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Private Investment and Endogenous Growth: Evidence From Cameroon

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Abstract

This paper investigates empirically the factors that have influenced economic growth in Cameroon during 1963-96. The results, which support the endogenous-growth-type model, indicate that (1) the aggregate production function exhibits increasing returns to scale; (2) the impact of increases in private investment on growth is large, significant, and robust; (3) increases in government investment have a positive impact on growth; (4) human capital development plays an important role in output expansion; (5) positive externalities are generated by physical and human capital accumulation; and (6) growth is boosted by economic policies that foster external competitiveness and a prudent fiscal stance.

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SUMMARY

This paper investigates empirically the factors that have influenced economic growth in Cameroon during 1963-96 and finds evidence to support the endogenous-growth-type model for Cameroon. Physical and human capital accumulation and economic policies appear to have played important roles in influencing economic growth.

The analysis indicates that the underlying aggregate production function for Cameroon exhibits increasing returns to scale. At the aggregate level, there are positive externalities stemming from physical and human capital accumulation, in line with a key assumption made by some endogenous growth models. The important contribution made by human capital in output expansion is registered mainly through the positive impact of growth in this type of capital on the volume of private investment. Also, increases in both private and government investment have positive impacts on economic growth. The effect of private investment is large and robust to the addition of other relevant explanatory variables in the growth equation.

In addition, there is evidence that economic growth is influenced by economic policies. Increases in the budget deficit are found to have an adverse impact on economic growth; this effect, however, is not direct, but is registered through the negative influence of expansions in the budget deficit on the volume of private investment. Furthermore, improvements in external competitiveness positively influence economic growth; this effect is registered through the impact of competitiveness gains on the efficiency of resource use.

The results of the empirical investigation have important policy implications for economic growth in Cameroon. First, since increases in private investment stimulate growth, the government should formulate and implement policies that encourage this type of investment. Second, fiscal imbalances should be avoided, while safeguarding expenditure on human capital development. Finally, policies designed to maintain and enhance external competitiveness would boost growth.

I. Introduction

Notwithstanding the secular decline in real GDP experienced during the period 1987-93, the Cameroonian economy remains one of the largest in the CFA franc zone, with a GDP of about US$9 billion in 1996.[2] Compared with other sub-Saharan African countries, Cameroon has one of the most diversified production and resource bases, as it produces and exports a broad range of non-oil commodities.[3] Cameroon is a net oil exporter; oil production, although declining steadily since 1986, still amounted to 37 million metric tons in 1996 and represented 8 percent of GDP. Nevertheless, agriculture has remained the mainstay of the economy and employs over 70 percent of the labor force. The recent history of Cameroon's economic and social development is characterized by two sharply diverging periods in economic performance. Most of the period from independence in 1960 to 1986 was characterized by fiscal balance, a rising investment-GDP ratio, rising human capital stock, and expanding real GDP. In contrast, the period 1987-93 was marked by declining terms of trade, deteriorating external competitiveness, a declining investment-GDP ratio, stagnating or declining human capital stock, rising fiscal imbalances, and shrinking output.

This paper investigates empirically the factors that have influenced economic growth in Cameroon during 1963-96. A number of papers have investigated economic growth with either cross-country or panel data.[4] Most of these studies have used the neoclassical growth model--or its extended version that includes human capital--because of its simplicity and ease of application.[5] Nonetheless, a number of the limitations of this model have prompted the development of endogenous growth models.[6] An important limitation of the neoclassical model is that steady state growth depends solely on technological progress and population growth, both of which are exogenous to the model. As such, economic policies have no influence on steady state growth, although they do influence the level of output when the economy is between steady states. By contrast, endogenous growth models provide mechanisms through which changes in economic policies and accumulation of human and private physical capital stocks can generate sustained economic growth, even in the absence of exogenous technological change and population growth. In general, these models assume increasing returns to scale in reproducible factors of production (e.g., Lucas, 1988; and

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[2]Throughout this paper, fiscal year data are used in the analysis; for example, the year denoted 1996 relates to the fiscal year July 1995-June 1996.

[3]They include coffee, cocoa, cotton, bananas, natural rubber, palm oil, timber, and aluminum.

[4]See, for example, the study by Ghura and Hadjimichael (1996) and the papers cited therein.

[5]For recent applications of this framework, see Khan and Kumar (1993), Knight, Loayza, and Villanueva (1993), and Mankiw, Romer, and Weil (1992).

[6]See Romer (1994) for a discussion of the weaknesses of the neoclassical growth model and how endogenous growth models address them.

Romer, 1986). Romer's (1986) model assumes that technological change is endogenous and that private investment raises the level of technology for the whole economy. The positive externality associated with private investment gives rise to a production function that exhibits increasing returns to scale; in this model increases in private investment raise growth in the steady-state. Lucas (1988) assumes that investment in human capital has spillover effects that give rise to sustained growth. It can be expected that private investment provides a linkage between imported technology and economic growth (Grossman and Helpman, 1991).

This paper contributes to the empirical growth literature in three ways. First, economic growth is analyzed for an individual country--Cameroon--with data spanning over three decades (1963-96). Economic activity in Cameroon, along with that in Côte d'Ivoire, Gabon, and Senegal, has traditionally been viewed as one of the engines of growth and prosperity in the CFA franc zone and in other neighboring countries. An investigation of the determinants of growth in Cameroon would contribute to a better understanding of the factors that can boost economic growth in the region. In addition, an investigation of the growth determinants for an individual economy can focus on the institutional and historical aspects of the country (Tallman and Wang, 1994). Second, the contributions of private and government investments to growth are investigated. Third, following the endogenous growth models by Lucas (1988), Becker, Murphy, and Tamura (1990) and Romer (1990), the role of human capital is investigated. The robustness of the effect of private investment on growth is examined by including variables related to monetary and fiscal policies, external competitiveness, the terms of trade, and the influence of the oil sector.

The results of the analysis, which support the endogenous-growth-type model, indicate that the production function exhibits increasing returns to scale. In addition, changes in economic policies and the accumulation of physical and human capital stocks influence economic growth. The rest of this paper is organized as follows: Section II outlines Cameroon's recent economic development. Section III presents some theoretical considerations. Section IV presents the empirical framework and summarizes the estimation results, and the last section puts forth the main conclusions of the paper.

II. Recent History of Cameroon's Economic and Social Development

Cameroon is a member of the French franc zone. Its currency, the franc de la Communauté Financière en Afrique Centrale (the CFA franc), is issued by the Banque des Etats de l'Afrique Centrale (BEAC),[7] and is pegged to the French franc. The exchange rate of the CFA franc in terms of the French franc, which had been fixed since 1948, was devalued by

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[7]The BEAC is the central bank for six African countries--Cameroon, Central African Republic, Chad, Congo, Equatorial Guinea, and Gabon. The other members of the CFA franc zone are Benin, Burkina Faso, Côte d'Ivoire, Niger, Senegal, Togo, and, since 1984, Mali, whose common central bank is the Banque Centrale des Etats de l'Afrique de l'Ouest.

50 percent in foreign currency terms in January 1994, thus changing the parity from CFAF 1 = F 0.02 to CFAF 1 = F 0.01. Cameroon's recent history of economic and social development may be subdivided into four distinct subperiods: the period 1963-77, or the pre-oil era; the period 1978-86, during which the oil sector played an important role; the period 1987-93, during which the economy experienced a recession; and the period 1994-96, after the CFA franc devaluation. The rest of this section discusses the evolution of these indicators.

A. Pre-Oil, 1963-77

Agriculture played a dominant role until 1978, when oil production started. The primary sector (including agriculture, forestry, and fishing) accounted for 34 percent of total value added on average during 1963-77, employed a large fraction of the labor force, and was a main source of economic growth and foreign exchange earnings. Real GDP grew on average by 4.6 percent a year during this period (Table 1 and Figure 1). The private investment-GDP ratio rose from 11 percent in 1963 to about 19 percent in 1977; government investment, however, remained low as a share of GDP, averaging 2 percent during 1963-77 (Table 1 and Figure 2). Government revenue averaged 17 percent of GDP during the period, and with total government expenditure averaging at about 18 percent of GDP, the average overall budget deficit remained low, at 1 percent of GDP (Table 1 and Figure 3).

