its origins to lower overall savings in the economy, a significantly reduced component of which is foreign savings. Weakened investment demand sends prices down for these sectors, thereby contributing to the contraction of output.

Exports (E). Small changes in food and cash crop exports reflect near constant production levels. Lower domestic prices for food crops suggest possible increases in excess supply that serve to slightly elevate food crops exports.

Higher world export prices, but reduced cash crop exports suggest substitution of domestic commodities for new, more expensive imported goods. Consumption of domestically-produced cash crops does in fact increase, further supporting this conjecture.

Exports of both processed foods and consumer goods decrease in spite of world price increases. In a manner similar to that of cash crops, this seemingly economically irrational behavior is linked to the relative prices of domestic versus imported goods produced by these sectors. Consumption of domestically-produced processed foods increases 1.3 percent, clearly signaling substitution between domestic and imported goods. The same phenomenon is witnessed for the consumer goods sector although to a lesser degree. That the substitution effect in the consumer goods sector is less marked may be

explained by fewer substitutes among consumer goods than among processed foods. For example, one may substitute palm oil for corn oil, but one cannot substitute an oil lamp for a radio.

Capital goods exports fall despite higher world market prices and reduced consumption of domestic output, due to sharply contracted production brought on by decreased investment.

Consumption of Domestic Production (X^{XD}). Food crops consumption is relatively unaffected by tariff increases on processed foods and consumer goods. In contrast, cash crops consumption increases slightly which, as previously discussed, may be explained by substitution between local commodities and higher-priced, imported processed foods. This suggests that the cross-price elasticity of demand between cash crops and processed food imports is higher than the cross-price elasticity between food crops and imported processed foods.

Behind the protection of the 50 percent additional tariff, consumption of domestic processed foods increases noticeably (1.3 percent). Although domestic prices have also risen, their 1.2 percent increase does not compare to the 32 percent increase in the equilibrium domestic price of imported processed food. Consequently, consumers elect to purchase domestically processed food over imported.

Consumption of domestically-produced consumer goods displays the same behavior, rising against higher domestic prices. Capital goods, construction services and construction materials consumption all decrease. These declines occur in the face of a relative price structure favoring increased domestic consumption, thereby signaling a general reduction in investment demand.

Imports (M). Food crop imports show little response to the given tariff increases. Cash crop imports, however, rise moderately in spite of relative prices that weigh against importation. This increase is consistent with reduced cash crop exports and adds weight to the argument that cash crops may substitute to a limited degree for imported processed foods.

As anticipated, import tariffs have a significant impact on food processing and consumer goods imports. The value of the processed food imports falls 27.6 percent. Levels of consumer goods imports drop 27.8 percent.

Capital goods and construction materials imports also fall, their percentages reflecting the import content of these two sectors and a price structure favoring increased domestic consumption.

Foreign Savings (FSAV). The imposition of a 50 percent luxury tax on consumer goods and processed foods reverses Cameroon's foreign trade position from one of deficit to one of surplus. Under this scenario, Cameroon now exports 6.1 billion FCFA more goods and services than it imports. While export growth is only moderate, on the import side there are sizeable reductions in food processing, consumer and capital goods, which more than compensate for Cameroon's mediocre export performance.

Private GDP (Y). Consumer demand for domestic substitutes for imported luxury goods stimulates domestic producers to increase output. Depending on the value added of the goods produced, this increased output would tend to raise private GDP. Model results indicate, however, that GDP contracts following luxury tax imposition. To infer what happens to value added in this case, one examines the third argument of the GDP equation, depreciation. Weakened investment demand translates into reduced demand for replacement capital by enterprises. Depreciation, therefore, falls. Thus,

decreased private GDP implies that the value added content of domestic production is less than it was prior to the luxury tax. The explanation for this lower value added is a combination of the structure of production, the capital /labor input ratio, and prices received for the respective sector outputs.

Private GDP responds only mildly to the rather sizeable import reductions which occur following tariff hikes. Such buoyancy on the part of the Cameroon economy is due to the amount of expenditure-switching consumers engage in as they substitute domestic for imported goods. A key variable in the successful use of fiscal policy to restore macroeconomic balance, it would seem then, is the elasticity of substitution between the goods being taxed and their domestic equivalents. This issue is discussed further in the Conclusions chapter.

Government Revenue (GR). Government coffers benefit from the luxury tax although not as much as might be expected. Government revenues increase only 1 percent. This moderate growth in tax receipts is attributed to the shift by consumers from tax-bearing luxury goods to domestically produced substitutes.

Social Welfare Analysis

Wages (W). Wages are left virtually unchanged following luxury tax imposition. Only very small adjustments are noted for urban-unskilled and urban-skilled labor, but the wage reductions are so trivial as to merely "hint" at movement.

Employment (L^D). As suggested by near constant wages, model employment figures confirm the stability of labor's sectoral distribution under this scenario. Examination reveals no dramatic movements between sectors. Greatest migration occurs out of the construction sector (-1,845). Food

processing (+994), cash crops (+815) and the food crops sector (+109), experience the largest increases. These trends correspond with observed increases in economic activity in sectors producing import substitutes and those adversely impacted by declining investment demand.

Private Consumption (C^D). Higher taxes on imported processed foods and consumer goods reduces private GDP. With smaller budgets, households must reallocate their expenditures and in due course consume less food and cash crop products. Households elect to make their greatest reductions in processed foods and consumer goods, which is not surprising in light of newly imposed tariffs. Although household income decreases, expenditure adjustments leave household savings virtually unchanged (231.3111 billion FCFA after import tax reform as compared to 231.5147 billion FCFA before). With savings preserved, lower domestic prices encourage households to invest in construction services, which increase by 0.8 percent. The impact of the luxury tax, then, is to reduce the size of the consumption bundle with virtually all sectors absorbing some of the adjustment.

Within labor classifications, rural-unskilled workers migrate from construction, private services and food crop sectors to find new opportunities in cash crops and food processing. Urban-unskilled labor also leaves construction to relocate in food processing, food and cash crops. Urban-skilled personnel shift from construction and capital goods to food processing and private services. Shifts within labor classifications are small, further substantiating labor's stability under this reform scenario.

Experiment 3: 50 Percent Decrease in Indirect Tax Rate
On the Cash Crop Sector Together With a Doubling
of Subsidies to the Food Crop, Cash Crop and
Food Processing Sectors

This experiment simulates efforts to revitalize Cameroon's agricultural sector and to promote increased domestic food processing. The indirect tax rate on the cash crop sector is halved and subsidies provided to the "food-oriented" sectors of the economy, i.e. food and cash crops, and food processing, are doubled. Table 15 presents the CGE model results of this experiment. Impacts of this simulated structural adjustment program are analyzed below.

Economic Analysis

Domestic Output (X^D). The simulated reform package has mild impact on domestic output of the food crops sector. Production increases merely 0.2 percent in response to the 5.8 billion FCFA which subsidies represent to the sector. Domestic food crop prices rise, however, indicating an increase in consumer demand. Closer examination reveals the source of this increased demand to be higher private GDP (+ .011 percent). This response by Cameroonian consumers implies that, for the overall population, the demand for food is income elastic.

Cash crops production falls in spite of efforts to enhance their attractiveness through tax incentives and increased subsidies. Furthermore, this drop in output occurs in the presence of higher prices. One possible explanation is an outward migration of labor into more attractive sectors, thereby reducing the productive resources available to the cash crop sector. Employment figures support this theory, revealing a rather large movement

TABLE 15

EXPERIMENT 3: 50 PERCENT INDIRECT TAX REDUCTION ON CASH CROP
SECTORS WITH CONCURRENT DOUBLING OF SUBSIDIES TO FOOD
CROP, CASH CROP AND FOOD PROCESSING SECTORS

	VALUE (Bill FCFA)	CHANGE FROM BASE MODEL (Bill FCFA)	PERCENTAGE CHANGE FROM BASE MODEL	DOMESTIC PRICE (UNITY)	DOMESTIC EXPORT PRICE (UNITY)	WORLD EXPORT PRICE (UNITY)	DOMESTIC IMPORT PRICE (UNITY)	WORLD IMPORT PRICE (UNITY)
I) PRODUCTION								
a) DOMESTIC OUTPUT								
Food Crops	581.5052	1.0411	0.002	1.0055				
Cash Crops	310.6491	-0.1887	-0.001	1.005				
Forestry	167.1954	0.1437	0.001	1.0018				
Food Processing	323.5069	1.6231	0.005	1.0012				
Consumer Goods	417.2503	2.1495	0.005	1.0021				
Intermediate Goods	1154.2829	0.5364	0.000	1.0029				
Construction Materials	128.136	-1.3815	-0.011	0.9954				
Capital Goods	54.0627	-1.937	-0.035	0.9849				
Construction	371.1611	-12.6744	-0.033	0.9727				
Private Services	1965.708	3.5672	0.002	1.0024				
Public Services	419.6833	0.1088	0.000	0.9986				
Sum	5893.1409	-7.0118						

TABLE 15 (Continued)

	VALUE (Bill FCFA)	CHANGE FROM BASE MODEL (Bill FCFA)	PERCENTAGE CHANGE FROM BASE MODEL	DOMESTIC PRICE (UNITY)	DOMESTIC EXPORT PRICE (UNITY)	WORLD EXPORT PRICE (UNITY)	DOMESTIC IMPORT PRICE (UNITY)	WORLD IMPORT PRICE (UNITY)
b) EXPORTS								
Food Crops	4.7927	-0.0224	-0.005		1.0012	2.2921		
Cash Crops	232.1257	-0.3818	-0.002		1.0004	2.2893		
Forestry	24.9226	0.0055	0.000		0.9999	2.2882		
Food Processing	15.8785	0.0435	0.003		0.9993	2.2868		
Consumer Goods	19.0719	0.0387	0.002		0.9995	2.2872		
Intermediate Goods	211.8131	-0.1354	-0.001		1.0002	2.2887		
Construction Materials	35.6676	-0.2579	-0.007		1.0018	2.2924		
Capital Goods	20.0449	-0.6007	-0.029		1.0074	2.3053		
Private Services	285.52	0.266	0.001		0.9998	2.2878		
Sum	849.84	-1.044						
II) CONSUMPTION								
a) DOMESTIC PRODUCTION								
Food Crops	576.7125	1.0634	0.002	1.0055				
Cash Crops	78.5229	0.1925	0.002	1.005				
Forestry	142.2728	0.1382	0.001	1.0018				
Food Processing	307.6284	1.5796	0.005	1.0012				
Consumer Goods	398.1783	2.1107	0.005	1.0021				
Intermediate Goods	942.4695	0.6716	0.001	1.0029				
Construction Materials	92.468	-1.124	-0.012	0.9954				
Capital Goods	34.0165	-1.3376	-0.038	0.9849				
Construction	371.1611	-12.6744	-0.033	0.9727				
Private Services	1680.1877	3.3008	0.002	1.0024				
Public Services	419.6833	0.1088	0.000	0.9986				
Sum	5043.301	-5.9704						

TABLE 15 (Continued)

	VALUE (Bil FCFA)	CHANGE FROM BASE MODEL (Bil FCFA)	PERCENTAGE CHANGE FROM BASE MODEL	DOMESTIC PRICE (UNITY)	DOMESTIC EXPORT PRICE (UNITY)	WORLD EXPORT PRICE (UNITY)	DOMESTIC IMPORT PRICE (UNITY)	WORLD IMPORT PRICE (UNITY)
b) IMPORTS								
Food Crops	10.1911	0.1023	0.010				1	2.0759
Cash Crops	12.6191	0.087	0.007				1	1.7515
Forestry	0	0	0.000				0	0
Food Processing	26.3273	0.1756	0.007				1	1.4857
Consumer Goods	43.7842	0.3473	0.008				1	1.4185
Intermediate Goods	151.6334	0.3248	0.002				1	1.8953
Construction Materials	69.3045	-1.0904	-0.015				1	1.6938
Capital Goods	278.0909	-12.7007	-0.044				1	1.497
Construction	0	0	0.000				0	0
Private Services	434.1966	1.2607	0.003				1	2.2883
Sum	1026.1471	-11.4934						
III) FOREIGN SAVINGS (M-E)								
III) FOREIGN SAVINGS (M-E)	13.8428	-14.4432	-0.511					
IV) GROSS DOMESTIC PRODUCT								
IV) GROSS DOMESTIC PRODUCT	2627.1052	28.476	0.011					
V) GOVERNMENT REVENUE								
V) GOVERNMENT REVENUE	715.6475	-31.8528	-0.043					

TABLE 15 (Continued)

	VALUE (FCFA)	CHANGE FROM BASE MODEL (FCFA)	PERCENTAGE CHANGE FROM BASE MODEL	
VI) WAGES				
Rural-Unskilled	149600	600	0.004	
Urban-Unskilled	383800	-700	-0.002	
Urban-Skilled	3833000	-12500	-0.003	
<hr/>				
SOCIO-ECONOMIC CLASS (Numbers of Laborers)				
<hr/>				
VII) NET CHANGE IN EMPLOYMENT				
SECTOR	Rur-Unsk	Urb-Unsk	Urb-Skil	SUM
Food Crops	5298.7	1485.7	0	6784.4
Cash Crops	-2697.4	174.1	6.6	-2516.7
Forestry	-13.1	10	4.2	1.1
Food Processing	175.7	207.7	58.9	442.3
Consumer Goods	161.2	529.5	197.5	888.2
Intermediate Goods	-16.2	122	74.8	180.6
Construction Materials	-55.3	-39.5	-18.7	-113.5
Capital Goods	-240.8	-191.5	-81.5	-513.8
Construction	-2575.8	-3018.8	-728.6	-6323.2
Private Services	-37	779.6	460.4	1203
Public Services	0	-58.8	26.5	-32.3

TABLE 15 (Continued)

	VALUE (Bill FCFA)	CHANGE FROM BASE MODEL (Bill FCFA)	PERCENTAGE CHANGE FROM BASE MODEL	DOMESTIC PRICE (UNITY)	DOMESTIC EXPORT PRICE (UNITY)	WORLD EXPORT PRICE (UNITY)	DOMESTIC IMPORT PRICE (UNITY)	WORLD IMPORT PRICE (UNITY)
VIII) PRIVATE CONSUMPTION								
Food Crops	549.7349	1.2139	0.002	1.0055			1	
Cash Crops	40.4928	0.1348	0.003	1.005			1	
Forestry	0	0	0	1.0018			0	
Food Processing	171.4233	1.1065	0.006	1.0012			1	
Consumer Goods	389.2957	2.2146	0.006	1.0021			1	
Intermediate Goods	529.661	2.7195	0.005	1.0029			1	
Construction Materials	0	0	0	0.9954			1	
Capital Goods	0	0	0	0.9849			1	
Construction	10.2553	0.3561	0.036	0.9727			0	
Private Services	845.0017	4.8402	0.006	1.0024			1	
Public Services	15.1117	0.1358	0.009	0.9986			0	
Sum	2550.976	12.7214	0.005					

(-2,697) of rural-unskilled workers out of the cash crop sector and into food crop production. When coupled with the food crop sector's weak supply response, this migration implies low marginal productivity for rural-unskilled labor in food production.

Higher prices, fueled by increased income and subsidies, have a positive impact on processed food production, causing it to rise 0.5 percent. It is ventured that this moderate response is linked to low supply elasticities in the food crop sector, which provides the basic inputs to food processing industries. Testing this hypothesis, however, would require further simulations beyond the scope of this study.

Consumer goods output expands as a function of income growth, greater consumer demand and higher prices. Conversely, lower prices lead to a decline in output of construction services and materials, and capital goods. Contraction of investment goods production can be traced to reduced levels of available investment capital. Subsidies and tax incentives reduce government revenue and thereby government savings. Adjustments in trade accounts decrease foreign savings as well, the overall effect being a 35.6 billion FCFA reduction in available investment capital. With less capital available for investment, demand for investment goods declines, prices fall and production decreases.

Exports (E). Exports of both food and cash crops decline in the wake of the simulated reforms. These declines reflect increased domestic consumption of both sectors' products. Higher domestic and export prices indicate stronger consumer demand for these goods. Processed food exports expand despite lower world market prices and increased domestic consumption. One explanation for this phenomenon is that increased subsidies stimulate

processed foods production over and beyond the current absorptive capacity of domestic consumers.

Exports of consumers goods rise in accordance with higher levels of domestic production. Conversely, exports from capital goods and construction materials sectors fall, mirroring domestic production trends.

Consumption of Domestic Production (X^{XD}). Consumption of domestic food crops, cash crops and processed food increases irrespective of higher domestic prices. Such behavior again suggests that in Cameroon the demand for food is generally income elastic. Consumer goods consumption displays the same increasing trend. Domestic investment goods, i.e. construction services and materials, and capital goods, all exhibit declining trends in consumption.

Imports (M). Higher domestic goods prices favor the importation of foreign substitutes, while increased income enhances consumers' ability to purchase imported items. These forces can be seen at work in the food crops, cash crops, processed foods and consumer goods sectors. Lower relative domestic prices in the capital goods and construction materials sectors combine with the general decline in investment demand to send imports down sharply.

