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Tax Revenue in Sub-Saharan Africa: Effects of Economic Policies and Corruption

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Abstract

An analysis of data for 39 sub-Saharan African countries during 1985–96 indicates that the variations in tax revenue-GDP ratios within this group are influenced by economic policies and the level of corruption. Namely, these ratios rise with declining inflation, implementation of structural reforms, rising human capital (a proxy for the provision of public services by the government), and declining corruption. The paper confirms that the tax revenue ratio rises with income, and that elements of a country's tax base (such as the share of agriculture in GDP and the degree of openness) influence tax revenue.

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SUMMARY

This paper contributes to the empirical literature on the determinants of tax revenue by focusing on the impact of economic policies and corruption, using data for 39 sub-Saharan African countries during 1985–96. The effect of corruption, which is typically defined as the abuse of public power for private benefit, is captured by an index that measures the extent to which bribes are generally expected by government officials in relation to, inter alia, tax assessments, trade licenses, and exchange controls.

The results indicate that, in addition to variables related to income and the tax base, a number of other factors typically not considered in the empirical literature are important in influencing the tax ratio. In particular, the economic policy environment and the level of corruption matter for the tax revenue-GDP ratio; the latter declines as inflation—a proxy for expansionary monetary and fiscal policies—and corruption rise. Also, there is evidence that other economic-policy-related variables have an impact on tax revenue. For instance, countries that have made progress in implementing structural reforms have achieved a higher average tax revenue-GDP ratio than others. Furthermore, an increase in the level of human capital—a proxy for the extent of public services provided by the government—is associated with an increase in tax revenue. The human capital index is used in the analysis so as to capture the visible impact of government expenditure on actual priority outlays.

An analysis of beta coefficients indicates that, among the economic-policy-related variables, inflation exerts the largest impact on the tax revenue-GDP ratio, followed by the implementation of structural reforms. Thus, for a given tax regime and rate, economic policies that emphasize a prudent financial stance and structural reforms can be expected to raise tax revenue. Also, measures taken to reduce corruption would be expected to enhance tax revenue significantly.

I. Introduction

Large fiscal deficits have been a daunting problem for a number of countries in sub-Saharan Africa over the past several years. Rapid expansions in expenditure and declining or low revenue levels have been the main cause of fiscal imbalances.[2] Recent endogenous growth models have demonstrated that growth can be enhanced by, inter alia, reducing fiscal imbalances, which, in turn, can be achieved by either lowering expenditure or raising revenue.[3] However, many countries in the region have reduced expenditure to minimum sustainable levels, especially in health, education, and infrastructure. Thus, raising tax revenue to achieve fiscal sustainability would be a feasible alternative. Also, in order to improve the environment for private sector development and sustained economic growth, governments need to play a supportive role by investing in physical and human capital, and institutional infrastructure. Tax revenue is needed for such expenditure if inflationary financing and the crowding out of the private sector are to be avoided (Hamada, 1994).

The mobilization of tax revenue is an important policy objective. While governments can do little in the short run to change the structural determinants of the tax revenue (such as the composition of value added), they can alter other factors that influence tax revenue, such as economic policies, the level of corruption, and the quality of tax administration. As documented by Nashashibi and Bazzoni (1994), the wide divergences between the effective and statutory tax rates in many countries in the region indicate that there is scope for raising tax revenue without increasing tax rates by reinforcing tax and customs administrations, reducing tax exemptions, and fighting fraud and corruption. Nevertheless, Heller (1997, p. 41) cautions that "one must be realistic in terms of improvement in revenue ratios that can be reasonably expected to be achieved in many African countries, given the low level of development and the heavily agricultural and informal character of their economies." In addition, Tanzi (1998) cautions that the fight against corruption takes time, needs to be undertaken on several fronts, and can be costly. Furthermore, tax mobilization and reform can be achieved only when there is strong political will and leadership to adopt the necessary measures (Hamada, 1994).

A number of empirical studies have investigated the determinants of tax revenue in developing countries.[4] However, few of them have focused on the effects of economic policies and corruption on tax revenue, even though these variables have been shown to influence

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[2]Nashashibi and Bazzoni (1994) provide an analysis of the trends in revenue and expenditure, as well as economic performance, in the region during 1980–91.

[3]See Tanzi and Zee (1997) for a literature survey of the effects of fiscal policies on growth.

[4]See, for example, Heller (1975), Tanzi (1981, 1987, and 1992), Farhadian-Lorie and Katz (1989), Leuthold (1991), Nashashibi and Bazzoni (1994), and Stotsky and WoldeMariam (1997). Stotsky and WoldeMariam (1997) provide a survey of previous empirical work.

other aspects of economic performance.[5] Tanzi (1989) argues that the wide fluctuations in tax ratios observed in several countries over short time periods cannot be satisfactorily explained by variations in the traditional determinant of tax revenue-the tax base; rather, changes in the macroeconomic policy environment have played an important role. Also, Chand and Moene (1997) argue that fiscal corruption has been a key factor behind the poor revenue performance in a number of developing countries.