B. Oil Boom, 1978-86

Beginning in 1978, Cameroon's economy experienced a structural change when oil became the main source of foreign exchange earnings. The share in GDP of the secondary sector (including mining, manufacturing, electricity, housing, and public works) rose from 19 percent on average during 1965-77 to an average of 28 percent during 1978-86. Real GDP grew about 8.8 percent a year during this period, reflecting in part the oil sector's rising output. Oil production increased from less than 5 million barrels in 1978 to more than 66 million barrels in 1986. Per capita real GDP rose by 52 percent from 1978 to 1986. The oil sector also contributed significantly to the government's budget, with oil revenue growing from less than CFAF 20 billion (1.4 percent of GDP and 9 percent of total revenue) in 1980 to CFAF 330 billion in 1985 (9 percent of GDP and 41 percent of total revenue). Total government revenue increased from an average of about 17 percent of GDP during 1965-77 to an average of 21 percent during 1978-86, but rising government outlays kept the budget broadly in balance (Figure 3).

With booming economic conditions during 1978-86, the government adopted a development strategy that centered on expanding the public sector in three ways. First, it shifted its expenditure priorities by expanding the capital budget from an average of 2 percent of GDP during 1965-77 to an average of 9 percent during 1978-86, while reducing current outlays from an average of 16 percent of GDP to 12 percent (Figure 3). Thus, the total investment-GDP ratio increased significantly, but the private investment-GDP ratio remained broadly unchanged. Second, a large number of public agencies, marketing boards, and public enterprises were set up or expanded in all sectors of the economy, often supported by

Table 1. Selected Economic Indicators, 1963-96

(Period averages; in units indicated)

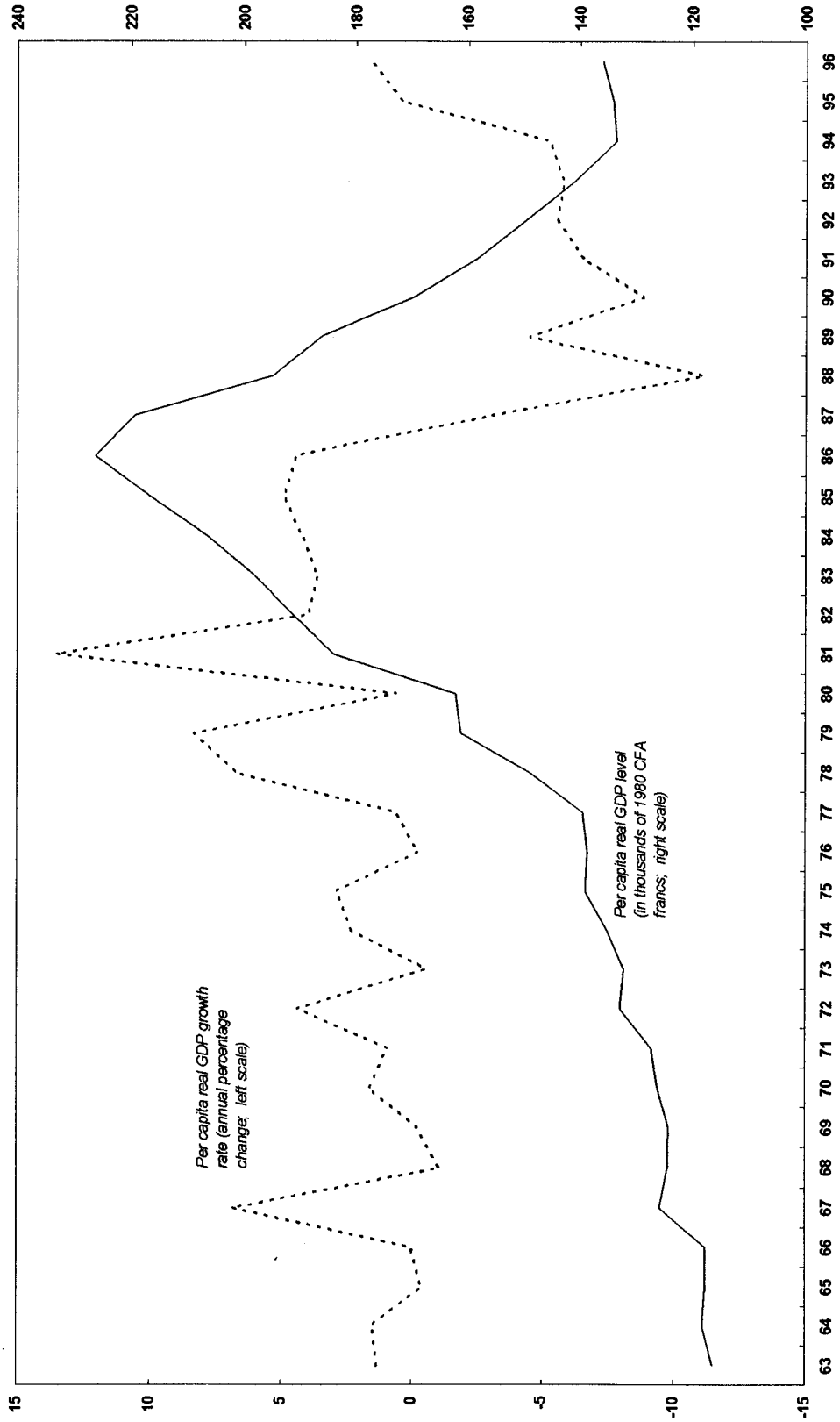
	1963-77	1978-86	1987-93	1994-96
National accounts and prices				
Real GDP growth rate 1/	4.6	8.8	-4.0	1.9
Per capita real GDP				
Level (in thousands of 1980 CFA francs)	127.6	188.4	174.1	134.6
Growth 1/	1.2	5.6	-6.5	-1.1
Gross domestic investment/GDP (in percent)	17.9	24.9	18.2	15.2
Private investment/GDP (in percent)	15.9	16.2	11.4	13.4
Government investment/GDP (in percent)	2.0	8.7	6.8	1.8
Consumer price				
Level (index, 1980=100)	43.3	131.8	225.5	309.4
Inflation 1/	6.6	11.3	2.1	16.6
Central government operations				
Total revenue/GDP (in percent)	16.6	21.3	15.8	12.5
Current expenditure/GDP (in percent)	15.5	11.8	16.3	16.3
Capital expenditure/GDP (in percent)	2.0	8.7	6.8	1.8
Overall budget balance/GDP (in percent)	-0.9	0.8	-7.3	-5.5
Monetary developments				
Real money balances				
Level (in thousands of 1980 CFA francs)	110.4	329.2	327.4	211.5
Growth 1/	7.6	9.5	-6.8	-10.5
Income velocity of circulation	6.6	5.2	4.7	6.2
BEAC discount rate	4.4	8.1	9.9	9.8
French money market rate	6.8	11.4	8.8	5.7
External sector				
Real effective exchange rate (index, 1980=100)	...	93.6	123.6	83.2
Relative price of nontraded goods (index, 1980=100) 2/	77.7	82.3	121.0	96.7
French consumer price				
Level (index, 1980=100)	45.5	127.0	193.0	217.4
Inflation 1/	6.3	9.8	2.9	1.8
Terms of trade (index, 1980=100)	89.0	91.2	60.0	58.3
French exchange rate (F per U.S. dollar)	4.9	6.3	5.8	5.5

Sources: See Appendix for sources of the variables.

1/ Annual average percentage change of the relevant variable expressed in level.