Foreign Savings (FSAV). The aforementioned decreases in capital goods and construction materials imports act to substantially reduce the imbalance in Cameroon's trade account, shrinking foreign savings by 14.4 billion FCFA. Nevertheless, these reductions are insufficient to compensate for increased importation of other goods and balance Cameroon's trade accounts. Under the scenario presented, general equilibrium results indicate Cameroon's imports exceed its exports by US\$ 13.8 million.

Private GDP (Y). Reduced taxes and increased subsidies have a substantial expansionary effect on private GDP, raising its value by 28 billion FCFA, or 1.1 percent. Domestic output decreases slightly (-7 billion FCFA), however, as does depreciation (-7 billion FCFA). The rise in private GDP is attributable, then, to an overall increase in the value added content of domestic output in the post-reform period. The particular combination of tax cuts and subsidy enhancements simulated bring about adjustments that result in a more value-laden economic structure. For example, the increase in processed food output that arises from the given policy reforms yields a processed product embodying more value added than if the end product were a primary good sold in its unprocessed form. Theoretically at least, subsidization of the food processing sector leads the Cameroon economy to produce canned pineapple as well as fresh, tomato paste in addition to raw tomatoes, and granulated sugar along with sugar cane.

Government Revenue (GR). The combination of increased subsidies and reduced taxes results in markedly lower government receipts. An indirect effect of the reform package is decreased importation of high tariff items such as capital goods and construction materials, which further reduces government revenues. In total, government intake falls by 4.3 percent, or 31.8 billion FCFA.

Social Welfare Analysis

Wages (W). As a direct result of increased subsidies, wages increase for those labor categories concentrated in the agricultural sector. In addition, lower tax rates bolster real income and have important second-round effects, generating increased demand and higher prices for agricultural products, and thereby raise agricultural workers wages further. In the case of Cameroon,

rural-unskilled workers realize wage gains, while urban-based unskilled and skilled labor experiences wage decreases.

Employment (E). Higher wages in the agricultural sectors of the economy attract labor. Results from the CGE model indicate a particularly strong shift to the food crops sector (+ 6,784). Labor is also attracted to private services (+1,203) and consumer goods (+888) sectors, but more as a result of displacement than wage opportunities. Food processing shows only moderate expansion (+442) in comparison with output, suggesting a lower capital/labor ratio than pertains in other sectors. Labor migrates in force out of construction (-6,323), consisting primarily of displaced unskilled labor.

Private Consumption (C^D). Reduced indirect taxes and higher subsidies leave households with more disposable income. (Private GDP rises 1 percent, or 28 billion FCFA, under this policy reform scenario.) Households respond by increasing their consumption of goods and services from all sectors. Food crops, cash crops and processed foods expenditures increase by 0.2, 0.3 and 0.6 percent, respectively. These increases occur in the face of higher domestic prices and suggest, therefore, that household demand for these goods is income elastic. Consumer goods as well as intermediate goods receive larger shares of the household budget. Demand for both public and private services also increases. Increased household savings (+ 2 billion FCFA) in conjunction with lower domestic prices spur households to invest in construction services, increasing their consumption by 3.6 percent.

In summary, the combination of lower indirect taxes and higher subsidies increases not only the size of the household consumption bundle, but also the shares of all its sectoral components.

The same trend is seen in the cash crops sector which diminishes by 2,517 employees, again the vast majority being unskilled labor. This migration occurs in spite of reduced taxes, increased subsidies and higher prices. Irrespective of these incentives, labor apparently finds more profitable opportunities in the food crops sector and therefore shifts out of cash crop production.

Within labor categories, there are again strong shifts in the direction of food crops. Rural-unskilled labor migrates out of cash crops (-2,697) and construction (-2,576) to find employment in food crops production (+5,299). Urban-unskilled workers follow suit, leaving construction (-3,019) for jobs in the food crops (+1,486), private services (+780) and consumer goods (+529) sector. Given their limited numbers and opportunities, urban-skilled workers are more restricted in their movement, with job-seekers leaving the construction sector (-729) for better opportunities in private services (+460).

Summary of Simulation Results

Employing the CGE model, HANABO, three experiments simulating alternative economic policy reform programs were conducted. Policy reforms were selected for their likelihood to produce desired structural adjustments in the Cameroon economy. The policy reform experiments consisted of: 1) 25 percent reduction in government expenditures, 2) 50 percent luxury tax on imported consumer goods and processed foods, and, 3) 50 percent reduction in indirect taxes on cash crops together with a doubling of subsidies to the food crops, cash crops and food processing sectors.

Expected results of these simulated reforms were structural adjustments in the Cameroon economy leading to improvements in the macroeconomic

accounts. CGE model results for the three policy reform experiments are summarized as follows:

(1) Experiment 1: 25 percent Reduction in Government Expenditure - Government revenue increases by 6.2 percent (46 billion FCFA). Private GDP falls by 1.3 percent (34 billion FCFA), however, and foreign savings (imports minus exports) increases 464 percent, or US\$ 131 million. Thus, government's budgetary position improves but at the expense of private GDP and a deterioration in the balance of trade. Higher wages and generally lower prices imply real income gains for rural-unskilled workers while other labor classes must adjust to wage losses. Employment opportunities decrease substantially in the food crop sector but are offset by vigorous expansion in construction.

(2) Experiment 2: 50 percent Luxury Tax on Consumer Goods and Food Processing Sectors - Government revenues show a slight increase of 0.1 percent (8 billion FCFA). Private GDP also falls, but only 0.2 percent (4 billion FCFA). Foreign savings decrease by 122 percent (US\$ 34 million) which is sufficient to reverse Cameroon's trade status from net importer to exporter. Under this scenario, Cameroon's exports exceed its imports by US\$ 6 million. Benefits from improved export performance fail to trickle down to labor, however, as wages fall in all three labor categories. Household consumption experiences its greatest reduction under this policy scenario. Changes in sectoral employment are negligible.

(3) Experiment 3: 50 percent Indirect Tax Reduction on Cash Crops Sector with a Doubling of Subsidies to Food Crops, Cash Crops and Food Processing Sectors - Government revenue decreases 4.3 percent, equal to 32 billion FCFA. Private income expands by 1.1 percent (28 billion FCFA). Foreign savings fall 51 percent (US\$ 14 million), but remain US\$ 14 million short of the amount needed to register a positive balance in Cameroon's trade

account. Rural-unskilled labor is the only category of labor to realize higher wages and, in fact, reaps its greatest wage gains under this set of adjustment reforms. Household consumption also shows its greatest increase under this policy scenario. Labor responds to the fiscal incentives offered by shifting out of cash cropping and construction, and into food crop production.

Identifying an Optimal Set of Structural Adjustment Policy Reforms

Ideally, structural adjustment reforms would accomplish three goals: 1) balance Cameroon's external accounts, 2) increase government revenues, and 3) distribute adjustment's costs and benefits over society's various groups in accordance with their economic status. Of the three simulation experiments presented, none satisfy all three criteria. The experiments do, however, provide information that may guide the search for an optimal solution.

Of the three simulations conducted, increased import tariffs targeting processed foods and consumer goods provides the closest approximation of an optimal solution. A systematic search for an optimal solution might logically begin here. By adjusting the size of these import tariffs and then observing their subsequent impact on the variables of interest, one might expect to at least improve on past efforts aimed at finding an optimal set of policy reforms.

With this objective in mind, a new series of simulation experiments is conducted. The experiments take as their starting point a 50 percent additional import tariff on processed foods and consumer goods. Model behavior under various scenarios leads to modification of both import tariff levels and government transfers to households. Although failing to produce a perfect solution, further modifications succeed in generating a set of policy reforms which yield near optimal results.

The policy set consists of a 42 percent increase in the import tariff on processed foods, a 40 percent import tariff increase on consumer goods, and raising the level of government transfers to households from 16 to 20 percent of government revenue. These reforms, which are consistent with Cameroon's adjustment goals, result in a positive foreign trade balance of US\$ 24 million (foreign savings = -US\$ 24 million). Concurrently, government revenue shows an increase of 210 million FCFA. Household consumption increases for all sectors except those directly affected by higher import taxes, i.e. food processing and consumer goods. Households also manage to save an additional 2 billion FCFA. Most of these savings would be expected to occur in households whose sources of incomes are linked to rural-unskilled labor, as this is the only labor class to experience wage increases. These gains--in foreign exchange, government revenue, household consumption and savings, and higher rural income--come at the sacrifice of 1.2 billion FCFA in private GDP. Thus, although the reduction in GDP is relatively small, the policy set fails to meet the economic growth criterion.

Nevertheless, experiment results are significant from the standpoint of their having successfully challenged the mutual exclusivity of balanced external accounts, economic growth and equitable distribution of adjustment costs and benefits. The experiments conducted represent only a small sample of the policy sets available to decision-makers. Initial results indicate that a more exhaustive search could yield one or possibly even several policy sets that simultaneously satisfy all of the established criteria.

CHAPTER VI

CONCLUSIONS

Summary

As set forth earlier, the purpose of this study is to estimate the impacts of structural adjustment-related reforms on the Cameroon economy and selected constituent socio-economic groups. Fulfillment of this purpose was defined as the accomplishment of four objectives. These objectives were:

- 1) To develop a SAM for the Republic of Cameroon identifying sectors and socio-economic groups of interest;
- 2) To estimate the general equilibrium results of selected SAP-related reforms on the identified socio-economic groups;
- 3) To evaluate the impacts of these reforms on variables identified as determinants of social welfare, and;
- 4) To explore via the designed general equilibrium framework alternative policy reform scenarios leading to balanced external accounts, positive economic growth and equitable distribution of adjustment's social costs and benefits.

Four hypotheses constituted the means of achieving these objectives. The stated hypotheses were:

- 1) Structural adjustment programs have distributional impacts on socio-economic groups;
- 2) The socio-economic groups most likely to suffer economic losses

from SAP-related reforms are unskilled-urban laborers, producers of export crops or other tradeables, and public employees;

3) The socio-economic groups most likely to benefit from SAP-related reforms are producers of food crops or other non-tradeables; and,

4) A set of conditions can be found that would permit simultaneous pursuance of balanced external accounts, economic growth and equitable distribution of adjustment's short-term costs and benefits.

To test these hypotheses, a SAM-based CGE model of the 1984 Cameroon economy was constructed. The model, HANABO, was then employed to conduct a series of four experiments simulating alternative SAP reform packages. Based upon the results of the CGE model simulations, the following conclusions are reached:

1) Structural adjustment-related reforms such as those undertaken in recent years by many developing countries have clearly discernible impacts on socio-economic groups. Economic policy reforms including government expenditure reductions, reduction and targeting of subsidies, and import tax adjustment, have significant implications for wages, employment, real income, and household consumption. The direction and magnitude of these effects are related to: a) the structures of demand and production in the economy, b) the substitution elasticities between traded goods, and c) investment behavior.

2) Structural adjustment reforms aimed at resolving the GOC's immediate budgetary crisis and achieving desired medium-term adjustments in the economy are likely to have their greatest negative impacts on unskilled-urban labor employed in the investment sub-sector. For Cameroon, this sub-sector would comprise primarily construction services and materials, and capital goods production. Rural-unskilled laborers engaged in these activities would also suffer adverse impacts. These socio-economic groups would suffer further

ill consequences to the degree SAP reforms increase prices of goods comprising the bulk of their consumption bundles and reduce government subsidies and/or transfers. Negative impacts would be expressed largely through unemployment of both a frictional and permanent nature, and reduced household consumption, particularly of food items.

Urban residents employed as skilled labor in construction or other investment sub-sector activities may also be harmed by SAP reforms, due to displacement and limited job opportunities in other high-paying skilled sectors. Members of this socio-economic group would be relatively less affected, however, by changes in basic domestic goods prices and government subsidies and transfers.

3) Structural adjustment-related economic reforms are likely to benefit most those Cameroonians employed in food processing and cash crop production. Positive impacts will consist of increased employment opportunities for all labor skill categories in these sectors and higher wages for unskilled labor. Unskilled-urban workers also may benefit from reforms as rural-unskilled labor makes the transition from food cultivation to food processing, thereby creating vacancies and new opportunities in food-related sectors.

4) Experiments based on information derived from the simulation results indicate that balanced external accounts, economic growth and equitable distribution of adjustment's social costs and benefits are not mutually exclusive. Experience with the simple model HANABO does substantiate, however, the complexity of the relationships between these three economic goals. Although unable to find a set of policies that simultaneously achieve all three objectives, the author believes that given more time to explore a wider range of policy combinations, an unqualified solution could be found that minimizes adjustment's short-run costs yet preserves its long-run benefits.

In spite of this failure, experiment results demonstrate the usefulness of SAM-based CGE models in assessing a priori social welfare impacts of alternative SAP reform packages, as well as evaluating program effectiveness in achieving specified economic goals. The demonstrated usefulness of the SAM-based CGE model, together with the foregoing conclusions, constitutes fulfillment of the study objectives.

In the course of testing the hypotheses, other conclusions were reached that also deserve mention. First and foremost is the general conclusion that no single policy reform will be able to bring about structural adjustment and economic growth with an equitable distribution of inherent social costs and benefits. Certainly the simulation experiments conducted here support such a conclusion in the case of Cameroon's economy. Given the numerous competing and complementary forces at work within (as well as outside) an economy, any reform striking at a single problem will do so at the aggravation of another problem. Hence, it is more realistic to conceive of structural adjustment reform as a package of evolving components, designed to accomplish a broad reorientation of an economy while simultaneously mitigating any negative policy impacts. Taking Cameroon as a case in point, any structural adjustment program which portends to balance the external accounts through fiscal policy must take into consideration the import content and substitution elasticities of the sectors targeted for taxation or subsidy. If these variables are overlooked or ignored, the adjustment program risks severely reducing private GDP and bringing economic growth to a halt.

Furthermore, with specific reference to Cameroon, it is clear that adjustment reform cannot have macroeconomic stabilization as its only goal. More value added must be built into Cameroon's production. Not only would this help to improve Cameroon's terms of trade with the ROW, but it would also

facilitate growth of the domestic economy. One important lesson learned from the simulation experiments is the capacity of Cameroon's domestic economy to absorb its own production, particularly of processed foods. This area shows considerable potential for development and has important implications for restoring the country's economic health.

Another lesson from the simulations worth noting is that before adjustment takes place, Cameroon will not only have to increase savings but with these savings it will also have to invest wisely. At present, the agricultural sectors - food and cash crops, along with food processing industries, appear to be the country's best (if not only) economic alternatives. But the cash crops sector is badly in need of revitalization and the food crops sector is straining to keep pace with population growth. Food processing, as an infant industry, will require incentives and assistance. Each of these undertakings will require substantial investment.

Where will this investment come from? An option currently under consideration by the government of Cameroon is a structural adjustment loan. Structural adjustment loans have proven successful in balancing external accounts and restoring economic growth in other developing countries. They are also known to have increased the numbers of those living below the poverty line. In part, these unintended negative impacts have occurred because the individuals responsible for structural adjustment have lacked appropriate methodologies for a priori evaluation of structural adjustment's social welfare impacts. This study demonstrates one methodology and tests its appropriateness.

SAM-based CGE models shed light on the direct and indirect impacts of economic policy on different socio-economic groups. By employing these models, lenders, planners and policy-makers may avoid causing inadvertent

economic harm to unintended populations while increasing the probability that designated benefits reach target groups.

The economy, government, and people of Cameroon may all benefit from structural adjustment--if it is planned wisely and with careful consideration given to those who might unduly share its burden. This study has attempted to facilitate that planning effort by demonstrating where and how it might begin.

CHAPTER VII

DIRECTIONS FOR FUTURE RESEARCH

In the course of this study, a number of issues arise that point to potentially fruitful directions for future research on distributional impacts of structural adjustment reforms. In the area of methodology, the SAM-based, CGE model which is demonstrated here to be a useful analytical tool, could be improved. The SAM employed might be further disaggregated, where data permits, or disaggregated differently to permit research on such subjects as regional impacts of structural adjustment.

Also, analysis might benefit from refinement of the parameters, in particular, those used in the CET, CES and ETA functions. Simulation results indicate that these elasticity parameters are critical in determining the direction and magnitudes of shifts in production and consumption. Thus, further research on estimation of these parameters could improve understanding of structural adjustment's distributional impacts.

Similarly, coefficients of the capital composition matrix need to be periodically updated. The sensitivity of model results to changes in investment levels suggests that not only should these coefficients be revised, but that future models may need to broaden opportunities for investment in order that three sectors should not dominate the financial capital market.

CGE models which permit less than full employment could provide additional valuable insights into the employment effects of SAP reforms. HANABO, with its simplifying assumption of full employment, is sufficient to

indicate sectors of potential short-term, frictional unemployment, but it cannot capture the effects of long-term unemployment. Estimates of long-term unemployment would be critical in weighing long-range benefits and costs of any structural adjustment program.