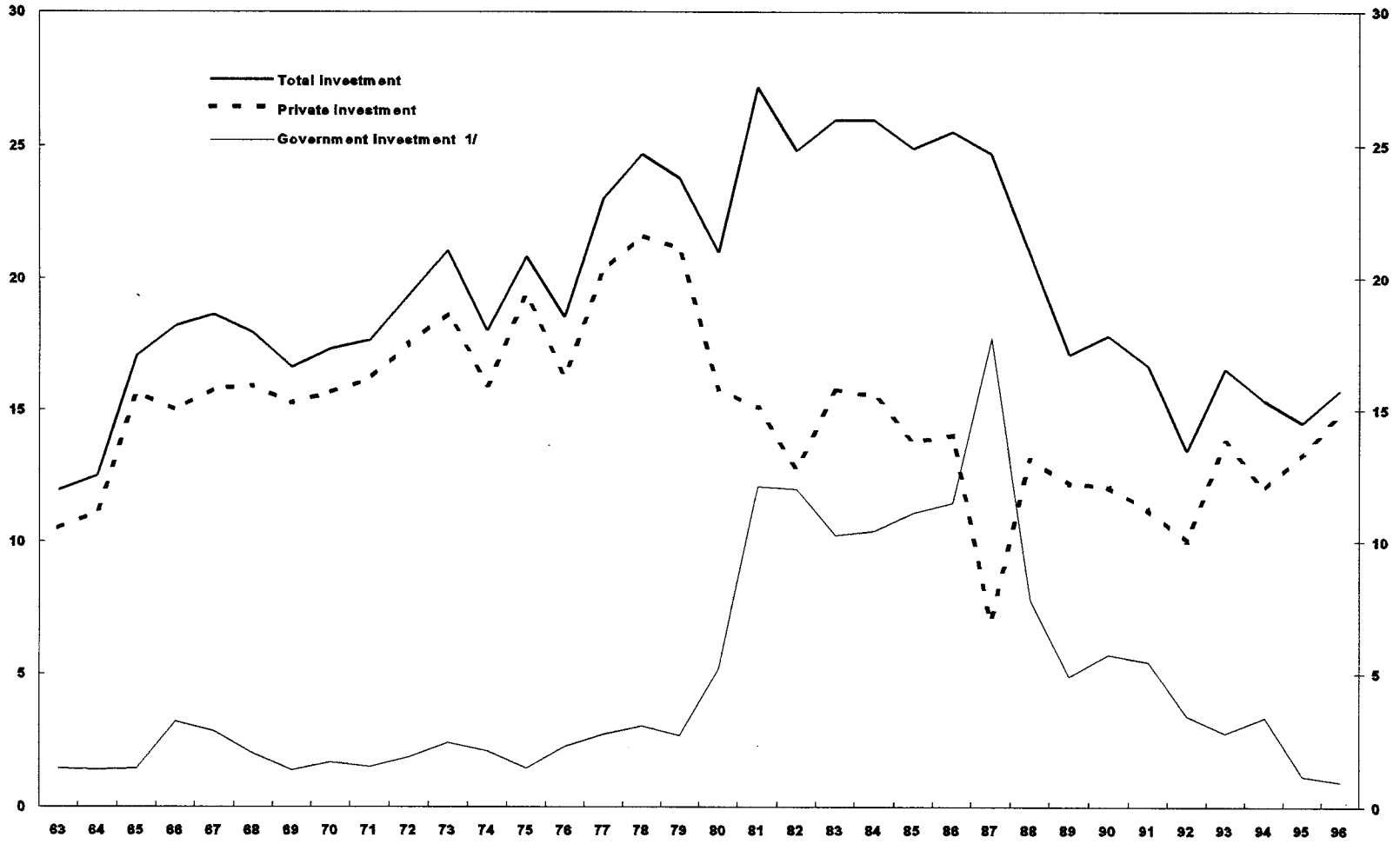
2/ Following Edwards (1988), defined as $CPI/(EI.WPI^{US})$, where CPI is the consumer price index, EI is an index of the nominal exchange rate (CFAF per U.S. dollar), and WPI^{US} is the U.S. wholesale price index.

Figure 1. Per Capita Real GDP Level and Growth, 1963-96



Sources: See Appendix.

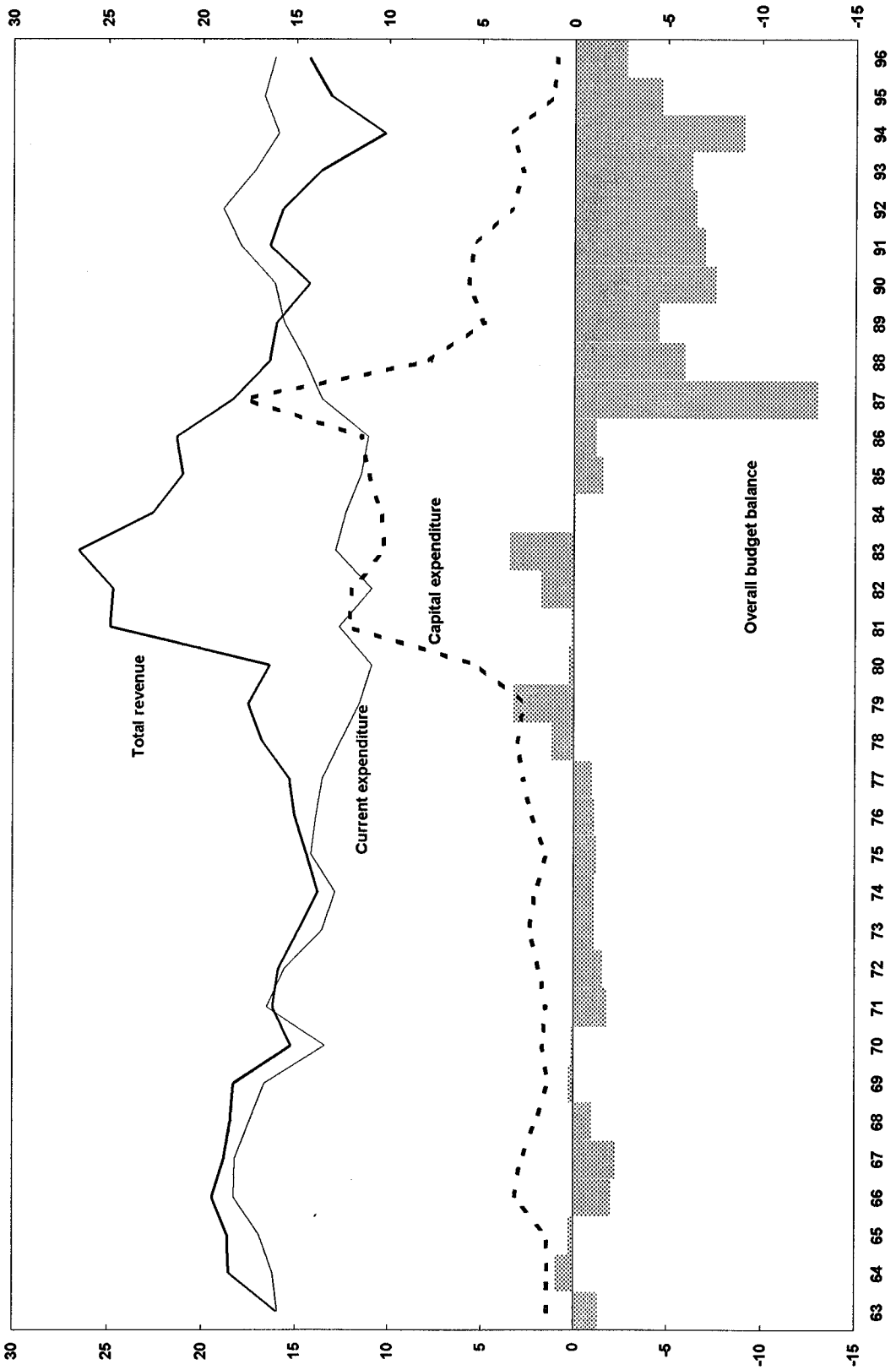
Figure 2. Investment, 1963-96
(In percent of GDP)



Sources : See Appendix

1/ Taken from the central government's fiscal tables.

Figure 3. Fiscal Developments, 1963-96
(In percent of GDP)



Sources: See Appendix.

government subsidies. Third, the transport sector suffered from heavy government intervention and was dominated by public enterprises in railways, urban transport, domestic air travel, merchant shipping, port management, and road maintenance. Finally, a complex system of regulations on prices, including interest rates, was put in place. External trade was regulated through import licensing and marketing boards, while quantitative import restrictions were imposed on goods that competed with domestic production.

The increased emphasis on capital expenditure during 1978-86 was reflected in substantial improvements in the nation's infrastructure and indicators of human capital development (Table 2). Both total and female primary and secondary school enrollment ratios

Table 2. Selected Social and Infrastructure Indicators, 1965-95

(Period averages; in units indicated)

	1965-77	1978-86	1987-93	1994-95
Education indicators				
Primary school enrollment ratio				
Total (percent)	96.0	101.8	97.0	...
Female (percent)	83.2	92.3	94.0	...
Secondary school enrollment ratio				
Total (percent)	11.2	19.0	28.7	...
Female (percent)	7.0	13.5	22.0	...
Illiteracy rate				
Total 1/	58.8	52.0	45.9	36.6
Female 2/	...	64.4	57.4	47.9
Total education stock 3/	1.3	2.5	3.0	2.9
Health indicators				
Life expectancy at birth (in years)	44.4	51.0	55.0	56.8
Infant mortality rate (per thousand)	123.9	90.8	66.1	55.7
Population per physician	23,408.0	14,003.0	11,988.0	...
Population per nurse	7,452.0	1,955.0	1,921.0	...
Infrastructure indicators				
Road length (in thousands of kilometers)	40.0	61.0	61.0	...
Area of irrigated land (percent of agricultural land)	13.7	24.2	29.9	29.8

Sources: See Appendix for sources of the variables.

1/ Percentage of total population of age 15 and above.

2/ Percentage of female population of age 15 and above.

3/ Mean school-years of education per working person. These data were obtained from Nehru, Swanson, and Dubey (1993).

improved, and the overall literacy rate rose. The total education-related human capital stock rose almost twofold between 1965-77 and 1978-86, from 1.3 years of education per working person to 2.5 years. Also, health indicators (life expectancy at birth and the infant mortality rate) improved markedly, reflecting, inter alia, an increase in the number of physicians and nurses relative to the population. Improvements in the nation's physical infrastructure, including roads and irrigated land, testified to the emphasis on capital expenditure.

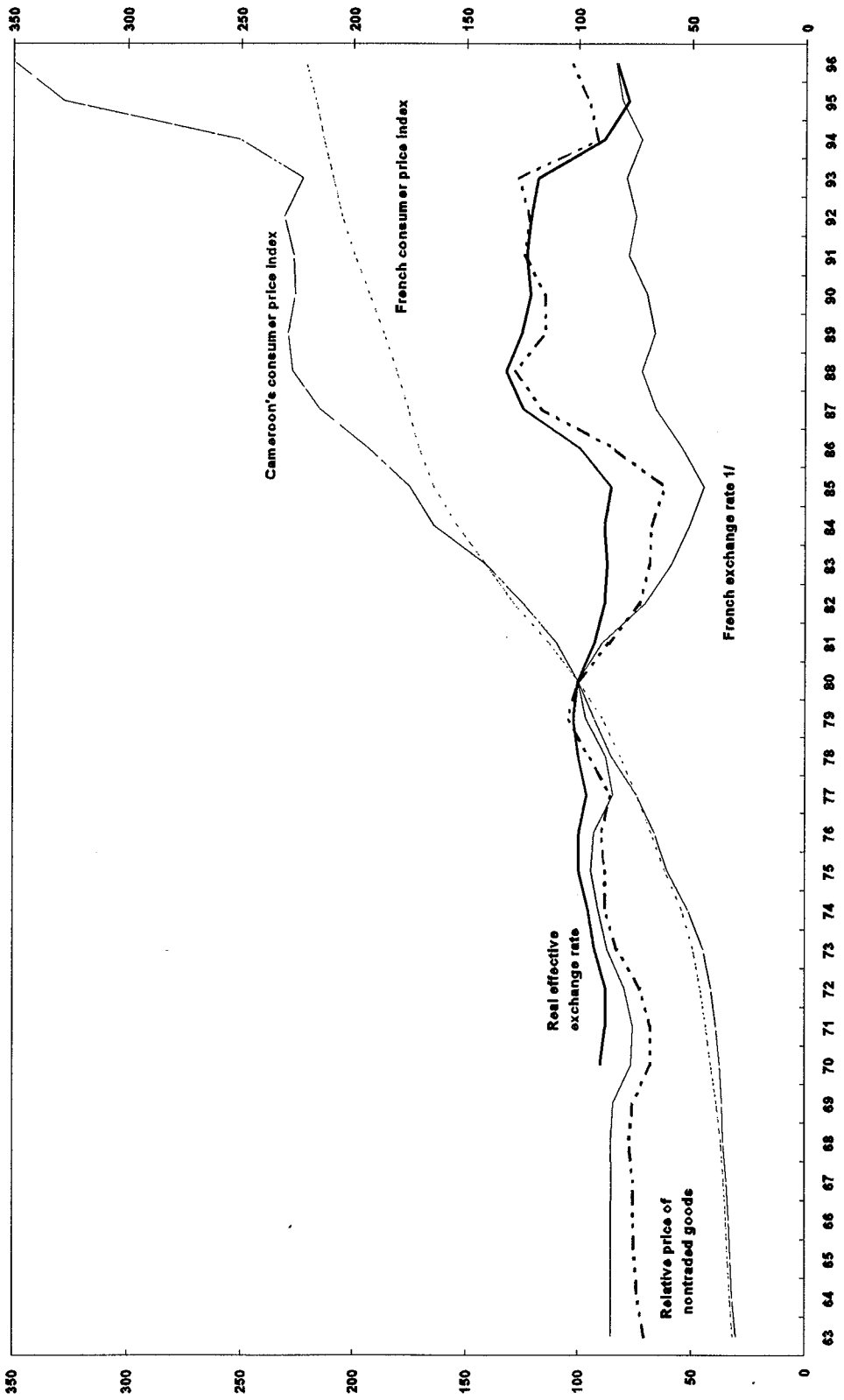
In principle, the oil boom experienced by Cameroon during 1978-86 should have given rise to the "Dutch disease" problem, characterized by a rise in the relative price of nontraded to traded goods. However, the Dutch disease was largely averted, as the real exchange rate depreciated by about 20 percent between 1979 and 1985, reflecting largely the depreciation of the French franc (Figure 4). In addition, Benjamin, Devarajan, and Weiner (1989) note that the government saved a large portion of the windfall income from oil since it perceived the oil boom as temporary, thus avoiding a spending boom.

C. Recession, 1987-93

The period 1987-93 was marked by a severe economic crisis that manifested itself in a 40 percent drop in per capita real GDP. Economic activity shrank in most areas, particularly in construction and public works, but also in the production of cash crops, retail trade, and the petroleum sector. The deterioration in Cameroon's economic and financial situation during this period can be explained by three main factors: a significant deterioration in the world market prices of its main export commodities; an appreciation of its real effective exchange rate (Figure 4); and a decline in oil output. Between 1986 and 1988, the international price of crude oil fell by two thirds, while the prices of coffee and cocoa dropped by one-half and one-third, respectively. Overall, during 1986-92, the terms of trade declined by nearly 40 percent. Meanwhile, the real effective exchange rate appreciated by some 40 percent on a cumulative basis between 1985 and 1992, owing to not only the appreciation of the French franc but also an increase in inflation triggered by expansionary fiscal policies (Figures 3 and 4).

The fiscal balance turned into an average deficit of 7 percent of GDP during 1987-93, compared with an average surplus of 1 percent during 1978-86, as the government attempted to jump-start the economy by expansionary fiscal policy reflected in an increase in total expenditure by 2½ percentage points of GDP between these two subperiods in the face of a decline in total revenue by 5½ percentage points of GDP (Figure 3). The deficit was financed from two main sources: external borrowings and the accumulation of domestic and external arrears. External debt rose to 49 percent of GDP during 1987-93, from 31 percent during 1978-86. Sizable stocks of arrears were accumulated to external creditors, as well as to domestic suppliers, which prompted several local companies to halt work and default on their obligations to domestic banks, as well as on their tax obligations. The deteriorating financial conditions during 1987-93 exposed the problems of several local banks, which were undercapitalized, poorly managed, and marginally profitable (Doe, 1995). Reflecting the lack of confidence in the domestic banking sector, money demand fell sharply starting in 1986, and currency rose from 17 percent of broad money in 1985 to 22 percent by 1993.

Figure 4. Indicators of External Competitiveness, 1963-96
(Indices 1980 = 100)



Sources: IMF, *International Financial Statistics*, and Information Notice System; for the relative price of nontraded goods, see Appendix

1/ Index of U.S. dollars per French franc.

In order to reverse the declining trends, the government attempted in the late 1980s and early 1990s to jump-start the economy, following a strategy that was based solely on internal adjustment measures. This strategy consisted mainly of maintaining the fixed common peg, reducing the fiscal deficit through increases in tax rates and cuts in the wage bill and public enterprise subsidies, and attempting to restore external competitiveness by reducing domestic costs and restructuring public enterprises. Nevertheless, given the magnitude of the macroeconomic imbalances, it became clear by end-1993 that strategies based exclusively on internal adjustment would not be sufficient to put the economy back on a sustainable economic recovery track. The internal adjustment strategy alone was unable to restore external competitiveness, as nominal domestic prices (including wages and producer prices) showed considerable downward rigidity. In addition, owing to declining government revenue, fiscal adjustment consisted mainly of cuts in the investment budget and in outlays on nonwage maintenance and other essential services, a policy that was harmful to growth.