Where long-range benefits and costs are of interest, researchers need to devote their energies to the development of dynamic models. Dynamic models would allow greater insight into the adjustment process itself, thereby aiding researchers in unlocking the mysteries of how sectors interact with one another, as well as how individual sectors react to changing stimuli and varying economic conditions. Simulations conducted using a dynamic model could potentially lead to improved understanding of how structural adjustment might be better managed, and assist in determining the composition of the policy package to be implemented, in addition to suggesting policy implementation timing and duration.

Apart from these methodological issues, the understanding of structural adjustment impacts could also be expected to advance through comparative country studies. Comparison of how structural adjustment impacts vary across countries would facilitate understanding the role of economic structure and the importance of selected variables in determining impacts and their distribution among different socio-economic groups.

To better ascertain adjustment impacts at the household level requires building models which include more than a single representative household. This demands more extensive household income and expenditure data. Generally, however, obtaining such data for most developing countries presents a stumbling block. Even so, successful efforts could yield significant rewards and, therefore, multiple household level models remain worthy research endeavors.

An optimal policy package that balances Cameroon's external accounts, promotes economic growth and distributes costs and benefits of adjustment equitably is not found by this study. Simulation results do indicate, however, that one, if not more, such policy sets may exist. SAM-based, CGE models provide one way of exploring the existence of optimal policy packages. Discovery of such sets could prove directly beneficial to policy-makers who find themselves faced with implementing a structural adjustment program and who are interested in minimizing adjustment's short-term social costs. These policy sets might also be useful to researchers who, by comparing the various packages, might further their understanding of economic phenomena.

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APPENDIX A

PRINCIPAL COMPONENTS OF STRUCTURAL ADJUSTMENT PROGRAMS, 1979-1984

TABLE 16

PRINCIPAL COMPONENTS OF STRUCTURAL ADJUSTMENT PROGRAMS, 1979-1984

	Bolivia	Guyana	Ivory Coast		Jamaica		Kenya		Korea		Malawi	
			I	II	I	II	I	II	I	II	I	II
I. TRADE POLICY												
Tariff reform and import liberalization					X	X	X	X	X	X		
Export incentives and improved institutional support		X	X	X	X	X	X	X			X	
II. RESOURCE MOBILIZATION												
Budget policy		X			X	X	X	X	X	X	X	X
Interest rate policy		X					X	X			X	X
Strengthening of institutional capacity to manage external borrowings	X	X	X				X	X			X	X
Public enterprise financial performance	X	X		X	X	X			X	X	X	X

TABLE 16 (Continued)

	Bolivia	Guyana	Ivory Coast		Jamaica		Kenya		Korea		Malawi	
			I	II	I	II	I	II	I	II	I	II
III. EFFICIENT USE OF RESOURCES												
Public investment program revision and review of structural priorities	X	X	X	X	X	X	X		X	X	X	X
Pricing policy:												
- Agriculture	X	X	X	X	X	X		X	X	X	X	X
- Energy	X	X			X			X	X	X	X	
Incentive system:												
- Industry				X	X	X	X	X	X	X		X
Energy conservation measures		X						X	X	X		
Energy - Development of indigenous sources		X						X	X	X		
IV. INSTITUTIONAL REFORMS												
Strengthening of institutional capacity to formulate and implement public investment programs		X	X	X			X	X	X	X	X	X
Institutional efficiency of public sector enterprises	X		X	X	X	X					X	X
Improved institutional support in agriculture (marketing, etc.)		X	X	X	X	X		X			X	X
Institutional improvements in industry and sub-sector programs				X	X	X					X	X

TABLE 16 (Continued)

	Mauritius		Pakistan	Panama	Philippines		Senegal	Thailand	
	I	II			I	II		I	II
I. TRADE POLICY									
Tariff reform and import liberalization		X		X	X	X	X	X	X
Export incentives and improved institutional support	X	X	X	X	X	X	X	X	X
II. RESOURCE MOBILIZATION									
Budget policy		X	X				X	X	X
Interest rate policy									
Strengthening of institutional capacity to manage external borrowings	X	X					X		X
Public enterprise financial performance			X	X			X	X	X

TABLE 16 (Continued)

	Mauritius		Pakistan	Panama	Philippines		Senegal	Thailand	
	I	II							
III. EFFICIENT USE OF RESOURCES									
Public investment program revision and review of structural priorities	X	X	X	X			X		
Pricing policy:									
- Agriculture	X	X	X	X			X	X	X
- Energy	X		X			X		X	X
Incentive system:									
- Industry	X	X	X	X	X	X	X	X	X
Energy conservation measures						X		X	X
Energy - Development of indigenous sources	X		X						X
IV. INSTITUTIONAL REFORMS									
Strengthening of institutional capacity to formulate and implement public investment programs		X	X				X	X	X
Institutional efficiency of public sector enterprises	X	X	X	X			X		X
Improved institutional support in agriculture (marketing, etc.)	X		X	X			X		X
Institutional improvements in industry and sub-sector programs	X		X	X	X	X			X

TABLE 16 (Continued)

	Togo	Turkey				TOTAL
		I	II	III	IV	(of 26 SALs)
I. TRADE POLICY						
Tariff reform and import liberalization		X	X	X	X	17
Export incentives and improved institutional support		X	X	X	X	21
II. RESOURCE MOBILIZATION						
Budget policy	X	X	X	X	X	19
Interest rate policy		X	X	X	X	9
Strengthening of institutional capacity to manage external borrowings	X	X		X	X	15
Public enterprise financial performance	X	X	X	X	X	19

TABLE 16 (Continued)

	Togo					Turkey	TOTAL	
							(of 26 SALs)	
III. EFFICIENT USE OF RESOURCES								
Public investment program revision and review of structural priorities	X	X	X	X	X			21
Pricing policy:								
- Agriculture	X			X	X	X		18
- Energy	X	X	X	X	X			17
Incentive systems:								
- Industry	X	X	X					20
Energy conservation measures	X			X	X	X		11
Energy - Development of indigenous sources	X			X	X	X		11

TABLE 16 (Continued)

	Togo	Turkey				TOTAL (of 26 SALS)
IV. INSTITUTIONAL REFORMS						
Strengthening of institutional capacity to formulate and implement public investment programs	X	X	X	X	X	20
Institutional efficiency of public sector enterprises	X		X	X	X	17
Improved institutional support in agriculture (marketing, etc.)	X		X	X	X	17
Institutional improvements in industry and sub-sector programs						11

Source: Adapted from "Progress Report on Structural Adjustment Lending," Report to the Executive Directors of the World Bank, June 6, 1984. p. 7

APPENDIX B

AGGREGATE SOCIAL ACCOUNTING MATRIX (SAM)
OF THE 1984 ECONOMY OF CAMEROON
WITH TECHNICAL NOTES

TABLE 10
AGGREGATE SOCIAL ACCOUNTING MATRIX (SAM) FOR THE ECONOMY OF CAMEROON, 1984
(BILLIONS FCFA)

	ACTIVITIES	PRODUCTION	FACTORS OF PRODUCTION		INSTITUTIONS			CAPITAL ACCOUNT	REST OF WORLD ^d
			LABOR	CAPITAL	HOUSEHOLDS	ENTERPRISES	GOVERNMENT		
ACTIVITIES		5049.261							850.877
PRODUCTION	2248.017				2538.255		345.326	955.300	
LABOR	989.508								
CAPITAL	2089.511						12.381		
Sum:	3079.019 ^a								
HOUSEHOLDS			989.508			1662.734	117.530		
ENTERPRISES				2089.511			53.587		
GOVERNMENT	573.102	174.399							
CAPITAL ACCOUNT					231.517	480.364 ^c	231.058		12.361
REST OF WORLD		863.238							
TOTAL (EXPENDITURES)	5900.138	6086.898	989.508	2089.511	2769.772	2143.098	747.501	955.300	863.238 ^d
TOTAL (RECEIPTS)	5900.138	6086.898	989.508	2089.511	2769.772	2143.098	747.501	955.300	863.238

^a Factor Payments = Gross Domestic Product (1984=3838.901) - Government Revenue 1984=750.882)

^b Returns to Capital are "subsidy-ridden", i.e. they include the value of government-paid subsidies.

^c Includes savings of financial, corporate and non-profit institutions (272.803), plus depreciation payments (194.653) variations in stocks (16.3) and miscellaneous financial transfers (3.396).

^d Includes exports and imports of goods and services (837.969 and 863.238, respectively), and miscellaneous net capital transfers (12.908).

Each of the six accounts comprising the aggregate SAM has an income and expenditure dimension. These dimensions result from the double entry accounting principle which is the mathematical basis of the aggregate SAM. Rows of the SAM represent income flows of the respective accounts. Columns define the expenditure flows. In accordance with double entry procedure, each Income entry has a corresponding expenditure entry. Hence, the SAM is said to be "square," with the sums of the row accounts equal to the sums of the corresponding column accounts. Logically, total Income equals total expenditure.

Values for the accompanying aggregate social accounting matrix are derived from the Comptes Nationaux du Cameroun (Version SCN): Resultats Semi-Definitifs 1984-85. The Comptes Nationaux are the national income and product accounts (NIPA) of Cameroon.

Individual entries in the 6 x 6 matrix are derived in one of three ways: 1) the value is taken directly from the NIPA, 2) the value is a composite of two or more NIPA accounts, or 3) the value is calculated as a residual term in one of the aggregate SAM's underlying macroeconomic identities. The following information describes, by account, how the individual entries of the aggregate SAM are derived.

1) Activities

a) Expenditures

Production (Intermediate Goods)	= 2248.017 (p. 34)
Labor (Wages)	989.508 (p. 34)
Capital	= 2089.511 (residual of Factor Payments minus Wages)
Government (Indirect Taxes)	= <u>573.102</u> (residual of Government Revenue minus Import Tariffs)
Subtotal	5900.138

b) Income

Production = 850.877 (p. 59)

Exports = 5049.261 (residual of total account
expenditures minus
Exports)

Subtotal 5900.138

2) Production

a) Expenditures

Activities = 5049.261

Government (Import taxes) = 174.399 (p. 34)

Rest of World (Imports) = 863.238 (p. 59)

Subtotal (Total Gross Domestic
Output) 6086.898 (p. 34)

b) Income

Intermediate Goods = 2248.017

Household Consumption = 2538.255 (residual total Household
income minus savings)

Government Consumption = 345.326 (p. 19)

Capital Account (Gross Fixed
Capital Formation) = 955.300 (p. 9)

Subtotal 6086.898

3) Factors of Production

a) Expenditures

Labor to Households (Wages) = 989.508

Capital to Enterprises = 2089.511

Subtotal (Value Added) 3079.019 (GDP minus direct and
indirect taxes)

b) Income

Activities to Labor (Wages) = 989.508

Activities to Capital = 2089.511

Subtotal 3079.019

4) Institutions

a) Expenditures

Households to: Production = 2538.255

Capital Account
(Savings) = 231.517 (p. 52)

Subtotal 2769.772

Enterprises to: Households = 1662.734 (residual total Enterprise
income minus savings)

Capital Account
(Savings) 480.364 (Sum of institutional savings,
p. 51, plus Depreciation,
p. 34, plus Variations in
Stocks, p. 19, and
financial transfers, p. 22.)

Subtotal 2143.098

Government to: Production = 345.326

Capital
(Subsidies) = 12.381 (p. 45)

Households
(Transfers) = 117.530 (p. 45)

Enterprises
(Transfers) = 53.587 (p. 45)

Capital Account
(Savings) = 231.058 (p. 51)

Subtotal 747.501 (p. 45)

b) Income

Households from: Labor (Wages) = 989.508

Enterprises = 1662.734

Government
(Transfers) = 117.530

Subtotal 2769.772

Enterprises from: Capital = 2089.511

Government
(Transfers) = 53.587

Subtotal 2143.098

Government from: Activities
(Indirect Taxes) = 573.102Production
(Import Tariffs) = 174.399

Subtotal 747.501

5) Capital Account

a) Expenditures

Production (Gross Fixed Capital
Formation) = 955.300

b) Income

Households (savings) = 231.517

Enterprises (savings) = 480.364

Government (savings) = 231.058

Rest of World (Foreign savings) = 12.361 (p. 21)

Subtotal 955.300

6. Rest of World

a) Expenditures

Activities (Exports) = 850.877

Capital Account (Foreign savings) = 12.361

Subtotal 863.238

b) Income

Production (Imports) = 863.238

APPENDIX C

DISAGGREGATE SOCIAL ACCOUNTING MATRIX (SAM)
OF THE 1984 ECONOMY OF CAMEROON
WITH TECHNICAL NOTES

TABLE 11
DISAGGREGATE SOCIAL ACCOUNTING MATRIX OF THE
REPUBLIC OF CAMEROON, 1984-1985
(MILLIONS FCFA)

Sector	1	2	3	4	5	6	7
1 Agriculture - Food	63903	0	0	42844	258	0	0
2 Agriculture - Cash	0	51582	0	19801	9861	5906	0
3 Forestry	0	0	0	15178	0	120242	0
4 Food Processing	5378	1752	0	90882	5598	2340	0
5 Consumption Goods	0	0	0	724	83540	1337	0
6 Intermediate Goods	8516	27564	10584	15213	62224	183650	33899
7 Construction Materials	2	3	48	24078	9861	15490	49819
8 Capital Goods	242	907	5114	1552	1852	8024	4670
9 Construction	3382	156	912	23864	3748	11032	175
10 Services - private	2295	32883	64987	19525	45845	40786	10538
11 Services - public	181	188	1792	1035	947	1114	612
Intermediate Consumption (Total)	83898	115016	83438	254475	223534	389922	99712
Intermediate Consumption (Local)	83898	104430	83438	222337	170523	215270	45685
Intermediate Consumption (Imported)	0	10586	0	32138	53010	174652	54047
Indirect Tax	3564	18969	28448	20580	90961	47877	7693
Subsidy	7867	2505	0	803	446	263	403
Net Indirect Tax	-4302	16463	28448	19757	90514	47594	7490
Value Added	500870	179358	55168	47654	101046	716230	22302
Total Production	580486	310837	167051	321886	415094	1153746	129504
Total Imports	9153	9592	0	16979	26925	125323	52099
Tariffs and Taxes	936	2940	0	9173	18511	25986	18285
Imports + Taxes	10089	12532	0	26152	43436	151309	70384
Total Absorption	590556	323369	167051	348038	458529	1305054	199889

TABLE 11 (Continued)

8	9	10	11	Total	Household Consumption	Government Consumption	Gross Fixed Capital Formation	Change in Stocks	Exports	Total
0	0	23728	0	130733	548517	0	5363	-98872	4815	590556
0	0	0	0	87130	40358	0	0	-36626	232507	323369
0	0	0	0	135420	0	0	0	6714	24917	167051
0	0	1868	25982	133778	170317	0	0	28108	15835	348038
0	0	1308	3536	90446	387084	0	0	-38033	19033	458529
3541	55110	15133	43700	459135	526942	0	0	107030	211948	1305054
14156	37437	187	0	151080	0	0	0	12886	35923	199889
5530	4109	2616	0	34615	0	0	403437	-111898	20648	346800
576	3681	3550	650	51524	9899	0	530200	-207789	0	383835
10817	57253	623268	55392	963389	840162	0	0	306269	285253	2395073
629	908	3363	0	10769	14976	345326	0	48511	0	419582
35249	158497	675020	129259	2248017	2538255	345326	939000	16300	850877	6937775
9217	158497	433146	129259	1655678						
26032	0	241873	0	592339						
4586	29820	331993	710	585483						
73	0	0	0	12381						
4514	29920	331993	710	573102						
16237	195417	955124	289613	3079019						
56001	383835	1982137	419582	5900138						
190231	0	432936	0	863238						
100568	0	0	0	174399						
290799	0	432936	0	1037637						
346800	383835	2395073	419582	6937775						

The disaggregate SAM is an expansion of the aggregate SAM, building upon both the figures and relationships presented in it. The disaggregate SAM is constructed according to the same double entry accounting procedure as followed in the aggregate SAM; hence, row and corresponding column totals are equal, as are totals for row and column sums. In the aggregate SAM, movement down a column represents account expenditure; movement along a row represents account income. These movements have slightly different interpretations in the disaggregate SAM. Bearing in mind that the disaggregate SAM describes activity at the sectoral level, movement down a column is perhaps more easily understood if thought of as demand for goods and services (which, of course, would entail expenditure). Movement along a row may be thought of as supply of goods or services (which would entail receiving income). The reason for this interpretation becomes clearer as the disaggregate SAM is developed.

The disaggregate and aggregate SAMs differ in their representation of the 1984 Cameroon economy by their degree of detail. The aggregate SAM provides a macro-level picture of the Cameroon economy. The disaggregate SAM goes well beyond this level, dividing the economy into 11 sectors and identifying taxes, subsidies, imports, value added, household and government consumption, capital formation, changes in stocks and exports.