D. Post-Devaluation, 1994-96

Given the inability of internal adjustment strategies alone to revive economic performance, Cameroon, in collaboration with other member countries of the CFA franc zone, devalued its currency by 50 percent in January 1994. Besides the exchange rate change, the government's program consisted of internal adjustment measures, including further fiscal tightening, as well as the implementation of structural reforms related to the reorganization and downsizing of the civil service, privatization of public enterprises, bank restructuring, and the liberalization of domestic prices and interest rates. Cameroon's external competitiveness has been largely restored since the devaluation in early 1994, and most exports have recorded strong gains, including coffee, cocoa, cotton, timber, aluminum, and manufacturing exports. Activity in domestically oriented industries, which had contracted in the wake of the devaluation, also expanded in 1995, particularly for beverages and tobacco. Overall real GDP turned around from an average decline of 4 percent during 1987-93 to an average growth of about 2 percent during 1994-96, accompanied by a rise in private investment from 11 percent of GDP to 13 percent between these two periods (Table 1 and Figure 2). Nevertheless, government investment was curtailed to historically low levels of about 2 percent of GDP, reflected, inter alia, in a deterioration in the education-related human capital stock.

III. Theoretical Considerations

This paper uses a Solow-Swan aggregate production function, modified to account for three types of capital stocks: private and government physical capital stocks, and human capital stock. The production function takes the following form:

$$Y_t = A_t(K^p{}_t)^{\alpha}(K^g{}_t)^{\beta}(Z_t)^{\gamma}, \qquad Z_t = H_t L_t, \tag{1}$$

where Y is output; A represents technology; K^p and K^g are the private and government physical capital stocks, respectively; Z represents labor (L) adjusted for human capital development (H); and t is a time index.

Two main motivations underlie the modification of the standard framework. First, following Barro's (1990) endogenous growth model, the possibility of the differential impacts of private and government capital stocks on economic growth are considered. Most growth models assume that $\alpha = \beta = \eta$ so that $(K^p)^{\alpha}(K^g)^{\beta}$ in equation (1) is replaced by K^{η}, where K is the total physical capital stock. Second, another strand of endogenous growth models stresses that human capital accumulation, by enhancing labor productivity, can boost growth in the steady state (Lucas, 1988; Romer, 1990; and Becker, Murphy, and Tamura, 1990). By assuming that $\alpha + \beta + \gamma \geq 1$, endogenous growth models can generate sustained growth, even in the absence of exogenously given technological progress and population growth, from forces within the economic system, such as accumulation of physical and human capital stocks and changes in economic policy. It is noteworthy that if $\alpha + \beta + \gamma = 1$, the production function given by (1) would be reduced to the so-called Y = AK model of endogenous growth (Barro, 1990; and Rebelo, 1991), where K is broadly defined to encompass all the reproducible capital stocks, both physical and human.

The parameters α, β, and γ in equation (1) represent the elasticities of output with respect to private, government, and human capital stocks, respectively. Under conditions of perfect competition, equation (1) is characterized by constant returns to scale, such that $(\alpha + \beta) = 1 - \gamma$. Thus, each individual factor of production faces diminishing returns to scale. Also, under conditions of perfect competition, the shares of total capital stock and labor in income are given by $(\alpha + \beta)$ and γ. Based on national income accounts data for developed economies (e.g., Maddison, 1987), the share of total capital stock is typically estimated at about one-fourth and that of labor at three-fourths. Nevertheless, as assumed in endogenous growth models, when there are positive externalities to the economy--stemming either from investment in human capital (Lucas, 1988; and Becker, Murphy, and Tamura, 1990), or investment in physical capital (Romer, 1986, 1987, and 1994), or increased openness to international trade (Grossman and Helpman, 1991)--$\alpha + \beta + \gamma \geq 1$. Romer (1987) has argued that the elasticity of output with respect to capital $(\alpha + \beta)$ is closer to one than to one-fourth. Thus, in growth models with externalities, diminishing returns to scale to capital sets in more slowly than in models under perfect competition. Grossman and Helpman (1991, p. 24) have noted that in models with externalities, economic growth "can be sustained by continuing accumulation of the inputs that generate the positive externalities."

Equation (1) can be expressed in growth rate terms as follows:

$$y = a + \alpha k^p + \beta k^g + \gamma z, \tag{2}$$

where a small letter for a variable denotes its growth rate. Equation (2), which represents a long-run economic growth relationship, can be estimated, provided that data are available for capital stocks. Unfortunately, such data are typically unavailable for developing economies, including Cameroon. Nevertheless, equation (2) can be transformed into an estimable form by making some simplifying assumptions regarding physical capital stocks. Consider the following growth equations for the stocks of private and government capital, which are simple transformations of the perpetual inventory accumulation equations:

$$\frac{\Delta K^p_t}{K^p_{t-1}} = \frac{I^p_t}{K^p_{t-1}} - \delta_p , \tag{3a}$$

and

$$\frac{\Delta K^g_t}{K^g_{t-1}} = \frac{I^g_t}{K^g_{t-1}} - \delta_g , \tag{3b}$$

where I^p and I^g are private and government investments (both expressed in real terms), respectively; and δ_p and δ_g are the respective rates of depreciation of the private and government capital stocks. Assuming that

$$K^p = \theta_p Y, \tag{4a}$$

and

$$K^g = \theta_g Y, \tag{4b}$$

where θ_p and θ_g are fixed coefficients, equation (2) can be rewritten as

$$y = a' + \alpha' \left(\frac{I^p_t}{Y_{t-1}} \right) + \beta' \left(\frac{I^g_t}{Y_{t-1}} \right) + \gamma z, \tag{5}$$

where $a' = (a - \alpha\delta_p - \beta\delta_g)$, $\alpha' = \alpha/\theta_p$, and $\beta' = \beta/\theta_g$.

Equation (5) can be estimated with available data for Cameroon. Following Tallman and Wang (1994), real GDP per capita is used as a measure of output. The variable I^g was obtained from Cameroon's fiscal accounts, and I^p is the difference between total investment, obtained from the national accounts, and I^g. Thus, I^p includes investment by public enterprises. Since, separate deflators for private and government investments are not available, the total investment deflator was used to deflate I^p and I^g. The human capital stock is measured by mean school-years of education per working person in the economy. The series on human capital, obtained from Nehru, Swanson, and Dubey (1993), were built from school enrollment data, adjusted for the mortality rate, and using the perpetual inventory method.

IV. Empirical Methodology and Results

The empirical counterpart of equation (5) is written as follows:

$$OG_t = a' + \alpha' PIY_t + \beta' GIY_t + \gamma ALG_t + \xi_t , \tag{6}$$

where *OG* is output growth; *PIY* is the ratio of real private investment to lagged real GDP; *GIY* is the ratio of real government investment to lagged real GDP, *ALG* is labor growth (*LG*), augmented by human capital stock; and ξ is a stochastic error term.[8] The strategy used for the empirical investigation is as follows: first, the time-series properties of the data are discussed; second, the existence and direction of causality between output and investment are discussed; and third, the regression results are discussed. The base regression presents the effects of private and government investments and human capital on economic growth. The robustness of the effect of private investment is investigated by augmenting equation (6) by other relevant explanatory variables.

A. Time-Series Properties of the Data

In order to avoid the problem of spurious correlations in the regression analysis, the time-series properties of the variables used in the regression analysis are investigated using the standard augmented Dickey-Fuller (ADF) and the Phillips-Perron unit root tests under two alternative hypotheses. Following Reinhart and Wickham (1994), it is first assumed that there are no structural breaks in the series; second, it is assumed that there is a onetime break in both the mean and the trend at a specific point in time (Perron, 1989). The form of the ADF test employed is given by

$$\Delta w_t = \mu + \beta t + \alpha w_{t-1} + \sum_{i=1}^{k} \delta_i \Delta w_{t-i} + e_t , \tag{7}$$

where w is the variable of interest. Equation (7) allows for the presence of a nonzero mean and a constant deterministic drift. The number of lags was determined by a general-to-specific method, whereby a generous lag structure was allowed and the insignificant lags were eliminated sequentially. The optimal lag structure and the results of the unit root tests are given in Table 3. The ADF test statistics indicate that all four variables (*OG*, *PIY*, *GIY*, and *ALG*) tested are nonstationary; however, once a onetime structural break is accounted for, these variables are I(0), that is, integrated of order zero. In addition, the growth rate of raw

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[8]The definitions and sources of these variables are given in the Appendix. Annual data for the period 1963-96 are used for the analysis.

Table 3. Unit Root Tests

Alternative hypothesis: no unit root

Regression: $\Delta w_t = \mu + \beta t + \alpha w_{t-1} + \sum_{i=1}^{k} \delta_i \Delta w_{t-i} + e_t$

Series [1]	Optimal Lag Length	t-statistic on α (ADF statistic)
OG	0	-3.24
PIY	0	-2.72
GIY	0	-1.44
ALG	1	-2.21
LG	0	-1.65

Note: The critical value at the 5 percent significance level is -3.51 for N = 50.[2]

Alternative hypothesis: Onetime structural break occurring at T_b

Alternative hypothesis: $w_t = \mu_1 + \beta_1 t + (\mu_2 - \mu_1)DU_t(\beta_2 - \beta_1)DT_t + e_t$

where $DU = DT = 0$ if $t \leq T_b$ and $DU = 1, DT = t$ if $t \geq T_b$

Regression: $\Delta \hat{w}_t = \alpha \hat{w}_{t-1} + \sum_{i=1}^{k} \delta_i \Delta \hat{w}_{t-i} + e_t$

Series[1]	T_b [3]	Phillips-Perron	λ[4]	Critical Values at the 5 Percent Level[5]
OG	1986	-5.78 **	0.7	-4.18
PIY	1981	-5.26 **	0.6	-4.24
GIY	1986	-4.47 **	0.7	-4.18
ALG	1986	-4.73 **	0.7	-4.18
LG	1975	-4.59 **	0.4	-4.22

Note: Two stars besides the F-statistic denote statistical significance at the 5 percent level.
[1]See Appendix for the definitions and sources of the variables. The sample period is 1963-96.
[2]Taken from Guilkey and Schmidt (1989).
[3]Break occurs in this year.
[4]Defined as the time of break relative to total sample.
[5]Taken from Perron (1989).

labor (LG) was tested for unit root. As indicated in Table 3, this variable is also nonstationary; however, once a onetime structural break is accounted for, it is I(0).

B. Testing for Causality: Output and Investment

With the order of integration established, it is useful to test the existence and direction of causality between *OG*, on the one hand and the investment variables (*PIY* and *GIY*) on the other. Owing to its popularity in this type of work, the Granger (1969) test is used for this purpose. It is implemented as follows:

$$OG_t = b_0 + \sum_{i=1}^{m} b_i(OG_{t-i}) + \sum_{i=1}^{n} c_i(PIY_{t-i}) + \epsilon_{1,t} , \tag{8a}$$

$$PIY_t = d_0 + \sum_{i=1}^{q} d_i(OG_{t-i}) + \sum_{i=1}^{r} f_i(PIY_{t-i}) + \epsilon_{2,t} , \tag{8b}$$

$$OG_t = g_0 + \sum_{i=1}^{s} g_i(OG_{t-i}) + \sum_{i=1}^{u} h_i(GIY_{t-i}) + \epsilon_{3,t} , \tag{8c}$$

$$GIY_t = l_0 + \sum_{i=1}^{v} l_i(OG_{t-i}) + \sum_{i=1}^{z} m_i(GIY_{t-i}) + \epsilon_{4,t} , \tag{8d}$$

where the ϵ's are the stochastic disturbance terms. If, for example, private investment Granger-causes economic growth, then the null hypothesis that the sum of the coefficients c_i (i = 1, ..., n) in equation (8a) is equal to zero is rejected. Also, if economic growth Granger-causes private investment, then the null hypothesis that the sum of the coefficients d_i = (1, ..., q) is equal to zero is rejected. The results of the Granger causality tests are presented in Table 4. It is noteworthy that causality between private investment and economic growth does exist and it runs from private investment to growth. Also, no causality exists between government investment and economic growth, in either direction.

C. Regression Results

Given that the variables used to estimate equation (6) are stationary, the ordinary least squares (OLS) procedure is used for estimation; the results, both with raw labor and effective labor units, are given in Table 5. The numbers in parentheses below the estimated coefficients are the absolute values of the t-statistics; ADJ-RSQ is the adjusted coefficient of determination; DW is the Durbin-Watson test statistic for serial correlation; and FK is the Fisher-Kappa test statistic for white noise for the series of residuals from the estimated

Table 4. Granger Causality Test: Output and Investment

Null hypothesis	Optimal lag Length	F-statistic	Implication
$\sum_{i=1}^{n} c_i = 0$	1	14.08 **	*PIY* Granger-causes *OG*
$\sum_{i=1}^{q} d_i = 0$	1	0.43	*OG* does not Granger-cause *PIY*
$\sum_{i=1}^{v} g_i = 0$	1	1.69	*GIY* does not Granger-cause *OG*
$\sum_{i=1}^{u} l_i = 0$	1	2.98	*OG* does not Granger-cause *GIY*

Notes: Two stars besides the F-statistic denote statistical significance at the 5 percent level. The sample period is 1963-96.

equation (6).[9] The number of lags was determined by a general-to-specific method, whereby a generous lag structure was allowed and the insignificant lags were eliminated sequentially; the optimal lag structure turned out to be zero for all explanatory variables. The DW test statistic indicates that there is no problem of serial correlation. Also, the FK test statistic indicates that the estimated series of residuals for each regression is white noise.

As indicated in the first regression results of Table 5, the coefficient estimate for raw labor growth (*LG*) although positive, is too high.[10] This unusually high coefficient estimate for the case of Cameroon could reflect the influence of a missing variable, namely human capital. Thus, equation (6) is reestimated with growth in raw labor augmented with human capital stock (*ALG*). The coefficient on *ALG* is more reasonable, although it is significant at the 0.10 level only for the one-tail test. The coefficient on private investment (α') falls

[9]A white noise series is independently and identically distributed with zero mean. Brocklebank and Dickey (1986, pp. 217-18) discuss the FK test; the critical value at the 0.05 level is 5.94.

[10] Evidence from developed economies shows that this coefficient falls in the range 0.70-0.75 (Maddison, 1987). As regards developing economies, De Gregorio (1992) obtains an average estimate for the coefficient on *LG* of 0.48 for Latin American countries, Tallman and Wang (1994) obtain 1.22 for Taiwan, and Leigh (1996) obtains 0.31 for Singapore.

Table 5. Growth Estimates: Raw Labor and Labor Augmented with Human Capital Stock 1/

Human Capital	Private Investment Ratio (*PIY*)	Government Investment Ratio (*GIY*)	Labor Growth (*LG* or *ALG*)	Constant	ADJ-RSQ 2/	DW 3/	FK 4/
None (raw labor, *LG*)	2.519 ***	0.809 ***	8.377 **	-0.371 ***	0.653	2.21	3.09
	(5.76)	(3.68)	(2.06)	(3.49)			
Included (effective labor, *ALG*)	1.392 ***	0.752 ***	0.386	-0.156 ***	0.628	1.75	3.33
	(3.84)	(3.33)	(1.42)	(7.06)			

1/ See Appendix for the definitions and sources of the variables. Three, two, and one star(s) besides the estimated coefficients denote(s) statistical significance at the .01, .05, and .10 levels, respectively. The numbers in parentheses below the estimated coefficients are the *t*-statistics. The sample period is 1963-96.

2/ ADJ-RSQ is the coefficient of determination.

3/ DW is the Durbin-Watson test statistic for serial correlation.

4/ FK is the Fisher-Kappa test statistic for white noise for the series of residuals from the estimated equation (6).

significantly from 2.5 to 1.4 and that on government investment (β') remains broadly unchanged. In the absence of a measure of human capital development in the aggregate production function, the coefficient on private investment is biased upward, owing to the complementarity between the private investment ratio and human capital in Cameroon; the correlation coefficient between private investment and effective labor growth is positive and very high (0.73). Thus, the impact on economic growth of an increase in the ratio of real private investment to real GDP (*PIY*) is positive and significant at the 1 percent level.[11] In addition, an increase in the ratio of real government investment to real GDP (*GIY*) has a positive effect on growth; this impact is also significant at the 1 percent level. The results suggest that the effect of *PIY* on economic growth is about twice that of *GIY*; an increase by 1 percentage point in *PIY* raises growth by 1.4 percentage points, in contrast to 0.8 percentage point for an increase in *GIY*. An F-test indicated that the coefficient on PIY is significantly different from that on GIY.

[11] Similar findings have been reported by Ghura and Hadjimichael (1996) for sub-Saharan African countries, and by Khan and Kumar (1993) and Khan and Reinhart (1990) for a diverse group of developing economies.