The 11 sector disaggregation incorporates 31 activities defined at the two-digit SCN level, and corresponds with aggregations used in the Comptes Nationaux 1984-85, the CDD model of the Cameroon economy (1987) and the original modeling work conducted by Benjamin and Devarajan (1985). These aggregations are outlined in Table 17 on the following page.

Figure 3 (p. 71) describes the disaggregate SAM as consisting of three "blocks" of data: Block A1, an Input-Output Matrix; Block A2, Residual

Components of Domestic Supply; and, Block A3, Final Demand. This same organizational framework is used to describe the derivation of the individual entries in the disaggregate SAM.

1) Block A1: Input-Output Matrix

The input-output matrix is an 11 x 11 matrix indicating intersectoral flow of goods and services in the 1984 Cameroon economy. The total amount of intermediate consumption, 2248.017 million FCFA, is provided by the aggregate SAM. This value is found at the intersection of the I-O matrix row and column totals. The distribution of intermediate consumption by sector is found on pp. 32-34 of the Comptes Nationaux 1984-85. (Note: sectoral figures in the disaggregate SAM are adjusted for intermediate financing, valued at 32.4 million FCFA in 1984. Financing is apportioned according to percentage share of intermediate consumption.)

Once sectoral intermediate consumption is determined, nominal intersectoral flows may be estimated. HANABO assumes fixed technical coefficients of production, thereby permitting application of input-output coefficients derived from the updated 1983 CDD model of the Cameroon economy. The input-output coefficients are derived by dividing each entry of the 1983 input-output matrix by its respective sector total of domestic production. Following this procedure for all 11 sectors yields an 11 x 11 matrix of input-output coefficients. These coefficients are then multiplied by the 1984 sectoral intermediate consumption figures. This yields an input-output matrix of intersectoral flows, denominated in nominal terms, for 1984.

2) Block A2: Residual Components of Domestic Supply

In addition to intermediate consumption, supply to the Cameroon economy embodies other costs: indirect taxes, subsidies to producers, value added, imports and import tariffs. Sectoral values for each of these domestic

TABLE 17
DISAGGREGATION OF THE 1984 CAMEROON ECONOMY
BY SECTOR AND COMPONENT ACTIVITIES

SECTOR	ACTIVITIES (SCN CODE)
1) Agriculture - Food	Food Crop production (01) Livestock (03) Hunting (03) Fishing (04)
2) Agriculture - Cash	Industrial and Export Crop production (02)
3) Forestry	Forestry (05)
4) Food Processing	Grain and Flour processing/milling (07) Fruit and Vegetable processing (08) Bakery and Confectionary processing (09) Other food processing industries (10)
5) Consumption Goods	Beverages and Tobacco products (11) Textiles and Clothing (12) Shoes and Leather goods (13)
6) Intermediate Goods	Extractive industries (06) Wood manufacturing (14) Paper production, Printing and newspaper production (15) Chemical industries (16) Plastic and Rubber manufacturing (17) Other manufacturing industries (22) Electricity, Gas and Water (23)
7) Construction Materials	Construction materials (18) Base metals (19)
8) Capital Goods	Mechanical and Electrical industries (20) Automotive and Transportation goods (21)
9) Construction	Construction Services and Public Works (24)
10) Private Services	Commercial enterprises (25) Hotel and Restaurant industries (26) Transportation and Communication industries (27) Banking and Insurance (28) Business services (29) Personnel services (30)
11) Public Services	Other services (31)

supply components are calculated as follows.

The aggregate SAM provides information on total net indirect taxes and subsidies. The sum of these two accounts is equal to gross indirect taxes. Gross indirect taxes are sectorally distributed according to values provided by the Comptes Nationaux 1984-85, pp.32-34. (Note: indirect taxes, as calculated by the Comptes Nationaux, include import tariffs. For the purposes of this study, however, indirect taxes are distinguished from import tariffs. Therefore, it shall be understood that when referred to, indirect taxes are net of import tariffs). Lacking information on subsidies distribution, it is assumed that sectoral subsidy rates are inversely related to sector import tax rates. Total subsidies are then distributed to the various sectors accordingly. Subtracting subsidies from gross indirect taxes yields the respective sectoral value of net indirect taxes.

The Comptes Nationaux also reports sectoral production (pp. 32-34). These figures include sector subsidies, however, which are already specified in the disaggregate SAM. In order for the SAM to balance, values of subsidies must be subtracted from the sectoral production figures reported.

Domestic production is defined as the sum of intermediate consumption, net indirect taxes and value added. Having determined two of the three components, value added is calculated as the residual in each respective sector.

In order to complete the supply side of the economy, it is necessary to furnish data on sectoral imports and import tariffs. Information on sectoral imports is obtained from the Comptes Nationaux, 1984-85, pp. 66-69. Absent among these figures are imports of private services. The value of private services imports is estimated as the difference between the sum of these figures, and the value for total Imports provided by the Comptes Nationaux,

p. 59. This latter total, 863.238 billion FCFA, is the same as that which appears in the aggregate SAM.

Total import tariffs also appears in the aggregate SAM, and is verified by the Comptes Nationaux, p. 34. In the absence of data on import tariff collections, total tariffs are sectorally distributed according to collection rates provided by the 1983 CDD model. Sectoral allocation of imports and import tariffs completes the supply side of the economy. Column totals represent gross output, or production, of the respective sectors.

2) Block A3: Final Demand

While producers consume goods to satisfy intermediate demand, the economy's output is also consumed as final products. HANABO attributes this final demand to households, government, fixed capital formation, changes in stocks, and exports.

Total household consumption is obtained from the aggregate SAM. The total is allocated across the various sectors according to fixed consumption coefficients provided by the 1983 CDD model.

Total government consumption is also obtained from the aggregate SAM, and verified by the Comptes Nationaux, p. 45. In accordance with model specifications, government consumes only public services.

Gross fixed capital formation together with changes in stocks equal total investment. The value of total investment (which by model definition is equal to total savings) is provided by the aggregate SAM and substantiated by the Comptes Nationaux, pp. 21 and 55. Fixed capital is distributed according to coefficients provided by the capital coefficients matrix of the 1983 CDD model. Sectoral changes in stocks are determined residually following allocation of sectoral exports.

Exports by sector are reported in the Comptes Nationaux, 1984-85, pp. 62-65. The difference between the sum of these exports and the value for total exports given by the Comptes Nationaux, p. 59 determines private services exports.

Adding sectoral final demand completes the disaggregate SAM. If correctly allocated, sector row totals equal the corresponding sector column total. This is seen to be the case in the disaggregate SAM of the 1984 Cameroon economy. Thus, the requirement that the SAM be "square" is met. Meeting this requirement ensures that total supply in the economy equals total demand, which is a necessary condition for finding a general equilibrium solution.

APPENDIX D

MODEL HANABO: BASE YEAR 1984 WITH TECHNICAL NOTES

MODEL HANABO: BASE YEAR 1984

CAMEROON CGE MODEL

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GAMS 2.04 PC AT/XT

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3 SET I      SECTORS /CROPS-FOOD FOOD CROPS
4            CROPS-CASH CASH CROPS
5            FORESTRY FORESTRY
6            FOOD-PROC FOOD PROCESSING
7            GOODS-CON CONSUMER GOODS
8            GOODS-INT INTERMEDIATE GOODS
9            CONST-MAT CONSTRUCTION MATERIALS
10           GOODS-CAP CAPITAL GOODS
11           CONSTRUCT CONSTRUCTION
12           SERV-PRIV PRIVATE SERVICES
13           SERV-PUB PUBLIC SERVICES /
14
15 IX(I)      EXPORTABLE SECTORS
16 IM(I)      IMPORTABLE SECTORS
17 INM(I)     NONIMPORTABLE SECTORS
18 INX(I)     NONEXPORTABLE SECTORS
19
20 LC         LABOR CATEGORIES /RURAL , URBAN-UNSK , URBAN-SKIL /
21 ALIAS (I,J)
22
23
24 *PARAMETERS
25
26 PARAMETER DELTA(I)  ARMINGTON FUNCTION SHARE PARAMETER      (UNITY)
27                AC(I)  ARMINGTON FUNCTION SHIFT PARAMETER    (UNITY)
28                RHOC(I) ARMINGTON FUNCTION EXPONENT           (UNITY)
29                RHOT(I) CET FUNCTION EXPONENT                 (UNITY)
30                AT(I)   CET FUNCTION SHIFT PARAMETER           (UNITY)
31                GAMMA(I) CET FUNCTION SHARE PARAMETER          (UNITY)
32                ETA(I)  EXPORT DEMAND ELASTICITY               (UNITY)
33                AD(I)   PRODUCTION FUNCTION SHIFT PARAMETER   (UNITY)
34                CLES(I) PRIVATE CONSUMPTION SHARES             (UNITY)
35                GLES(I) GOVERNMENT CONSUMPTION SHARES           (UNITY)
36                DEPR(I) DEPRECIATION RATES                     (UNITY)
37                DSTR(I) RATIO OF INVENTORY INVESTMENT TO GROSS OUTPUT (UNITY)
38                KIO(I)  SHARES OF INVESTMENT BY SECTOR OF DESTINATION (UNITY)

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39      TM0(I)   TARIFF RATES              (UNITY)
40      TE(I)    EXPORT DUTY RATES         (UNITY)
41      ITAXN(I) INDIRECT TAX RATES NET OF SUBSIDIES (UNITY)
42      ALPHL(LC,I) LABOR SHARE PARAMETER IN PRODUCTION FUNCTION (UNITY)
43
44
45 *DUMMIES TO HOLD INITIAL DATA
46
47      M0(I)    VOLUME OF IMPORTS          ('84-85 BILL CFAF)
48      E0(I)    VOLUME OF EXPORTS         ('84-85 BILL CFAF)
49      XD0(I)   VOLUME OF DOMESTIC OUTPUT BY SECTOR ('84-85 BILL CFAF)
50      K0(I)    VOLUME OF CAPITAL STOCKS BY SECTOR ('84-85 BILL CFAF)
51      ID0(I)   VOLUME OF INVESTMENT BY SECTOR OF ORIGIN ('84-85 BILL CFAF)
52      DST0(I)  VOLUME OF INVENTORY INVESTMENT BY SECTOR ('84-85 BILL CFAF)
53      INT0(I)  VOLUME OF INTERMEDIATE INPUT DEMANDS ('84-85 BILL CFAF)
54      XXD0(I)  VOLUME OF DOMESTIC SALES BY SECTOR ('84-85 BILL CFAF)
55      X0(I)    VOLUME OF COMPOSITE GOOD SUPPLY ('84-85 BILL CFAF)
56      PWE0(I)  WORLD MARKET PRICE OF EXPORTS (UNITY)
57      PWM0(I)  WORLD MARKET PRICE OF IMPORTS (UNITY)
58      PD0(I)   DOMESTIC GOOD PRICE (CONSUMER PRICE) (UNITY)
59      PVA0(I)  VALUE ADDED PRICE BY SECTOR (UNITY)
60      PE0(I)   DOMESTIC PRICE OF EXPORTS (UNITY)
61      PM0(I)   DOMESTIC PRICE OF IMPORTS (UNITY)
62      QD(I)    DUMMY VARIABLE FOR COMPUTING AD(I) (UNITY) ✓
63      XLLB(I,LC) DUMMY VARIABLE (L MATRIX WITH NO ZEROS) (UNITY) ✓
64      WA0(LC)  AVERAGE WAGE RATE BY LABOR CATEGORY ('84-85 MILL CFAF PR WORKER)
65      LD(LC)   EMPLOYMENT (1000 PERSONS)
66      LS0(LC)  LABOR SUPPLIES BY CATEGORY (1000 PERSONS) ;
67
68
69 *BASE DATA
70
71 *WAGE RATES BY SECTOR AND LABOR CATEGORY
72
73      WA0("RURAL") = .149 ;
74      WA0("URBAN-UNSK") = .384552 ;
75      WA0("URBAN-SKIL") = 3.84552 ;
76
77 SCALAR
78      ER0 REAL EXCHANGE RATE (UNITY) / .437 /
79      GR0 GOVERNMENT REVENUE ('84-85 BILL CFAF) / 747.501 /
80      GDTOT0 GOVERNMENT CONSUMPTION ('84-85 BILL CFAF) / 345.326 /
81      CDTOT0 PRIVATE CONSUMPTION ('84-85 BILL CFAF) / 2538.255 /

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82 GTE0 GOVT TRNFRS ENTERPRISES('84-85 BILL CFAF) /53.587/
 83 GTHH0 GOVT TRNFRS HOUSEHOLDS ('84-85 BILL CFAF) /117.53/
 84 FSAV0 FOREIGN SAVING ('84-85 MILL DOLLARS) /28.286/ ;

85
 86 TABLE IO(I,J) INPUT-OUTPUT COEFFICIENTS

87
 88 CROPS-FOOD CROPS-CASH FORESTRY FOOD-PROC GOODS-CON GOODS-INT CONST-MAT GOODS-CAP CONSTRUCT SERV-PRIV SERV-PUB

89											
90 CROPS-FOOD.11009			.13310	.00062						.01209	
91 CROPS-CASH	.16588		.06151	.02376	.00512						
92 FORESTRY			.04715		.10422						
93 FOOD-PROC .00926	.00564		.28228	.01349	.00203					.00095	.06192
94 GOODS-CON			.00225	.20126	.00116					.00067	.00843
95 GOODS-INT .01467	.08868	.06336	.04726	.14990	.15918	.26176	.06323	.14358	.00771		.10415
96 CONST-MAT	.00001	.00028	.07480	.02376	.01343	.38469	.25278	.09754	.00010		
97 GOODS-CAP .00042	.00292	.03062	.00482	.00446	.00695	.03606	.09874	.01071	.00133		
98 CONSTRUCT .00583	.00050	.00546	.07352	.00903	.00956	.00135	.01029	.00959	.00181		.00155
99 SERV-PRIV .00395	.10579	.38902	.06066	.10996	.03535	.08137	.19316	.14916	.31765		.13202
100 SERV-PUB .00031	.00060	.01073	.00322	.00228	.00097	.00472	.01123	.00236	.00171		

101
 102
 103 TABLE IMAT(I,J) CAPITAL COMPOSITITON MATRIX (UNITY)

104
 105 CROPS-FOOD CROPS-CASH FORESTRY FOOD-PROC GOODS-CON GOODS-INT CONST-MAT GOODS-CAP CONSTRUCT SERV-PRIV SERV-PUB

106											
107 CROPS-FOOD .05192											
108 GOODS-CAP .59930	.59970	.63140	.59970	.77970	.63140	.63140	.60060	.68860	.16830	.15340	
109 CONSTRUCT .34878	.40030	.36860	.40030	.22030	.36860	.36860	.39940	.31140	.83170	.84660	

110
 111

112 TABLE WDIST(I,LC) WAGE PROPORTIONALITY FACTORS

113

114 RURAL URBAN-UNSK URBAN-SKIL

115

116 CROPS-FOOD	.88694	.34366	
117 CROPS-CASH	.32874	.12737	.12737
118 FORESTRY	8.20028	3.17731	3.17731
119 FOOD-PROC	2.05727	.79712	.79712
120 GOODS-CON	1.31509	.50955	.50955
121 GOODS-INT	2.62815	1.01831	1.01831
122 CONST-MAT	5.53984	2.14649	2.14649
123 GOODS-CAP	2.98045	1.15482	1.15482
124 CONSTRUCT	3.28068	1.27115	1.27115
125 SERV-PRIV	2.18524	.84670	.84670
126 SERV-PUB		.94744	.94744

127

128 TABLE XLE(I,LC) EMPLOYMENT BY SECTOR AND LABOR CATEGORY (1000 PERSONS)

129

130 RURAL URBAN-UNSK URBAN-SKIL

131

132 CROPS-FOOD	1554.371	153.729	
133 CROPS-CASH	661.522	81.68500	1.949
134 FORESTRY	8.87500	2.10200	.70100
135 FOOD-PROC	17.22800	12.59000	3.31300
136 GOODS-CON	37.68300	50.24400	16.74800
137 GOODS-INT	24.24900	21.93900	10.97000
138 CONST-MAT	1.92900	1.74500	.87200
139 GOODS-CAP	4.20000	3.72300	1.62300
140 CONSTRUCT	30.32600	38.10200	9.33100
141 SERV-PRIV	124.934	131.341	64.06900
142 SERV-PUB		102.168	39.73200