It would be useful to infer the values of α and β in equation (6). However, the values of θ_p and θ_g are unknown for Cameroon and estimates for other developing countries are unavailable. Nevertheless, an approximate value of the sum $(\alpha + \beta)$, which captures the impact on output expansion of growth of total capital stock, can be inferred from the estimate of $(\alpha' + \beta')$. It should be noted that $\alpha + \beta = \alpha'\theta_p + \beta'\theta_g$. As the coefficient on labor is 0.39 (from regression (2) in Table 5), if the underlying production function for exhibited constant or decreasing returns to scale, the total capital-output ratio ($\theta_p + \theta_g = \theta$) would have to be much less than 1, which is implausible. The work by Nehru and Dhareshwar (1993) provides some guidance on the average ratio of total capital stock to real GDP (θ) for Cameroon for the period 1960-90; they estimate it at about 1½.[12] If it is assumed that $\theta = 1½$ and $\theta_p = \theta_g = ¾$, the contribution of capital would be 1.6, which is larger than Romer's (1987) prediction of a value closer to 1. Thus, it would appear that $\theta < 1½$ for Cameroon. If it is assumed that $\theta = 1$ and $\theta_p = \theta_g = ½$, the contribution of private and government capital would be about 0.70 and 0.39, respectively, with a contribution of total capital stock of 1.08 and $\alpha + \beta + \gamma = 1.47$; under these assumptions, the null hypothesis of constant returns to scale is rejected at the 0.05 significance level. Thus, if it is assumed that $\theta_p = \theta_g = ½$, the aggregate production function given by equation (1) exhibits increasing returns to scale, a result that supports the assumption of nondecreasing returns to scale made by endogenous growth models (e.g., Lucas, 1988; Rebelo, 1991; and Romer, 1986).[13] An interpretation of these results is that at the aggregate level, there are positive externalities stemming from physical and human capital accumulation, as suggested by a number of endogenous growth models (e.g., Becker, Murphy, and Tamura, 1990; Romer, 1986, 1987, and 1994; Grossman and Helpman, 1991, and Lucas, 1988).

Because *PIY* may be endogenous, Table 6 presents the estimation results for equation (6) using an instrumental variables estimation procedure.[14] Overall these results are not very different from the results of the OLS regression incorporating human capital (Table 5), again confirming the important role played by private investment in output expansion.

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[12]This ratio is larger than the average value of 1.2 for Latin American countries during 1950-85 estimated by De Gregorio (1992). Mankiw, Romer, and Weil (1992, p. 431) have noted that "...low-saving countries have capital-output ratios near one and high-saving countries have capital-output ratios near three."

[13]The studies by Leigh (1996) and Tallman and Wang (1994), using data from Singapore and Taiwan, respectively also find evidence in support of nondecreasing returns to scale.

[14]The following instruments are used: *ALG*; *GIY*; lagged growth of the real exchange rate; the BEAC real discount rate; terms of trade growth; broad money; population; life expectancy at birth; terms of trade; nominal exchange rate (CFA francs per U.S. dollar); the share of oil sector value in total GDP; the U.S. wholesale price index; the French money market rate; the French consumer price index; the French nominal and real GDP; the French broad money; the French wholesale price index; and the French population.

Table 6. Growth Estimates: Instrumental Variables 1/

Private Investment Ratio (*PIY*)	Government Investment Ratio (*GIY*)	Effective Labor Growth (*ALG*)	Constant	ADJ-RSQ 2/	DW 3/	FK 4/
1.313 ***	0.747 ***	0.429	-0.153 ***	0.595	1.89	3.19
(3.31)	(3.17)	(1.47)	(6.50)			

1/ See Appendix for the definitions and sources of the variables. Three, two, and one star(s) besides the estimated coefficients denote(s) statistical significance at the .01, .05, and .10 levels, respectively. The numbers in parentheses below the estimated coefficients are the *t*-statistics. The sample period is 1963-96.

2/ ADJ-RSQ is the coefficient of determination.

3/ DW is the Durbin-Watson test statistic for serial correlation.

4/ FK is the Fisher-Kappa test statistic for white noise for the series of residuals from the estimated equation (6).

D. Robustness of Private Investment

In order to test for the robustness of the impact of private investment on growth in Cameroon, other relevant explanatory variables are added to equation (6). They are the percentage change in the real exchange rate (*RERG*), an indicator of external competitiveness; the ratio of the budget deficit to GDP (*BDY*), an indicator of fiscal policy; the real discount rate (*RDR*), an indicator of monetary policy; the percentage change in the terms of trade (*TTG*); and the share of the oil sector value added in total GDP (*OILSHR*).[15] Before proceeding with the estimation, it is important to establish the order of integration of these variables, using the above-mentioned methodology. The results (not provided here) indicate that *RERG*, *RDR*, and *TTG* are I(0). The remaining variables (*BDY* and *OILSHR*) are I(0) after accounting for a onetime structural break.

The results of the regressions that include these additional variables are provided in Table 7. For each additional policy-related variable (*RERG*, *BDY*, and *RDR*), the results of two regressions are presented; the second regression excludes the variable *PIY* in order to investigate the channel through which the policy-related variable influences economic growth. Kormendi and Meguire (1985) have argued that, if a policy variable influences economic

[15]For a discussion of the effects of these (or related) variables on economic growth, see the papers by Fischer (1991), and Ghura and Hadjimichael (1996). The definitions and sources of these variables are provided in the Appendix.

Table 7. Growth Estimates: Robustness of Private Investment 1/

Regression Number	Private Investment Ratio (*PIY*)	Government Investment Ratio (*GIY*)	Effective Labor Growth (*ALG*)	Added Variable	Constant	ADJ-RSQ 2/	DW 3/	FK 4/
			Added variable: *RERG*(t-1)					
(1)	1.238 ***	0.751 ***	0.469 *	-0.088 **	-0.149 ***	0.665	2.01	3.63
	(3.52)	(3.50)	(1.79)	(2.07)	(7.02)			
(1')		0.673 **	1.148 ***	-0.119 **	-0.100 ***	0.538	1.62	4.07
		(2.69)	(5.53)	(2.45)	(5.33)			
			Added variable: *BDY*					
(2)	0.962 *	0.717 ***	0.328	-0.354	-0.108 **	0.638	1.89	2.57
	(1.99)	(3.19)	(1.20)	(1.33)	(2.57)			
(2')		0.646 ***	0.559 **	-0.710 ***	-0.039	0.602	1.80	2.64
		(2.78)	(2.16)	(3.43)	(1.57)			
			Added variable: *RDR*					
(3)	1.397 ***	0.723 ***	0.299	-0.072	-0.149 ***	0.625	1.82	2.99
	(3.83)	(3.15)	(1.02)	(0.85)	(6.31)			
(3')		0.633 **	1.072 ***	-0.066	-0.094 ***	0.454	1.55	4.41
		(2.30)	(4.20)	(0.65)	(4.16)			
			Added variable: *TTG*					
(4)	1.397 ***	0.726 ***	0.385	-0.020	-0.156 ***	0.618	1.73	3.40
	(3.80)	(3.07)	(1.39)	(0.44)	(6.97)			
			Added variable: *OILSHR*					
(5)	1.300 ***	0.291	0.696 *	0.272	-0.175 ***	0.634	1.88	3.01
	(3.54)	(0.66)	(1.87)	(1.22)	(6.49)			

1/ See Appendix for the definitions and sources of the variables. Three, two, and one star(s) besides the estimated coefficients denote(s) statistical significance at the .01, .05, and .10 levels, respectively. The numbers in parentheses below the estimated coefficients are the t-statistics. The sample period is 1963-96.

2/ ADJ-RSQ is the coefficient of determination.

3/ DW is the Durbin-Watson test statistic for serial correlation.

4/ FK is the Fisher-Kappa test statistic for white noise for the series of residuals from the estimated equation (6).

growth mainly through its effect on the efficiency of resource use, the inclusion of the investment ratio in the growth equation would raise the significance of the coefficient of that variable but would not change substantially the value of its coefficient. However, if a policy variable works mainly through the volume of investment channel, the inclusion of the investment ratio would lower the significance and magnitude of the coefficient of the policy variable. The regression results indicate that the effects of increases in private investment on economic growth are robust;[16] the magnitude of the estimated coefficient for PIY remain broadly unchanged, except where the added variables are highly correlated with the variables in equation (6). In addition, in the regressions where PIY is excluded, the effect of growth of the effective labor force becomes significant at the conventional levels, and the magnitude of the impact increases. These outcomes suggest that the impact of human capital development is registered mainly through its positive effect on the volume of private investment. The results of each added variable can be summarized as follows.

First, from regression (1), improvements in external competitiveness--represented by declines in *RERG*[17]--are found to stimulate growth, confirming similar results obtained by Ghura and Hadjimichael (1996) for sub-Saharan Africa. This effect comes with a one-period lag and is registered mainly through the impact of improvements in competitiveness on the efficiency of resource use (regression (1')). Given Cameroon's membership in a currency union, with a fixed exchange rate arrangement, the burden of improving external competitiveness falls heavily on fiscal policy, since there is no scope for the conduct of independent monetary and exchange rate policy. In particular, large increases in government consumption would, by raising the price of nontraded goods, have a tendency to lower external competitiveness and thus need to be avoided. In addition, external competitiveness can be reinforced by structural reforms that lower economy-wide per unit cost of production.

Second, from regression (2), it is interesting to note that, although the correlation between private investment and the budget deficit ratio is high (correlation coefficient of -0.83), the positive and statistically significant impact of private investment on growth is maintained when *BDY* is included in the regression. However, owing to multicollinearity, the effect of the budget deficit ratio, although negative, is not statistically significant, and the statistical significance of *PIY* is weakened. Nevertheless, from regression (2'), this effect becomes significantly negative when private investment is excluded from the regression. Thus, the deleterious effects of expansionary fiscal policy--as represented by increases in *BDY* in

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[16]Levine and Renelt (1992) find a similar result between the ratio of total investment to GDP and economic growth, using cross-section data for a diverse group of countries.

[17]The real exchange rate (*RER*) is defined as the relative price of nontraded to traded goods; see the Appendix for the empirical measure used.

regressions (2) and (2')--on economic growth is not direct, but is registered indirectly through its adverse impact on private investment.[18]

Third, from regression (3), the effects of changes in monetary policy, captured by changes in the real discount rate (*RDR*), are not significant. Monetary policy, which is implemented at the regional level by the BEAC, aims at controlling domestic credit and protecting the central bank's net foreign assets position. By accepting the conduct of monetary policy by the regional central bank, each member country forgoes the option of financing fiscal deficits through unlimited monetary financing, thus bringing credibility to its commitment to maintain low inflation. The main tools used to achieve these objectives include adjustments in the discount rate (*taux d'escompte normal*) and changes in domestic credit.

Finally, from regressions (4) and (5), it can be seen that the effects of changes in the terms of trade (*TTG*) and changes in the share of the oil sector's value added in GDP (*OILSHR*) are not significant. The effect of GIY becomes insignificant in the regression that includes *OILSHR*, owing to the high degree of correlation between *GIY* and *OILSHR* (correlation coefficient of 0.76). As indicated in Table 1, the largest increase in government investment during 1963-96 coincided with the oil boom period.

V. Conclusions and Policy Implications

The determinants of economic growth have been widely investigated by a number of recent studies using cross-sectional data. This paper has contributed to the growth literature with an analysis of growth in an individual developing economy--Cameroon--using data for the period 1963-96. Evidence is found to support the endogenous-growth-type model for Cameroon: physical and human capital accumulation and economic policies appear to play important roles in influencing economic growth. The results and their policy implications can be summarized as follows.

First, the underlying production function for Cameroon exhibits increasing returns to scale; it appears that at the aggregate level, there are positive externalities stemming from physical and human capital development, thus supporting a key assumption of a number of endogenous growth models. An important aspect of these models is that changes in economic policies and physical and human capital stocks can affect economic growth in the steady state; in contrast, in the neoclassical growth model, growth in the steady state can occur only from exogenously given technological progress and population growth. Second, human capital development plays an important role in output expansion. This effect is registered mainly through the positive impact of increased human capital on the volume of private investment.

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[18]Other authors have found direct adverse effects of rising budget deficits on economic growth; they include Barro (1991) and Fischer (1991) for a diverse group of countries, and Ghura and Hadjimichael (1996) for sub-Saharan Africa.

Third, private investment plays a crucial role in output expansion. The empirical analysis established a significant causal linkage between private investment and economic growth: increases in the private investment ratio boost economic growth. This effect is large, statistically significant, and robust. An increase in the private investment ratio by one percentage point raises economic growth by about 1.4 percentage points. This impact is larger than that of an increase in government investment; an increase in the government investment ratio by one percentage point raises growth by about 0.8 percentage point. An implication is that government investment would be more efficient if it focused on capital projects chosen on the basis of strict economic criteria and with adequate rates of return. The impact of the expansion of private investment on growth is robust to the addition of other relevant explanatory variables and thus reinforces the crucial role played by this type of investment in output expansion. As increases in private investment stimulate growth, the government should formulate and implement policies that encourage private sector investment. The ratio of private investment to GDP during 1994-96 averaged about 13½ percent, which is lower than the average for other developing economies. In order to generate sustainable real GDP growth rates of at least 5 percent per year in the period ahead, the private investment ratio will have to be raised.

Fourth, there is evidence that economic growth is influenced by economic policies. Increases in the budget deficit are found to adversely impact economic growth. However, this effect is not direct, but is registered through the adverse influence of expansions in the budget deficit on the volume of private investment. Furthermore, improvements in external competitiveness positively influence economic growth; this effect is registered through the impact of competitiveness gains on the efficiency of resource use. Given that Cameroon is a member of a currency union with a fixed exchange rate arrangement, the burden of improving external competitiveness falls heavily on fiscal policy, as well as on structural reforms that contribute to lowering economy-wide per unit cost of production. Fiscal policy should aim at reducing unproductive government expenditure while safeguarding investment in infrastructure and human capital development.

Finally, while controlling the budget deficit would be beneficial to economic growth, doing so by cutting government investment would be counterproductive. Thus, alternative ways of lowering the budget deficit would be needed. In this regard, the ongoing efforts by Cameroon to raise tax receipts by broadening the tax base and improving tax administration represent an important step in the right direction. Improved revenue mobilization would also enable the government to raise its investment, which fell to about 2 percent of GDP during 1994-96, as well as to increase much-needed priority expenditure in health, education, agriculture, and infrastructure development and maintenance.

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Definitions and Sources of Variables[1]

The sources of the variables will be denoted as (A) various issues of the Article IV consultation document entitled Recent Economic Developments; (B) various issues of *Comptes Nationaux du Cameroun* and *Note Annuelle de Statistique* published by the Direction de la Statistique et de la Comptabilité Nationale, Ministry of Planning and Territorial Administration, Yaoundé, Cameroon; (C) various issues of the International Monetary Fund, *International Financial Statistics*; (D) International Monetary Fund, *International Financial Statistics* database; (E) International Monetary Fund, World Economic Outlook database; (F) World Bank, Social Indicators of Development database; and (G) various issues of World Bank, *World Tables*.

Variable	Definition and Source
OG	Output growth, measured by per capita real GDP growth rate. Sources for real GDP: for 1963-68, (A); for 1969-79, (C); for 1980-93, (B); for 1994-96, (A). Source for population: (A).
TIY	Real total investment (*RTI*) as a ratio to lagged real GDP. Sources for both *RTI* and real GDP: for 1963-64, (A); for 1965-93, (B); and for 1994-96, (A).
GIY	Real government investment (*RGI*) as a ratio to lagged real GDP. Sources for *RGI*: for 1963-84, (A); and for 1985-96, (A).
PIY	Real private investment (*RPI*) as a ratio to lagged real GDP, measured as *TIY-GIY*.
LG	Growth of labor force. Source for labor force: (F).
ALG	Growth of labor force, augmented with total level human capital stock (*HCS*). *HCS* is proxied by the mean school-years of education per working person multiplied by the labor force. Source for labor force: (F). The series on human capital was obtained from Nehru, Swanson, and Dubey (1993); as this series ends in 1990, it was extrapolated for 1991-96 on the basis of data on the school enrollment ratio.
BDY	Government budget deficit (*BD*) as a ratio to GDP. Source for GDP: same as for *RTI* (see *TIY* above). Source for *BD*: (A).
RERG	Percentage change in the real exchange rate (*RER*). *RER* is defined as the price index of nontraded goods relative that of traded goods (P_N/P_T). In the absence of data for the domestic price of tradables (P_T), an index of the world market price for traded goods (P_T^W) is used. Following Edwards (1988) on the measurement of *RER* in less-developed economies, the proxies used for P_N and P_T^W, respectively, are Cameroon's consumer price index (*CPI*) and the U.S. wholesale price index (WPI^{US}). Hence, $RER = CPI/(EI.WPI^{US})$, where *EI* is an index of the nominal exchange rate (CFAF per U.S. dollar). All indices have 1980=100. Sources: for *CPI*, *E*, and WPI^{US}: monthly series from (D) were converted into fiscal year (July-June) series. Owing to lack of data, the French monthly consumer price inflation rates were used to construct the monthly *CPI* for Cameroon for 1963-68.
RDR	*DR-INF*, where *DR* is BEAC's end-June discount rate minus the *CPI* inflation rate for the 12-month period ending June. Source for *DR*: (D). Source for *CPI*: see above.
TTG	Percentage change in the terms of trade. Sources: for 1963-93, (G); and for 1994-96, (E).
OILSHR	The ratio of the oil sector value added (*OILVA*) to total GDP. Sources for *OILVA*: (A).

[1]All data series are measured on a fiscal year (July-June) basis.