143

144

145 TABLE ZZ(*,I) MISCELLANEOUS PARAMETERS AND INITIAL DATA

146

147 CROPS-FOOD CROPS-CASH FORESTRY FOOD-PROC GOODS-CON GOODS-INT CONST-MAT GOODS-CAP CONSTRUCT SERV-PRIV SERV-PUB

148

149	MO	10.089	12.532		26.152	43.436	151.309	70.384	290.799		432.936	
150	E0	4.815	232.507	24.917	15.835	19.033	211.948	35.923	20.646		285.253	
151	XDO	580.466	310.837	167.051	321.886	415.094	1153.746	129.504	56.001	383.835	1962.137	419.582
152	K	870.699	404.088	417.628	643.772	830.188	3461.237	388.512	112.002	959.588	2452.671	461.540
153	DEPR	.04362	.05289	.04906	.02685	.03982	.04776	.02628	.02186	.02402	.05061	.05421
154	RHOC	1.5	.9	.4	1.25	1.25	.5	.75	.4	.4	.4	
155	RHOT	1.5	.9	.4	1.25	1.25	.5	.75	.4	.4	.4	
156	ETA	4.0	4.0	4.0	4.00	4.00	4.0	4.00	4.0	4.0	4.0	4.0
157	PD0	1.0	1.0	1.0	1.00	1.00	1.0	1.00	1.0	1.0	1.0	1.0
158	TMO	.10231	.30652		.54025	.61320	.20735	.35097	.52866			
159	ITAX	.00614	.06102	.17029	.06388	.21913	.04150	.06095	.08192	.07795	.16920	.00169
160	SUBV0	.01355	.00806		.00249	.00107	.00025	.00311	.00131			
161	CLES	.2161	.01590		.06710	.15250	.20760			.00390	.3310	.0059
162	GLES											1.00
163	KIO	.11	.09	.06	.01	.04	.14	.02	.01	.08	.34	.100
164	DSTR	-.170332	-.117831	.040193	.087324	-.091626	.092767	.099502	-1.998156	-.541349	.156089	.115618
165	DST	-.98.872	-.36.626	6.714	28.108	-.38.033	107.030	12.886	-111.898	-207.789	306.269	48.511
166	ID	5.363							403.437	530.200		

167 TE

168 ;

169

170

171 *COMPUTATION OF PARAMETERS AND COEFFICIENTS FOR CALIBRATION

172

173 DEPR(I) = ZZ("DEPR",I);

174 RHOC(I) = (1/ZZ("RHOC",I)) - 1 ;

175 RHOT(I) = (1/ZZ("RHOT",I)) + 1;

176 ETA(I) = ZZ("ETA",I);

177 TMO(I) = ZZ("TMO",I);

178 TE(I) = ZZ("TE",I);

179 ITAXN(I) = ZZ("ITAX",I) - ZZ("SUBV0",I);

180 CLES(I) = ZZ("CLES",I);

181 GLES(I) = ZZ("GLES",I);

182 KIO(I) = ZZ("KIO",I);

183 DSTR(I) = ZZ("DSTR",I);

184 XLLB(I,LC) = XLE(I,LC) + (1 - SIGN(XLE(I,LC)));

185 E0(I) = ZZ("E0",I);

186

```

187 M0(I) = ZZ("M0",I) ;
188 IX(I) = YES$E0(I);
189 IM(I) = YES$M0(I);
190 INM(I) = NOT IM(I);
191 INX(I) = NOT IX(I);
192 XD0(I) = ZZ("XD0",I);
193 K0(I) = ZZ("K",I);
194 PD0(I) = ZZ("PD0",I);
195 PM0(I) = PD0(I) ;
196 PE0(I) = PD0(I) ;
197 PWM0(I) = PM0(I)/((1+TM0(I))*ER0) ;
198 PWE0(I) = PE0(I)/((1+TE(I))/ER0) ;
199 PVA0(I) = PD0(I) - SUM(J, IO(J,I)*PD0(J) ) - ITAXN(I); ✓
200 XXD0(I) = XD0(I) - E0(I);
201 DST0(I) = ZZ("DST",I);
202 ID0(I) = ZZ("ID",I);
203 LS0(LC) = SUM(I, XLE(I,LC) );
204
205
206 *CALIBRATION OF ALL SHIFT AND SHARE PARAMETERS
207
208 * GET DELTA FROM COSTMIN, X0 FROM ABSORPTION , AC FROM ARMINGTON
209
210 DELTA(IM)$M0(IM) = PM0(IM)/PD0(IM)*(M0(IM)/XXD0(IM))**(1+RHOC(IM)) ;
211 DELTA(IM) = DELTA(IM)/(1+DELTA(IM)) ;
212 X0(I) = PD0(I)*XXD0(I) + (PM0(I)*M0(I))$IM(I) ;
213 AC(IM) = X0(IM)/(DELTA(IM)*M0(IM)**(-RHOC(IM)) + (1-DELTA(IM))*XXD0(IM)**(-RHOC(IM)))**(-1/RHOC(IM)) ;
214
215 * GET INTO FROM INTEQ, GAMMA FROM ESUPPLY, ALPHL FROM PROFITMAX
216
217 INTO(I) = SUM(J, IO(I,J)*XD0(J) );
218 GAMMA(IX) = 1/(1 + PD0(IX)/PE0(IX)*(E0(IX)/XXD0(IX))**(RHOT(IX) - 1) ) ;
219 ALPHL(LC,I) = (WDIST(I,LC) * WA0(LC) * XLE(I,LC)) / (PVA0(I)*XD0(I));
220
221 * GET AD FROM OUTPUT, LD FROM PROFITMAX, AT FROM CET
222
223 QD(I) = (XLLB(I,"RURAL")**ALPHL("RURAL",I))*(XLLB(I,"URBAN-UNSK")**ALPHL("URBAN-UNSK",I))
224 * (XLLB(I,"URBAN-SKIL")**ALPHL("URBAN-SKIL",I))*(K0(I)**(1 - SUM(LC, ALPHL(LC,I)))) ;
225 AD(I) = XD0(I)/QD(I);
226 LD(LC) = SUM(I, (XD0(I)*PVA0(I)*ALPHL(LC,I)/(WDIST(I,LC)*WA0(LC)))$WDIST(I,LC));
227 AT(IX) = XD0(IX)/( GAMMA(IX)*E0(IX)**RHOT(IX) + ( 1-GAMMA(IX) ) *XXD0(IX)**RHOT(IX) )**(1/RHOT(IX)) ;
228
229

```

230 *MODEL DEFINITION - VARIABLES
 231
 232 VARIABLES
 233
 234 *PRICES BLOCK
 235 PD(I) DOMESTIC PRICES (CONSUMER PRICES) (UNITY)
 236 PM(I) DOMESTIC PRICE OF IMPORTS (UNITY)
 237 PE(I) DOMESTIC PRICE OF EXPORTS (UNITY)
 238 PK(I) RATE OF CAPITAL RENT BY SECTOR (UNITY)
 239 PX(I) AVERAGE OUTPUT PRICE BY SECTOR (UNITY)
 240 P(I) PRICE OF COMPOSITE GOODS (UNITY)
 241 PVA(I) VALUE ADDED PRICE BY SECTOR (UNITY)
 242 PNDX REAL PRICE INDEX (UNITY)
 243 ER REAL EXCHANGE RATE (UNITY)
 244 PWM(I) WORLD MARKET PRICE OF IMPORTS (UNITY)
 245 PWE(I) WORLD MARKET PRICE OF EXPORTS (UNITY)
 246 TM(I) TARIFF RATES (UNITY)
 247 *PRODUCTION BLOCK
 248 X(I) COMPOSITE GOODS SUPPLY ('84-85 BILL CFAP)
 249 XD(I) DOMESTIC OUTPUT BY SECTOR ('84-85 BILL CFAP)
 250 XXD(I) DOMESTIC SALES ('84-85 BILL CFAP)
 251 E(I) EXPORTS BY SECTOR ('84-85 BILL CFAP)
 252 M(I) IMPORTS BY SECTOR ('84-85 BILL CFAP)
 253 *FACTORS BLOCK
 254 K(I) CAPITAL STOCK BY SECTOR ('84-85 BILL CFAP)
 255 WA(LC) AVERAGE WAGE RATE BY LABOR CATEGORY (CURR MILL. CFAP PR PERSON)
 256 LS(LC) LABOR SUPPLY BY LABOR CATEGORY (1000 PERSONS)
 257 L(I,LC) EMPLOYMENT BY SECTOR AND LABOR CATEGORY (1000 PERSONS)
 258 *DEMAND BLOCK
 259 INT(I) INTERMEDIATES USES ('84-85 BILL CFAP)
 260 CD(I) FINAL DEMAND FOR PRIVATE CONSUMPTION ('84-85 BILL CFAP)
 261 GD(I) FINAL DEMAND FOR GOVERNMENT CONSUMPTION ('84-85 BILL CFAP)
 262 ID(I) FINAL DEMAND FOR PRODUCTIVE INVESTMENT ('84-85 BILL CFAP)
 263 DST(I) INVENTORY INVESTMENT BY SECTOR ('84-85 BILL CFAP)
 264 Y PRIVATE GDP (CURR BILL CFAP)
 265 GR GOVERNMENT REVENUE (CURR BILL CFAP)
 266 TARIFF TARIFF REVENUE (CURR BILL CFAP)
 267 IND TAXN NET INDIRECT TAX REVENUE (CURR BILL CFAP)
 268 DUTY EXPORT DUTY REVENUE (CURR BILL CFAP)
 269 GDTOT TOTAL VOLUME OF GOVERNMENT CONSUMPTION ('84-85 BILL CFAP)
 270 TRNFRE PERCENTAGE GOVT BUDGET TRNFD ENTERPRISES ('84-85 BILL CFAP)
 271 GTE GOVT TRNFRS TO ENTERPRISES (CURR BILL CFAP)
 272 MPS MARGINAL PROPENSITY TO SAVE (UNITY)

273 HNSAV TOTAL HOUSEHOLD SAVINGS (CURR BILL CFAF)
 274 TRNFRHH PERCENTAGE GOVT BUDGET TRNF'D HOUSEHOLDS (CURR BILL CFAF)
 275 GTHH GOVT TRNFRS TO HOUSEHOLDS (CURR BILL CFAF)
 276 GOVSAV GOVERNMENT SAVINGS (CURR BILL CFAF)
 277 DEPRECIA TOTAL DEPRECIATION EXPENDITURE (CURR BILL CFAF)
 278 SAVINGS TOTAL SAVINGS (CURR BILL CFAF)
 279 FSAV FOREIGN SAVINGS (CURR BILL DOLLARS)
 280 DK(I) VOLUME OF INVESTMENT BY SECTOR OF DESTINATION ('84-85 BILL CFAF)
 281 *WELFARE INDICATOR FOR OBJECTIVE FUNCTION
 282 OMEGA OBJECTIVE FUNCTION VARIABLE ('84-85 BILL CFAF)
 283 ;
 284
 285
 286 *MODEL DEFINITION - EQUATIONS
 287
 288 EQUATIONS
 289 *PRICE BLOCK
 290 PMDEF(I) DEFINITION OF DOMESTIC IMPORT PRICES (UNITY)
 291 PEDEF(I) DEFINITION OF DOMESTIC EXPORT PRICES (UNITY)
 292 ABSORPTION(I) VALUE OF DOMESTIC SALES (CURR BILL CFAF)
 293 SALES(I) VALUE OF DOMESTIC OUTPUT (CURR BILL CFAF)
 294 ACTP(I) DEFINITION OF ACTIVITY PRICES (UNITY)
 295 PKDEF(I) DEFINITION OF CAPITAL GOODS PRICE (UNITY)
 296 PNDXDEF DEFINITION OF REAL PRICE INDEX (UNITY)
 297 *OUTPUT BLOCK
 298 ACTIVITY(I) PRODUCTION FUNCTION ('84-85 BILL CFAF)
 299 PROFITMAX(I,LC) FIRST ORDER CONDITION FOR PROFIT MAXIMUM (1000 PERSONS)
 300 LMEQUIL(LC) LABOR MARKET EQUILIBRIUM (1000 PERSONS)
 301 CET(I) CET FUNCTION ('84-85 BILL CFAF)
 302 EDEMAND(I) EXPORT DEMAND (UNITY)
 303 ESUPPLY(I) EXPORT SUPPLY (UNITY)
 304 ARMINGTON(I) COMPOSITE GOOD AGGREGATION FUNCTION ('84-85 BILL CFAF)
 305 COSTMIN(I) FIRST ORDER CONDITION FOR COST MINIMIZATION OF COMPOSITE GOOD (UNITY)
 306 XXDSN(I) DOMESTIC SALES FOR NONTRADED SECTORS ('84-85 BILL CFAF)
 307 XSN(I) COMPOSITE GOOD AGGREGATION FOR NONTRADED SECTORS ('84-85 BILL CFAF)
 308 *DEMAND BLOCK
 309 INTEQ(J) TOTAL INTERMEDIATE USES ('84-85 BILL CFAF)
 310 CDEQ(I) PRIVATE CONSUMPTION BEHAVIOR (CURR BILL CFAF)
 311 DSTEQ(I) INVENTORY INVESTMENT ('84-85 BILL CFAF)
 312 GDP PRIVATE GDP (CURR BILL CFAF)
 313 GTEDEF GOVERNMENT TRANSFERS TO ENTERPRISES (CURR BILL CFAF)
 314 GTHHDEF GOVERNMENT TRANSFERS TO HOUSEHOLDS (CURR BILL CFAF)
 315 GDEQ GOVERNMENT CONSUMPTION BEHAVIOR ('84-85 BILL CFAF)

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316 GREQ      GOVERNMENT REVENUE      •      (CURR BILL CFAF)
317 TARIFFDEF  TARIFF REVENUE          (CURR BILL CFAF)
318 IND TAXNDEF NET INDIRECT TAXES ON DOMESTIC PRODUCTION (CURR BILL CFAF)
319 DUTYDEF    EXPORT DUTIES           (CURR BILL CFAF)
320 *SAVINGS-INVESTMENT BLOCK
321 HHSAVEQ    HOUSEHOLD SAVINGS       (CURR BILL CFAF)
322 GRUSE      GOVERNMENT SAVINGS      (CURR BILL CFAF)
323 DEPREQ     DEPRECIATION EXPENDITURE (CURR BILL CFAF)
324 TOTSAV     TOTAL SAVINGS           (CURR BILL CFAF)
325 PRODINV(I) INVESTMENT BY SECTOR OF DESTINATION (CURR BILL CFAF)
326 IEQ(I)     INVESTMENT BY SECTOR OF ORIGIN ('84-85 BILL CFAF)
327 *BALANCE OF PAYMENTS
328 CAEQ       CURRENT ACCOUNT BALANCE (CURR BILL DOLLAR)
329 *MARKET CLEARING
330 EQUIL(I)   GOODS MARKET EQUILIBRIUM ('84-85 BILL CFAF)
331 *OBJECTIVE FUNCTION
332 OBJ        OBJECTIVE FUNCTION      ('84-85 BILL CFAF) ;
333
334
335 *MODEL DEFINITION - PRICE BLOCK
336
337 PMDEF(IM).. PM(IM) =E= PWM(IM)*ER*(1 + TM(IM)) ;
338
339 PEDEF(IX).. PE(IX)*(1 + TE(IX)) =E= PWE(IX)*ER ;
340
341 ABSORPTION(I).. P(I)*X(I) =E= PD(I)*XXD(I) + (PM(I)*M(I))$IM(I) ;
342
343 SALES(I)..   PX(I)*XD(I) =E= PD(I)*XXD(I) + (PE(I)*E(I))$IX(I) ;
344
345 ACTP(I)..    PX(I)*(1-ITAXN(I)) =E= PVA(I) + SUM(J, IO(J,I)*P(J)) ;
346
347 PKDEF(I)..   PK(I) =E= SUM(J, P(J)*IMAT(J,I)) ;
348
349 PNDXDEF..    PNDX =E= SUM(I, XXD(I)*PD(I)) / SUM(J, XXD(J));
350
351 *OUTPUT AND FACTORS OF PRODUCTION BLOCK
352
353 ACTIVITY(I).. XD(I) =E= AD(I) * PROD(LC$WDIST(I,LC), L(I,LC)**ALPHL(LC,I)) *K(I)**(1 - SUM(LC, ALPHL(LC,I))) ;
354
355 PROFITMAX(I,LC)$WDIST(I,LC).. WA(LC)*WDIST(I,LC)*L(I,LC) =E= XD(I)*PVA(I)*ALPHL(LC,I) ;
356
357 LMEQUIL(LC).. SUM(I, L(I,LC)) =E= LS(LC) ;
358

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359 CET(IX)..   XD(IX) =E= AT(IX)*( GAMMA(IX)*E(IX)**RHOT(IX) + ( 1-GAMMA(IX) )**XXD(IX)**RHOT(IX) )**(1/RHOT(IX)) ;
360
361 EDEMAND(IX).. E(IX)/E0(IX) =E= ( PWE0(IX)/PWE(IX) )**ETA(IX) ;
362
363 ESUPPLY(IX).. E(IX)/XXD(IX) =E= ( PE(IX)/PD(IX)*(1 - GAMMA(IX))/GAMMA(IX) )**(1/(RHOT(IX)-1)) ;
364
365 ARMINGTON(IM).. X(IM) =E= AC(IM)*(DELTA(IM)*M(IM)**(-RHOC(IM)) + (1-DELTA(IM))*XXD(IM)**(-RHOC(IM)))*(-1/RHOC(IM)) ;
366
367 COSTMIN(IM).. M(IM)/XXD(IM) =E= (PD(IM)/PM(IM)*DELTA(IM)/(1-DELTA(IM)))*(1/(1+RHOC(IM)));
368
369 XXDSN(INX)..  XXD(INX) =E= XD(INX) ;
370
371 XSN(INM)..    X(INM) =E= XXD(INM) ;
372
373
374 *DEMAND BLOCK
375
376 INTEQ(J)..    INT(J) =E= SUM(I, IO(J,I)*XD(I) );
377
378 DSTEQ(I)..    DST(I) =E= DSTR(I)*XD(I) ;
379
380 CDEQ(I)..     P(I)*CD(I) =E= CLES(I)*(1-MPS)*(Y + GTE +GTHH) ;
381
382 GDP..         Y =E= SUM(I, PVA(I)*XD(I) ) - DEPRECIA ;
383
384 HHSVEQ..      HHSV =E= MPS*(Y + GTE + GTHH) ;
385
386 GREQ..        GR =E= TARIFF + DUTY + IND TAXN ;
387
388 GRUSE..       GR =E= SUM(I, P(I)*GD(I)) + GOVSAV + GTE + GTHH ;
389
390 GDEQ(I)..     GD(I) =E= GLES(I)*GDTOT ;
391
392 GTEDEF..      GTE =E= TRNFRE*GR ;
393
394 GTHHDEF..     GTHH =E= TRNFRHH*GR ;
395
396 TARIFFDEF..   TARIFF =E= SUM(IM, TM(IM)*M(IM)*PWM(IM) )*ER ;
397
398 IND TAXNDEF.. IND TAXN =E= SUM(I, ITAXN(I)*PX(I)*XD(I) );
399
400 DUTYDEF..     DUTY =E= SUM(IX, TE(IX)*E(IX)*PE(IX) ) ;
401

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402 DEPREQ..      DEPRECIA =E= SUM(I, DEPR(I)*PK(I)*K(I) ) ;
403
404 TOTSAV..      SAVINGS =E= HHSAV + GOVSAV + DEPRECIA + FSAV*ER ;
405
406 PRODINV(I)..  PK(I)*DK(I) =E= KIO(I)*SAVINGS - KIO(I)*SUM(J, DST(J)*P(J)) ;
407
408 IEQ(I)..      ID(I) =E= SUM(J, IMAT(I,J)*DK(J));
409
410 CAEQ..        SUM(IM, PWM(IM)*M(IM)) =E= SUM(IX, PWE(IX)*E(IX)) + FSAV ;
411
412
413 *MARKET CLEARING
414
415 EQUIL(I)..    X(I) =E= INT(I) + CD(I) + GD(I) + ID(I) + DST(I) ;
416
417 OBJ..        OMEGA =E= PROD(I$CLES(I), CD(I)**CLES(I)) ;
418
419
420 *MODEL SETUP - BOUNDING AND INITIALIZATION OF VARIABLES
421
422 P.LO(I) = .01 ; PD.LO(I) = .01 ; PM.LO(IM) = .01 ; PWE.LO(IX) = .01 ; PK.LO(I) = .01 ;
423 PX.LO(I) = .01 ; PNDX.LO = .01 ; X.LO(I) = .01 ; XD.LO(I) = .01 ; M.LO(IM) = .01 ;
424 XXD.LO(IX) = .01 ; WA.LO(LC) = .01 ; INT.LO(I) = .01 ; Y.LO = .01 ; E.LO(IX) = .01 ;
425 L.LO(I,LC) = .01 ;
426
427 X.L(I) = X0(I) ; XD.L(I) = XD0(I) ; XXD.L(I) = XXD0(I) ; CD.L(I) = CLES(I)*CDTOT0 ; M.L(I) = M0(I) ;
428 E.L(I) = E0(I) ; ID.L(I) = ID0(I) ; SAVINGS.L = 955.3 ; DK.L(I) = KIO(I)*(SAVINGS.L - SUM(J, DST0(J)));
429 DST.L(I) = DST0(I) ; INT.L(I) = INT0(I) ; PD.L(I) = PD0(I) ;
430 ER.L = ER0 ; PM.L(I) = PM0(I) ; PE.L(I) = PE0(I) ; P.L(I) = PD0(I) ; PX.L(I) = PD0(I) ;
431 PK.L(I) = PD0(I) ; PVA.L(I) = PVA0(I) ; PWE.L(I) = PWE0(I) ; PNDX.L = SUM(I, XXD0(I)*PD0(I))/SUM(J, XXD0(J));
432 WA.L(LC) = WA0(LC) ; L.L(I,LC) = XLE(I,LC) ; GR.L = GR0 ; Y.L = SUM(I, PVA0(I)*XD0(I) - DEPR(I)*K0(I));
433 TM.L(IX) = TM0(IX);
434 GD.L("SERV-PUB") = 345.326;
435 TARIFF.L = 174.399;
436 GOVSAV.L = 231.058;
437 DEPRECIAL = 480.364;
438 HHSAV.L = 231.517;
439 GTE.L = GTE0;
440 GTHH.L = GTHH0;
441

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442 *CLOSURE
443
444 K.FX(I) = K0(I);
445 PWM.FX(I) = PWM0(I);
446 LS.FX(LC) = LS0(LC);
447 TM.FX(IM) = TM0(IM);
448 TM.FX(INM) = TM0(INM);
449 MPS.FX = .083587;
450 FSAV.FX = FSAV0;
451 IND TAXN.FX = 573.102;
452 GDTOT.FX = GDTOT0;
453 TRNFRE.FX = .071688;
454 TRNFRHH.FX = .157230;
455 M.FX(INM) = 0;
456 L.FX("SERV-PUB","RURAL") = 0;
457 L.FX("CROPS-FOOD","URBAN-SKIL") = 0;
458 E.FX(INX) = 0;
459
460 OPTIONS ITERLIM=1000,LIMROW=0,LIMCOL=0;
461 * OPTIONS ITERLIM=1,LIMROW=1000,LIMCOL=0;
462 MODEL CAMCGE SQUARE BASE MODEL /
463 PMDEF, PEDEF, ABSORPTION, SALES, ACTP, PKDEF, PNDXDEF, ACTIVITY, PROFITMAX, LMEQUIL, CET
464 EDEMAND, ESUPPLY, ARMINGTON, COSTMIN, XXDSN, XSN, INTEQ, CDEQ, DSTEQ, GDP, GDEQ
465 GREQ, TARIFFDEF, IND TAXNDEF, DUTYDEF, HHSAVEQ, GRUSE, DEP REQ, TOTSAV, PRODINV
466 GTEDEF, GTHHDEF, IEQ, EQUIL, OBJ /;
467
468 SOLVE CAMCGE MAXIMIZING OMEGA USING NLP;
469
470 * PARAMETER XDGR(I,*) OUTPUT GROWTH RATE (PERCENT)
471 * IMGR(I,*) IMPORT GROWTH RATE (PERCENT)
472 * EXGR(I,*) EXPORT GROWTH RATE (PERCENT);
473
474
475 * XDGR(I,"OUTPUT") = XD.L(I)/XD0(I) - 1;
476 * IMGR(IM,"IMPORTS") = M.L(IM)/M0(IM) - 1;
477 * EXGR(IX,"EXPORTS") = E.L(IX)/E0(IX) - 1;
478
479 * PARAMETER GOVREVGR REVENUE GROWTH RATE (PERCENT)
480 * TARIFFGR TARIFF REVENUE GROWTH (PERCENT)
481 * IND TAXGR IND TAX REVENUE GROWTH (PERCENT);
482
483 * GOVREVGR = GR.L/747.501 - 1;

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484 * TARIFFGR = TARIFF.L/174.399 - 1;  
485 * IND TAXGR = IND TAX.L/573.102 - 1 ;  
486  
487 * DISPLAY XDGR, IMGR, EXGR, GOVREVGR,TARIFFGR,IND TAXGR;
```

COMPILATION TIME = 0.573 MINUTES

CAMEROON CGE MODEL
MODEL STATISTICS SOLVE CAMCGE USING NLP FROM LINE 468

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GAMS 2.04 PC AT/XT

MODEL STATISTICS

BLOCKS OF EQUATIONS 36 SINGLE EQUATIONS 244
BLOCKS OF VARIABLES 44 SINGLE VARIABLES 282
NON ZERO ELEMENTS 1415 NON LINEAR N-Z 912
DERIVATIVE POOL 36 CONSTANT POOL 205
CODE LENGTH 11349

GENERATION TIME = 1.548 MINUTES

EXECUTION TIME = 2.010 MINUTES

SOLVE SUMMARY

MODEL CAMCGE OBJECTIVE OMEGA
TYPE NLP DIRECTION MAXIMIZE
SOLVER MINOS5 FROM LINE 468

**** SOLVER STATUS 1 NORMAL COMPLETION
**** MODEL STATUS 2 LOCALLY OPTIMAL
**** OBJECTIVE VALUE 507.7509

RESOURCE USAGE, LIMIT 43.983 1000.000
ITERATION COUNT, LIMIT 214 1000
EVALUATION ERRORS 0 0

MINOS --- VERSION 5.0 APR 1984

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courtesy of B. A. Murtagh and M. A. Saunders,
Department of Operations Research,
Stanford University,
Stanford California 94305 U.S.A.

WORK SPACE NEEDED (ESTIMATE) -- 25305 WORDS.
WORK SPACE AVAILABLE -- 30982 WORDS.

EXIT -- OPTIMAL SOLUTION FOUND

MAJOR ITERATIONS 9
NORM RG / NORM PI .000E+00
TOTAL USED 44.23 UNITS
MINOS5 TIME 41.70 (INTERPRETER - 1.00)

--- VAR PD DOMESTIC PRICES (CONSUMER PRICES) (UNITY)

	LOWER	LEVEL	UPPER	MARGINAL
CROPS-FOOD	0.0100	1.0000	+INF	.
CROPS-CASH	0.0100	1.0000	+INF	.
FORESTRY	0.0100	1.0000	+INF	.
FOOD-PROC	0.0100	1.0000	+INF	.
GOODS-CON	0.0100	1.0000	+INF	.
GOODS-INT	0.0100	1.0000	+INF	.
CONST-MAT	0.0100	1.0000	+INF	.
GOODS-CAP	0.0100	1.0000	+INF	.
CONSTRUCT	0.0100	1.0000	+INF	.
SERV-PRIV	0.0100	1.0000	+INF	.

--- VAR PM DOMESTIC PRICE OF IMPORTS (UNITY)

	LOWER	LEVEL	UPPER	MARGINAL
CROPS-FOOD	0.0100	1.0000	+INF	.
CROPS-CASH	0.0100	1.0000	+INF	.
FOOD-PROC	0.0100	1.0000	+INF	.
GOODS-CON	0.0100	1.0000	+INF	.
GOODS-INT	0.0100	1.0000	+INF	.
CONST-MAT	0.0100	1.0000	+INF	.
GOODS-CAP	0.0100	1.0000	+INF	.
SERV-PRIV	0.0100	1.0000	+INF	.

--- VAR PE DOMESTIC PRICE OF EXPORTS (UNITY)

	LOWER	LEVEL	UPPER	MARGINAL
CROPS-FOOD	-INF	1.0000	+INF	.
CROPS-CASH	-INF	1.0000	+INF	.
FORESTRY	-INF	1.0000	+INF	.
FOOD-PROC	-INF	1.0000	+INF	.
GOODS-CON	-INF	1.0000	+INF	.
GOODS-INT	-INF	1.0000	+INF	.
CONST-MAT	-INF	1.0000	+INF	.
GOODS-CAP	-INF	1.0000	+INF	.
SERV-PRIV	-INF	1.0000	+INF	.

--- VAR PK RATE OF CAPITAL RENT BY SECTOR (UNITY)

	LOWER	LEVEL	UPPER	MARGINAL
CROPS-FOOD	0.0100	1.0000	+INF	.
CROPS-CASH	0.0100	1.0000	+INF	.
FORESTRY	0.0100	1.0000	+INF	.
FOOD-PROC	0.0100	1.0000	+INF	.
GOODS-CON	0.0100	1.0000	+INF	.
GOODS-INT	0.0100	1.0000	+INF	.
CONST-MAT	0.0100	1.0000	+INF	.
GOODS-CAP	0.0100	1.0000	+INF	.
CONSTRUCT	0.0100	1.0000	+INF	.
SERV-PRIV	0.0100	1.0000	+INF	.
SERV-PUB	0.0100	1.0000	+INF	.

--- VAR PX AVERAGE OUTPUT PRICE BY SECTOR (UNITY)

	LOWER	LEVEL	UPPER	MARGINAL
CROPS-FOOD	0.0100	1.0000	+INF	.
CROPS-CASH	0.0100	1.0000	+INF	.
FORESTRY	0.0100	1.0000	+INF	.
FOOD-PROC	0.0100	1.0000	+INF	.
GOODS-CON	0.0100	1.0000	+INF	.
GOODS-INT	0.0100	1.0000	+INF	.
CONST-MAT	0.0100	1.0000	+INF	.
GOODS-CAP	0.0100	1.0000	+INF	.
CONSTRUCT	0.0100	1.0000	+INF	.
SERV-PRIV	0.0100	1.0000	+INF	.
SERV-PUB	0.0100	1.0000	+INF	.

--- VAR P PRICE OF COMPOSITE GOODS (UNITY)

	LOWER	LEVEL	UPPER	MARGINAL
CROPS-FOOD	0.0100	1.0000	+INF	.
CROPS-CASH	0.0100	1.0000	+INF	.
FORESTRY	0.0100	1.0000	+INF	.
FOOD-PROC	0.0100	1.0000	+INF	.
GOODS-CON	0.0100	1.0000	+INF	.
GOODS-INT	0.0100	1.0000	+INF	.
CONST-MAT	0.0100	1.0000	+INF	.
GOODS-CAP	0.0100	1.0000	+INF	.
CONSTRUCT	0.0100	1.0000	+INF	.
SERV-PRIV	0.0100	1.0000	+INF	.
SERV-PUB	0.0100	1.0000	+INF	.

---- VAR PVA VALUE ADDED PRICE BY SECTOR (UNITY)

	LOWER	LEVEL	UPPER	MARGINAL
CROPS-FOOD	-INF	0.8629	+INF	.
CROPS-CASH	-INF	0.5770	+INF	.
FORESTRY	-INF	0.3302	+INF	.
FOOD-PROC	-INF	0.1480	+INF	.
GOODS-CON	-INF	0.2434	+INF	.
GOODS-INT	-INF	0.6208	+INF	.
CONST-MAT	-INF	0.1722	+INF	.
GOODS-CAP	-INF	0.2900	+INF	.
CONSTRUCT	-INF	0.5091	+INF	.
SERV-PRIV	-INF	0.4868	+INF	.
SERV-PUB	-INF	0.6902	+INF	.

	LOWER	LEVEL	UPPER	MARGINAL
---- VAR PNDX	0.0100	1.0000	+INF	.
---- VAR ER	-INF	0.4370	+INF	.

PNDX REAL PRICE INDEX (UNITY)
ER REAL EXCHANGE RATE (UNITY)

--- VAR PWM WORLD MARKET PRICE OF IMPORTS (UNITY)

	LOWER	LEVEL	UPPER	MARGINAL
CROPS-FOOD	2.0759	2.0759	2.0759	-1.0479
CROPS-CASH	1.7515	1.7515	1.7515	-1.9482
FOOD-PROC	1.4857	1.4857	1.4857	-2.7737
GOODS-CON	1.4185	1.4185	1.4185	-6.8228
GOODS-INT	1.8953	1.8953	1.8953	-16.1336
CONST-MAT	1.6938	1.6938	1.6938	-8.6021
GOODS-CAP	1.4970	1.4970	1.4970	-32.1961
SERV-PRIV	2.2883	2.2883	2.2883	-41.3743

--- VAR PWE WORLD MARKET PRICE OF EXPORTS (UNITY)

	LOWER	LEVEL	UPPER	MARGINAL
CROPS-FOOD	0.0100	2.2883	+INF	.
CROPS-CASH	0.0100	2.2883	+INF	.
FORESTRY	0.0100	2.2883	+INF	.
FOOD-PROC	0.0100	2.2883	+INF	.
GOODS-CON	0.0100	2.2883	+INF	.
GOODS-INT	0.0100	2.2883	+INF	.
CONST-MAT	0.0100	2.2883	+INF	.
GOODS-CAP	0.0100	2.2883	+INF	.
SERV-PRIV	0.0100	2.2883	+INF	.

--- VAR TM TARIFF RATES (UNITY)

	LOWER	LEVEL	UPPER	MARGINAL
CROPS-FOOD	0.1023	0.1023	0.1023	-0.8141
CROPS-CASH	0.3065	0.3065	0.3065	-1.5867
FOOD-PROC	0.5402	0.5402	0.5402	-1.1363
GOODS-CON	0.6132	0.6132	0.6132	-3.6689
GOODS-INT	0.2073	0.2073	0.2073	-10.8344
CONST-MAT	0.3510	0.3510	0.3510	-5.4001
GOODS-CAP	0.5287	0.5287	0.5287	-14.1539
SERV-PRIV	.	.	.	-34.2312

---- VAR X COMPOSITE GOODS SUPPLY ('84-85 BILL CFAF)

	LOWER	LEVEL	UPPER	MARGINAL
CROPS-FOOD	0.0100	585.7379	+INF	.
CROPS-CASH	0.0100	90.8625	+INF	.
FORESTRY	0.0100	142.1346	+INF	.
FOOD-PROC	0.0100	332.2005	+INF	.
GOODS-CON	0.0100	439.5044	+INF	.
GOODS-INT	0.0100	1093.1065	+INF	.
CONST-MAT	0.0100	163.9869	+INF	.
GOODS-CAP	0.0100	326.1457	+INF	.
CONSTRUCT	0.0100	383.8355	+INF	.
SERV-PRIV	0.0100	2109.8227	+INF	.
SERV-PUB	0.0100	419.5745	+INF	.

---- VAR XD DOMESTIC OUTPUT BY SECTOR ('84-85 BILL CFAF)

	LOWER	LEVEL	UPPER	MARGINAL
CROPS-FOOD	0.0100	580.4641	+INF	.
CROPS-CASH	0.0100	310.8378	+INF	.
FORESTRY	0.0100	167.0517	+INF	.
FOOD-PROC	0.0100	321.8838	+INF	.
GOODS-CON	0.0100	415.1008	+INF	.
GOODS-INT	0.0100	1153.7464	+INF	.
CONST-MAT	0.0100	129.5175	+INF	.
GOODS-CAP	0.0100	55.9997	+INF	.
CONSTRUCT	0.0100	383.8355	+INF	.
SERV-PRIV	0.0100	1962.1408	+INF	.
SERV-PUB	0.0100	419.5745	+INF	.

---- VAR XXD DOMESTIC SALES ('84-85 BILL CFAP)

	LOWER	LEVEL	UPPER	MARGINAL
CROPS-FOOD	0.0100	575.6491	+INF	.
CROPS-CASH	0.0100	78.3304	+INF	.
FORESTRY	0.0100	142.1346	+INF	.
FOOD-PROC	0.0100	306.0488	+INF	.
GOODS-CON	0.0100	396.0676	+INF	.
GOODS-INT	0.0100	941.7979	+INF	.
CONST-MAT	0.0100	93.5920	+INF	.
GOODS-CAP	0.0100	35.3541	+INF	.
CONSTRUCT	-INF	383.8355	+INF	.
SERV-PRIV	0.0100	1676.8869	+INF	.
SERV-PUB	-INF	419.5745	+INF	.

---- VAR E EXPORTS BY SECTOR ('84-85 BILL CFAP)

	LOWER	LEVEL	UPPER	MARGINAL
CROPS-FOOD	0.0100	4.8151	+INF	.
CROPS-CASH	0.0100	232.5075	+INF	.
FORESTRY	0.0100	24.9171	+INF	.
FOOD-PROC	0.0100	15.8350	+INF	.
GOODS-CON	0.0100	19.0332	+INF	.
GOODS-INT	0.0100	211.9485	+INF	.
CONST-MAT	0.0100	35.9255	+INF	.
GOODS-CAP	0.0100	20.6456	+INF	.
SERV-PRIV	0.0100	285.2540	+INF	.

---- VAR M IMPORTS BY SECTOR ('84-85 BILL CFAF)

	LOWER	LEVEL	UPPER	MARGINAL
CROPS-FOOD	0.0100	10.0888	+INF	.
CROPS-CASH	0.0100	12.5321	+INF	.
FOOD-PROC	0.0100	26.1517	+INF	.
GOODS-CON	0.0100	43.4369	+INF	.
GOODS-INT	0.0100	151.3086	+INF	.
CONST-MAT	0.0100	70.3949	+INF	.
GOODS-CAP	0.0100	290.7916	+INF	.
SERV-PRIV	0.0100	432.9359	+INF	.

---- VAR K CAPITAL STOCK BY SECTOR ('84-85 BILL CFAF)

	LOWER	LEVEL	UPPER	MARGINAL
CROPS-FOOD	870.6990	870.6990	870.6990	0.0698
CROPS-CASH	404.0880	404.0880	404.0880	0.0646
FORESTRY	417.6280	417.6280	417.6280	0.0007
FOOD-PROC	643.7720	643.7720	643.7720	0.0011
GOODS-CON	830.1880	830.1880	830.1880	0.0148
GOODS-INT	3461.2370	3461.2370	3461.2370	0.0284
CONST-MAT	388.5120	388.5120	388.5120	0.0003
GOODS-CAP	112.0020	112.0020	112.0020	0.0051
CONSTRUCT	959.5880	959.5880	959.5880	0.0006
SERV-PRIV	2452.6710	2452.6710	2452.6710	0.0428
SERV-PUB	461.5400	461.5400	461.5400	-0.0391

---- VAR WA AVERAGE WAGE RATE BY LABOR CATEGORY (CURR MILL. CFAF PR PERSON)

	LOWER	LEVEL	UPPER	MARGINAL
RURAL	0.0100	0.1490	+INF	.
URBAN-UNSK	0.0100	0.3845	+INF	.
URBAN-SKIL	0.0100	3.8455	+INF	.

--- VAR LS	LABOR SUPPLY BY LABOR CATEGORY				(1000 PERSONS)
	LOWER	LEVEL	UPPER	MARGINAL	
RURAL	2465.3170	2465.3170	2465.3170	0.0288	
URBAN-UNSK	599.3680	599.3680	599.3680	0.0259	
URBAN-SKIL	149.3080	149.3080	149.3080	0.3001	

--- VAR L EMPLOYMENT BY SECTOR AND LABOR CATEGORY (1000 PERSONS)

	LOWER	LEVEL	UPPER	MARGINAL
CROPS-FOOD.RURAL	0.0100	1554.3599	+INF	.
CROPS-FOOD.URBAN-UNSK	0.0100	153.7279	+INF	.
CROPS-FOOD.URBAN-SKIL		.	.	-0.3001
CROPS-CASH.RURAL	0.0100	661.5307	+INF	.
CROPS-CASH.URBAN-UNSK	0.0100	81.6861	+INF	.
CROPS-CASH.URBAN-SKIL	0.0100	1.9490	+INF	.
FORESTRY .RURAL	0.0100	8.8751	+INF	.
FORESTRY .URBAN-UNSK	0.0100	2.1020	+INF	.
FORESTRY .URBAN-SKIL	0.0100	0.7010	+INF	.
FOOD-PROC .RURAL	0.0100	17.2277	+INF	.
FOOD-PROC .URBAN-UNSK	0.0100	12.5898	+INF	.
FOOD-PROC .URBAN-SKIL	0.0100	3.3129	+INF	.
GOODS-CON .RURAL	0.0100	37.6843	+INF	.
GOODS-CON .URBAN-UNSK	0.0100	50.2457	+INF	.
GOODS-CON .URBAN-SKIL	0.0100	16.7486	+INF	.
GOODS-INT .RURAL	0.0100	24.2491	+INF	.
GOODS-INT .URBAN-UNSK	0.0100	21.9391	+INF	.
GOODS-INT .URBAN-SKIL	0.0100	10.9700	+INF	.
CONST-MAT .RURAL	0.0100	1.9294	+INF	.
CONST-MAT .URBAN-UNSK	0.0100	1.7454	+INF	.
CONST-MAT .URBAN-SKIL	0.0100	0.8722	+INF	.
GOODS-CAP .RURAL	0.0100	4.1999	+INF	.
GOODS-CAP .URBAN-UNSK	0.0100	3.7229	+INF	.
GOODS-CAP .URBAN-SKIL	0.0100	1.6229	+INF	.
CONSTRUCT .RURAL	0.0100	30.3261	+INF	.
CONSTRUCT .URBAN-UNSK	0.0100	38.1021	+INF	.
CONSTRUCT .URBAN-SKIL	0.0100	9.3310	+INF	.
SERV-PRIV .RURAL	0.0100	124.9348	+INF	.
SERV-PRIV .URBAN-UNSK	0.0100	131.3419	+INF	.
SERV-PRIV .URBAN-SKIL	0.0100	64.0694	+INF	.
SERV-PUB .RURAL		.	.	-0.0288
SERV-PUB .URBAN-UNSK	0.0100	102.1651	+INF	.
SERV-PUB .URBAN-SKIL	0.0100	39.7309	+INF	.

---- VAR INT INTERMEDIATES USES ('84-85 BILL CFAF)

	LOWER	LEVEL	UPPER	MARGINAL
CROPS-FOOD	0.0100	130.7257	+INF	.
CROPS-CASH	0.0100	87.1308	+INF	.
FORESTRY	0.0100	135.4203	+INF	.
FOOD-PROC	0.0100	133.7755	+INF	.
GOODS-CON	0.0100	90.4574	+INF	.
GOODS-INT	0.0100	459.1353	+INF	.
CONST-MAT	0.0100	151.0996	+INF	.
GOODS-CAP	0.0100	34.6083	+INF	.
CONSTRUCT	0.0100	51.5286	+INF	.
SERV-PRIV	0.0100	963.3926	+INF	.
SERV-PUB	0.0100	10.7623	+INF	.

---- VAR CD FINAL DEMAND FOR PRIVATE CONSUMPTION ('84-85 BILL CFAF)

	LOWER	LEVEL	UPPER	MARGINAL
CROPS-FOOD	-INF	548.5210	+INF	.
CROPS-CASH	-INF	40.3580	+INF	.
FORESTRY	-INF	.	+INF	.
FOOD-PROC	-INF	170.3168	+INF	.
GOODS-CON	-INF	387.0811	+INF	.
GOODS-INT	-INF	526.9415	+INF	.
CONST-MAT	-INF	.	+INF	.
GOODS-CAP	-INF	9.8992	+INF	.
SERV-PRIV	-INF	840.1615	+INF	.
SERV-PUB	-INF	14.9759	+INF	.

---- VAR GD FINAL DEMAND FOR GOVERNMENT CONSUMPTION ('84-85 BILL CFAP)

	LOWER	LEVEL	UPPER	MARGINAL
CROPS-FOOD	-INF	.	+INF	.
CROPS-CASH	-INF	.	+INF	.
FORESTRY	-INF	.	+INF	.
FOOD-PROC	-INF	.	+INF	.
GOODS-CON	-INF	.	+INF	.
GOODS-INT	-INF	.	+INF	.
CONST-MAT	-INF	.	+INF	.
GOODS-CAP	-INF	.	+INF	.
CONSTRUCT	-INF	.	+INF	.
SERV-PRIV	-INF	.	+INF	.
SERV-PUB	-INF	345.3260	+INF	.

---- VAR ID FINAL DEMAND FOR PRODUCTIVE INVESTMENT ('84-85 BILL CFAP)

	LOWER	LEVEL	UPPER	MARGINAL
CROPS-FOOD	-INF	5.3628	+INF	.
CROPS-CASH	-INF	.	+INF	.
FORESTRY	-INF	.	+INF	.
FOOD-PROC	-INF	.	+INF	.
GOODS-CON	-INF	.	+INF	.
GOODS-INT	-INF	.	+INF	.
CONST-MAT	-INF	.	+INF	.
GOODS-CAP	-INF	403.4337	+INF	.
CONSTRUCT	-INF	530.1968	+INF	.
SERV-PRIV	-INF	.	+INF	.
SERV-PUB	-INF	.	+INF	.

---- VAR DST INVENTORY INVESTMENT BY SECTOR ('84-85 BILL CFAF)

	LOWER	LEVEL	UPPER	MARGINAL
CROPS-FOOD	-INF	-98.8716	+INF	.
CROPS-CASH	-INF	-36.6263	+INF	.
FORESTRY	-INF	6.7143	+INF	.
FOOD-PROC	-INF	28.1082	+INF	.
GOODS-CON	-INF	-38.0340	+INF	.
GOODS-INT	-INF	107.0296	+INF	.
CONST-MAT	-INF	12.8872	+INF	.
GOODS-CAP	-INF	-111.8962	+INF	.
CONSTRUCT	-INF	-207.7890	+INF	.
SERV-PRIV	-INF	306.2686	+INF	.
SERV-PUB	-INF	48.5104	+INF	.

	LOWER	LEVEL	UPPER	MARGINAL
---- VAR Y	0.0100	2598.6292	+INF	.
---- VAR GR	-INF	747.5003	+INF	.
---- VAR TARIFF	-INF	174.3983	+INF	.
---- VAR IND TAXN	573.1020	573.1020	573.1020	EPS
---- VAR DUTY	-INF	+INF		
---- VAR GDTOT	345.3260	345.3260	345.3260	0.1067
---- VAR TRNFRE	0.0717	0.0717	0.0717	111.5539
---- VAR GTE	-INF	53.5868	+INF	.
---- VAR MPS	0.0836	0.0836	0.0836	-451.0473
---- VAR HHS AV	-INF	231.5147	+INF	.
---- VAR TRNFRHH	0.1572	0.1572	0.1572	111.5539
---- VAR GTHH	-INF	117.5295	+INF	.
---- VAR GOV SAV	-INF	231.0647	+INF	.
---- VAR DEPRECIA	-INF	480.3477	+INF	.
---- VAR SAVINGS	-INF	955.2880	+INF	.
---- VAR FSAV	28.2860	28.2860	28.2860	0.0461

Y PRIVATE GDP (CURR BILL CFAF)
 GR GOVERNMENT REVENUE (CURR BILL CFAF)
 TARIFF TARIFF REVENUE (CURR BILL CFAF)
 IND TAXN NET INDIRECT TAX REVENUE (CURR BILL CFAF)
 DUTY EXPORT DUTY REVENUE (CURR BILL CFAF)
 GDTOT TOTAL VOLUME OF GOVERNMENT CONSUMPTION ('84-85 BILL CFAF)
 TRNFRE PERCENTAGE GOVT BUDGET TRNF'D ENTERPRISES ('84-85 BILL CFAF)

GTE	GOVT TRNFRS TO ENTERPRISES	(CURR BILL CFAF)
MPS	MARGINAL PROPENSITY TO SAVE	(UNITY)
HHSV	TOTAL HOUSEHOLD SAVINGS	(CURR BILL CFAF)
TRNFRHH	PERCENTAGE GOVT BUDGET TRNF'D HOUSEHOLDS	(CURR BILL CFAF)
GTHH	GOVT TRNFRS TO HOUSEHOLDS	(CURR BILL CFAF)
GOVS	GOVERNMENT SAVINGS	(CURR BILL CFAF)
DEPRECIA	TOTAL DEPRECIATION EXPENDITURE	(CURR BILL CFAF)
SAVINGS	TOTAL SAVINGS	(CURR BILL CFAF)
FSAV	FOREIGN SAVINGS	(CURR BILL DOLLARS)

--- VAR DK VOLUME OF INVESTMENT BY SECTOR OF DESTINATION ('84-85 BILL CFAF)

	LOWER	LEVEL	UPPER	MARGINAL
CROPS-FOOD	-INF	103.2893	+INF	.
CROPS-CASH	-INF	84.5094	+INF	.
FORESTRY	-INF	56.3396	+INF	.
FOOD-PROC	-INF	9.3899	+INF	.
GOODS-CON	-INF	37.5597	+INF	.
GOODS-INT	-INF	131.4590	+INF	.
CONST-MAT	-INF	18.7799	+INF	.
CONSTRUCT	-INF	75.1194	+INF	.
SERV-PRIV	-INF	319.2578	+INF	.
SERV-PUB	-INF	93.8994	+INF	.

	LOWER	LEVEL	UPPER	MARGINAL
--- VAR OMEGA	-INF	507.7509	+INF	.
OMEGA	OBJECTIVE FUNCTION VARIABLE			('84-85 BILL CFAF)

**** REPORT SUMMARY: 0 NONOPT
 0 INFEASIBLE
 0 UNBOUNDED
 0 ERRORS

**** FILE SUMMARY

INPUT C:\WSTAR\HANABO84.GMS
OUTPUT C:\WSTAR\HANABO84.LST
SAVE C:\WSTAR\BASE84.G0?

EXECUTION TIME = 0.869 MINUTES

The SAM-based, CGE model, HANABO, is a modified version of the 1983 Condon-Dahl-Devarajan model of the Cameroon economy. In addition to specifying sectoral subsidies, HANABO also includes government transfers to households and enterprises. The social accounting matrix, which serves as a data source for the model, is updated to 1984.

The vehicle for constructing, implementing and solving HANABO is the microcomputer-based software package GAMS - General Algebraic Modeling System (Version 2.04), developed by A. Brooke, B. Kendrick and A. Meeraus under the auspices of the World Bank. GAMS incorporates MINOS (Version 5.0), a computer-based algorithm package, which it uses to solve the model's 244 non-linear equations.

Model equations and specifications are explained in Chapter IV - Methodology. Presented here is the GAMS program version of HANABO as it is submitted to the microcomputer. The presentation begins with an explanation of set definition.

Set Definition

In GAMS, set definition is used to separate base data into relevant areas of interest. There are two sets in the model HANABO. The first, SET I, defines the sectors of the Cameroon economy. SET I has 11 elements which correspond in name with the 11 disaggregated sectors. Specification of SET I occurs in lines 3-13.

Lines 15-18 define subsets on SET I, distinguishing tradable from non-tradable sectors. Assignment to these subsets takes place during model calibration. Sectors which report zero base year values for either imports or exports are assigned to the appropriate non-tradable subset. Positive base

year values result in assignment to a tradable subset. Once assigned to a subset, the sector retains this designation throughout the modeling exercise.

Line 20 defines SET LC. SET LC indicates labor categories used in the model and has three elements; Rural-Unskilled, Urban-Unskilled and Urban-Skilled.

The entry "Alias (I,J)" in line 21 is a GAMS convention which permits the identification of a set over either rows or columns. The use of the alias convention is necessary because each defined set appears twice in the SAM, once as a row and again as a column.

Parameter Identification

To enable GAMS to distinguish parameters from variables, it is necessary to specify each. Lines 26-43 define the parameters associated with the equations of the model. Letters in parentheses after parameter names identify the sets, or subsets, over which the parameter is defined. GAMS permits short descriptions of the parameters, e.g. "Armington Function Share Parameter (Unity)," indicating the equation with which it is associated and parameter scaling.

Dummies to Hold Initial Data

In the same "block style" used for parameter identification, data names needed for model calibration are listed on lines 47-66.

Base Data

Wage Rates by Sector and Labor Category

Base data entry begins on line 73 with wage rates by labor category. Wage rates for Rural-Unskilled labor are estimated from 1984 Agricultural

Census data on farm income (1984 Agriculture Census, pp. 70-71). Wage rates for Urban-Unskilled and Urban-Skilled labor are based on information provided to the author in personal interviews with Cameroonian management during a visit to Cameroon in August 1988.

Scalars

Scalar data (data with a dimension of one) must be identified in order to be properly handled by GAMS. Scalar data appears on lines 78-84. Data values are derived from the aggregate SAM with the exception of the real exchange rate, which is taken from International Financial Statistics, (1987).

Table I-O (I,J) Input-Output Coefficients

Input-output coefficients are derived from the input-output matrix of the disaggregate SAM in conjunction with sectoral domestic production totals. Division of each entry in the 11 x 11 input-output matrix by its respective sectoral domestic production total results in a corresponding 11 x 11 matrix of input-output coefficients.

Table IMAT (I,J) Capital Composition Matrix

The capital composition matrix determines allocation of sectoral investment. Coefficients in the matrix indicate shares of sector capital invested in each of three specified investment sectors: Food Crops, Capital Goods and Construction. The amount of capital made available by each sector is a fixed coefficient of sector savings. (Fixed coefficients for each sector are found in the Table of Miscellaneous Parameters and Initial Data discussed later in this section.)

Table WDIST (I.LC) Wage Proportionality Factors

Although an average wage exists for each category of labor, it is recognized that wages vary within sectors. Among other reasons, differentials may exist due to geographic location such that a rural worker in the food crops sector earns either more or less than his unskilled urban counterpart. To allow for these differentials, wage proportionality factors are calculated. Proportionality factors equate wages of the same skill category within sectors and establish proportions between wages of different skill categories. In HANABO, wage proportionality factors are set following the approach used by Benjamin and Devarajan. According to this approach, skilled labor is assumed to earn ten times the wages of unskilled labor (Benjamin and Devarajan, 1985, p. 39).

Calculation of the wage proportionality factors begins with distributing the total number of employed workers among the various sectors and across the three defined labor categories. (See Table XLE Employment by Sector and Labor Category below.) The next step is to estimate the distribution of income from wages over the disaggregated sectors of the economy. This is done using the value for total wages reported in the Comptes Nationaux (p. 34), and the functional income distribution inferred from the 1983 CDD model. Together, these two pieces of information allow allocation of total 1984 wages to the various sectors.

These wages must then be apportioned within sectors according to skill category. This is done by dividing total sectoral wages by the sum of rural- and urban-unskilled workers plus the number of urban-skilled laborers times ten. (Urban-skilled workers are multiplied by ten to account for their higher wage level.) The resulting figure is the wage earned by rural- and urban-unskilled

labor in that sector. Urban-skilled wages are obtained by multiplying unskilled wages by a factor of ten.

Finally, wage proportionality factors are obtained by dividing the estimated sector wage for each labor category by the predetermined average wage of that labor category.

Table XLE (I.L.C) Employment by
Sector and Labor Category

Employment figures for food and cash crop sectors are derived from the 1984 Agricultural Census, pp. 14 and 218. Information on these pages indicate that there are 1,092,900 food crop farms in Cameroon and 615,200 livestock farms. Based on the conservative assumptions of only one owner-operator per farm and that livestock is not generally a tradable, this sums to a total of 1,708,100 individuals employed in the food crops sector. The 1984 Agricultural Census indicates 638,200 cash crop farms (p. 67) employing 78,000 permanent employees (Ibid., p. 44). Assuming only one owner-operator per farm, this implies 716,200 laborers engaged in cash crop farming in Cameroon's traditional agricultural sub-sector. With an additional 36,956 individuals employed in the modern agricultural sub-sector (Cameroon Agriculture in Figures, 1986, p. 7), a total of 753,156 Cameroonians work in the cash crop sector.

Employment estimates for the remaining sectors are based upon labor figures in the 1983 CDD model and sector employment growth rates found in Benjamin and Devarajan (p. 39).

Sectoral labor is distributed to the various labor categories according to coefficients estimated by Benjamin and Devarajan (p. 46).

Table ZZ (*.l) Miscellaneous Parameters
and Initial Data

Table ZZ furnishes miscellaneous sectoral information needed by GAMS in order to calibrate the model HANABO. Description of Table ZZ proceeds line by line.

Line 149: M0 - Base year import levels obtained from the disaggregate SAM.

Line 150: E0 - Base year export levels obtained from the disaggregate SAM.

Line 151: XD0 - Base year domestic output obtained from the disaggregate SAM.

Line 152: K - Base year capital stock levels calculated by multiplying domestic output by coefficients supplied by Benjamin and Devarajan (p. 40).

Line 153: DEPR - Depreciation rates calculated using fixed capital consumption values taken from the Comptes Nationaux 1984-85, pp. 32-34. Dividing fixed capital consumption by the amount of fixed capital (K) yields sectoral depreciation rates.

Line 154: RHOC - Parameter estimate for the Armington function exponent, also equal to the elasticity of substitution between domestically produced and imported goods. This series of elasticity estimates are borrowed from Benjamin and Devarajan's original 1985 CGE model of the Cameroon economy. The authors explain that, in the absence of detailed historical data on relative prices of imported and domestic goods, and domestic consumption of both, values of the elasticities are based upon the characteristics of the goods in each sector (Benjamin and Devarajan, pp. 41-42). In HANABO, as in the original model, all substitution elasticity estimates are between 0.4 and 4.0.

Line 155: RHOT - Parameter estimates for the CET function exponent, also the elasticity of transformation between goods produced for domestic consumption and those produced for export. Values for transformation elasticities are borrowed from Benjamin and Devarajan (1985).

Line 156: ETA - Parameter estimates for export demand elasticities adapted from Benjamin and Devarajan (1985).

Line 157: PD0 - Domestic goods prices set at unity in the base year model.

Line 158: TM0 - Import tariff rates based upon import tariff collections and imports reported in the disaggregate SAM. Dividing import tariff collections by total sectoral imports yields effective tariff rates.

Line 159: ITAX - Indirect tax rate calculated by dividing indirect tax collections by total sectoral domestic output. Values for indirect tax collection and domestic output are obtained from the disaggregate SAM.

Line 160: SUBV0 - Subsidy rates obtained by dividing sectoral subsidy values by total sectoral domestic output. The disaggregate SAM provides figures for both subsidies and domestic output.

Line 161: CLES - Private (household) consumption shares based on the linear expenditure system estimated by Condon, Dahl and Devarajan (1987).

Line 162: GLES - Government linear expenditure system. Under the assumption that government consumes only public services, all coefficients are zero, except for that of the Public Services sector which is equal to 1.

Line 163: KIO - Capital investment coefficients denoting the percentage of sectoral savings allocated for investment. These coefficients are taken from Benjamin and Devarajan (p. 45) who estimate these parameters based on information presented in Cameroon's Annual Statistical Notes.

Line 164: DSTR - Ratio of Inventory Investment to Gross Output, calculated by dividing changes in stocks by domestic output. Values are obtained from the disaggregate SAM.

Line 165: DST - Volume of Inventory Investment (Changes in Stocks). Figures are extracted directly from the disaggregate SAM.

Line 166: ID - Volume of Investment Demand. Values are derived from the disaggregate SAM.

Line 167: TE - Export Tariff. It is assumed there are no export tariffs exist, therefore, coefficients for all sectors are zero.

Computation Parameters and Coefficients for Calibration

From a programming standpoint, the objective of the modeling exercise is to create a computer program that will correctly solve the system of model equations. Proper performance of the model is verified when submission of base year data returns the original, square, base year SAM. A second test of proper performance is to verify that the model is homogeneous of degree zero in all prices. This is done by doubling the level of the variable that acts as a numeraire. The result should be a doubling of all absolute prices and nominal magnitudes, but no change in real quantities or relative prices.

Before the model becomes operative, it must first be "calibrated." Calibration refers to the calculation of values for various specified coefficients which are not explicitly provided in the base data. Once properly calibrated, (which normally requires some debugging) the model is operative and may then be used for simulation.

Lines 171-203 identify various parameters and coefficients to be calibrated. In some cases, coefficients may be retrieved directly from one of the

data tables earlier specified. In others, calibration may require mathematical manipulation of base year data. Whichever the case, the modeler must specify the name of the data needed and how it is to be employed. Using DEPR to illustrate, the GAMS syntax `DEPR (I) = ZZ ("DEPR", I)` informs the program that model calibration requires sector depreciation rates defined over the SET I, and that this information is found in Table ZZ, labelled as "DEPR").

Calibration of All Shift and Share Parameters

Calibration of the model continues in lines 210-227 with instructions for calculation of Armington function shift and share parameters. Solving for the shift and share parameters entails manipulation of the Armington functions such that all known variables appear on one side of the equation.

Model Definition - Variables

Model variables are presented in lines 235-282. To clarify model structure and enhance its transparency, variables are organized into four blocks: Prices, Production, Factors and Demand. The "Welfare Indicator" variable, "Omega," is created to permit maximization of economy output, which in neo-classical economic theory is consistent with rational, utility-maximizing behavior.

Model Definition - Equations

The model HANABO is comprised of 36 block equations representing 244 single equations. Model equations appear on lines 337-417. These equations define both real and nominal flows within the economy as well as behavioral constraints on the system, material balance and market clearing

conditions. In order for a model solution to exist, all of the specified equations must hold simultaneously.

Model Setup - Bounding and Initialization of Variables

After calibration, GAMS initiates an iterative process in search of a solution to the system of model equations. To facilitate convergence on a solution, however, a starting point must be specified. Provision of this starting point is known as "initializing the variables," and consists of providing values for all of the specified variables. Values are chosen on the basis of their likelihood for speeding convergence. In HANABO, variables are initialized using base year values.

Bounding refers to delimiting the range of values which a variable may assume. Bounds may be either upper or lower. Experience shows that restricting variable values to a known feasibility set can reduce convergence time (Condon, et. al., p. 30).

Closure

In order for a general equilibrium solution to be found there can neither be any "leakages" from, nor "injections" into the defined economic system. All real and nominal flows of supply and demand must take place within defined model boundaries. This concept of a closed economic system finds a parallel in the "squareness" of a social accounting matrix.

Closure of a CGE model consists of restricting the value of model variables in such a way as to create a closed economic system. Closure should not be confused with bounding. Bounding sets either upper or lower limits on a variable's value; closure entails fixing the value of a variable at a specific level.

Closure rules are a highly debated issue in the realm of economic modeling, with schools of thought sometimes being distinguished by the particular set of closure rules they advocate. (For discussion of some of these schools and their philosophies, see Robinson, 1988).

Closure in HANABO is "savings-driven." Both private marginal propensity to save (MPS) and foreign savings are fixed. By fixing the values of these two variables, absolute restrictions are placed on the ability of the economy to expand. The model is thereby closed.

Other restrictions are also specified under model closure, such as fixed labor supply and capital stock. While facilitating closure, these do not represent the strong restrictions on the model that fixed private and foreign savings do.

Model Statement and Solve Command

The "Model" statement in line 462 names the model and describes it as a square base CGE model. The listing of equations that immediately follows defines the model. The "Solve" statement followed by the model name in line 468 initiates compilation of the data into machine-readable format and instructs the MINOS solver to maximize the objective function using non-linear programming.

APPENDIX E

EXPERIMENT 1: 25 PERCENT GOVERNMENT EXPENDITURE REDUCTION (GAMS 2.04 PROGRAM)

EXPERIMENT 1: 25 PERCENT GOVERNMENT EXPENDITURE REDUCTION

CAMEROON CGE MODEL
COMPILATION

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```
488 GDTOT.LO      = -INF;
489 GDTOT.UP      = +INF;
490 GDTOT.FX      = GDTOT0-(.25*GDTOT0);
491 IND TAXN.LO    = -INF;
492 IND TAXN.UP    = +INF;
493 FSAV.LO       = -INF;
494 FSAV.UP       = +INF;
495 ER.FX         = ER0;
496 PNDX.FX       = 1.00;
497
498 MODEL GVTEXP25 SQUARE BASE MODEL/
499 PMDEF, PEDEF, ABSORPTION, SALES, ACTP, PKDEF, PNDXDEF, ACTIVITY, PROFITMAX, LMEQUIL
500 CET, EDEMAND, ESUPPLY, ARMINGTON, COSTMIN, XXDSN, XSN, INTEQ, CDEQ, DSTEQ, GDP, GDEQ
501 GREQ, TARIFFDEF, IND TAXNDEF, DUTYDEF, HHSAVEQ, GRUSE, DEPREQ, TOTSAV, PRODINV
502 GTEDEF, GTHHDEF, IEQ, EQUIL, OBJ /;
503
504 SOLVE CAMCGE MAXIMIZING OMEGA USING NLP;
```

APPENDIX F

EXPERIMENT 2: ADDITIONAL 50 PERCENT "LUXURY TAX" ON IMPORTED CONSUMER GOODS AND PROCESSED FOODS (GAMS 2.04 PROGRAM)

EXPERIMENT 2: ADDITIONAL 50 PERCENT "LUXURY TAX" ON IMPORTED CONSUMER GOODS AND PROCESSED FOODS

CAMEROON CGE MODEL
COMPILATION

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```
504 TM.FX("FOOD-PROC") = TM0("FOOD-PROC")+.50;
505 TM.FX("GOODS-CON") = TM0("GOODS-CON")+.50;
506 IND TAXN.LO          = -INF;
507 IND TAXN.UP          = +INF;
508 FSAV.LO              = -INF;
509 FSAV.UP              = +INF;
510 ER.FX                = ER0;
511 PNDX.FX              = 1.00;
512
513 MODEL LUTX50 SQUARE BASE MODEL/
514 PMDEF, PEDEF, ABSORPTION, SALES, ACTP, PKDEF, PNDXDEF, ACTIVITY, PROFITMAX, LMEQUIL
515 CET, EDEMAND, ESUPPLY, ARMINGTON, COSTMIN, XXDSN, XSN, INTEQ, CDEQ, DSTEQ, GDP, GDEQ
516 GREQ, TARIFFDEF, IND TAXNDEF, DUTYDEF, HHSAVEQ, GRUSE, DEPREQ, TOTSAV, PRODINV
517 GTEDEF, GTHHDEF, IEQ, OBJ /;
518
519 SOLVE CAMCGE MAXIMIZING OMEGA USING NLP;
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APPENDIX G

EXPERIMENT 3: 50 PERCENT DECREASE IN INDIRECT
TAX RATE ON CASH CROP SECTOR WITH A
DOUBLING OF SUBSIDIES TO THE FOOD
CROP, CASH CROP AND FOOD
PROCESSING SECTORS
(GAMS 2.04 PROGRAM)

EXPERIMENT 3: 50 PERCENT DECREASE IN INDIRECT TAX RATE ON CASH CROP SECTOR WITH A DOUBLING OF
SUBSIDIES TO THE FOOD CROP, CASH CROP AND FOOD PROCESSING SECTORS

145 TABLE ZZ(*,I) MISCELLANEOUS PARAMETERS AND INITIAL DATA

146

147 CROPS-FOOD CROPS-CASH FORESTRY FOOD-PROC GOODS-CON GOODS-INT CONST-MAT GOODS-CAP CONSTRUCT SERV-PRIV SERV-PUB

148

159 ITAX .00614 .03051 .17029 .06388 .21913 .04150 .06095 .08192 .07795 .16920 .00169

160 SUBV0 .0106 .0398

168 ;

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