This paper contributes to the empirical literature by focusing on the impact of economic policies and corruption on tax revenue, using data for 39 sub-Saharan African countries during 1985–96. Among the economic policy-related variables considered in this study are the rate of inflation, the percentage change in the real effective exchange rate, the implementation of structural reforms, and the provision of public services by the government. The effect of corruption, which is typically defined as the abuse of public power for private benefit, is captured by an index that measures the extent to which bribes are generally expected by government officials in relation to, inter alia, tax assessments, trade licenses, and exchange controls.

There were wide variations in the tax performance of sub-Saharan African countries during 1985–96. For example, while the average total tax revenue-GDP ratio for these countries was about 17 percent during this period, 9 countries had ratios below 10 percent and 10 countries had ratios above 20 percent (Table 1). The majority of countries had average tax revenue-GDP ratios below 15 percent during 1985–96. On average, the total tax revenue-GDP ratio declined over time from 18.4 percent in 1985 to 16.3 percent in 1996. The largest decline was experienced by the oil producers—Cameroon, Congo, Gabon, and Nigeria—whose average tax ratio fell from 25½ percent in 1985 to 18½ percent in 1996, largely reflecting the decline in oil price.[6] For the non-oil producers, the ratio declined from 17.3 percent to 16 percent.

While controlling for the elements of the tax base, this paper investigates whether economic policies and corruption can account for part of the variation observed in tax revenue performance in sub-Saharan African countries. The results indicate that, in addition to variables related to income and the structure of the tax base, a number of other factors influence tax revenue, including macroeconomic and structural policies, the provision

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[5]Bardhan (1997) provides a literature review on corruption and development. Mauro (1996) finds evidence of adverse effects of corruption on economic growth. Ghura and Hadjimichael (1996) find evidence to support the positive effects of macroeconomic stability on economic growth in sub–Saharan Africa.

[6]For the oil producers in the sample, tax revenue includes oil revenue from all sources—that is, from oil production sharing between private oil companies and the government, and oil company profits or income taxes.

Table 1. Sub-Saharan Africa: Tax Revenue in Selected Countries, 1985-96 1/
(In percent of GDP)

	Average		
	1985-90	1991-96	1985-96
Benin 2/	9.6	10.9	10.2
Botswana	40.9	34.1	37.5
Burkina Faso 2/	9.4	10.1	9.7
Burundi	13.6	14.6	14.2
Cameroon 2/ 3/	16.2	12.5	14.3
Central African Republic 2/	9.7	7.6	8.6
Chad 2/	7.1	7.5	7.3
Comoros 2/	10.9	11.8	11.4
Congo, Republic of 2/	25.2	24.2	24.7
Cote d'Ivoire 2/	18.7	16.9	17.5
Equatorial Guinea 2/	14.7	11.7	13.2
Ethiopia	12.2	8.5	10.4
Gabon 2/ 3/	24.9	23.7	24.3
Gambia, The	19.1	19.4	19.2
Ghana	11.6	14.2	12.9
Guinea	13.7	10.9	11.6
Guinea-Bissau	6.5	6.0	6.2
Kenya	19.9	22.7	21.3
Lesotho	34.4	40.0	37.2
Madagascar	9.8	8.0	8.9
Malawi	18.6	17.0	17.8
Mali 2/	9.6	11.2	10.4
Mauritius	20.4	19.0	19.7
Mozambique	16.2	17.4	16.8
Namibia	25.6	33.3	29.4
Niger 2/	8.5	6.5	7.5
Nigeria 3/	13.7	12.5	13.1
Rwanda	9.9	7.6	8.8
Sao Tome and Principe	11.8	10.9	11.3
Senegal 2/	14.3	13.7	14.0
Seychelles	34.7	32.4	33.5
Sierra Leone	5.4	9.7	8.6
South Africa	24.4	25.0	24.7
Swaziland	26.3	30.3	28.3
Tanzania	14.3	12.0	13.2
Togo 2/	20.1	12.6	16.3
Uganda	5.8	7.8	6.8
Zambia	18.1	16.2	17.0
Zimbabwe	32.4	30.9	31.6
Unweighted averages			
Sub-Saharan Africa	17.3	16.4	16.9
Oil-producing countries	20.0	18.2	19.1
Non-oil-producing countries	16.9	16.2	16.6
CFA franc countries	14.1	12.9	13.5
Oil-producing countries	22.1	20.1	21.1
Non-oil-producing countries	11.8	10.9	11.3
Non-CFA franc countries	19.1	18.4	18.8
Oil-producing countries 4/	13.7	12.5	13.1
Non-oil-producing countries	19.4	18.7	19.0

1/ See the Appendix for the sources and definitions of the variables.
2/ CFA franc country.
3/ Oil-producing country.
4/ Nigeria.

of public services by the government, and the level of corruption. The rest of the paper is organized as follows. The next section presents the theoretical model and discusses the hypotheses. Section III presents the empirical results, and the last section draws conclusions and suggests possible policy implications.

II. Theoretical Considerations

In order to account for the effects of economic policies and corruption, along with the impact of the elements of the tax base, this paper extends the tax model developed by Heller (1975). The public decision maker's utility function is given by

$$U = U(Y\text{-}T, G, D; F\text{+}L), \tag{1}$$

$$U_{Y\text{-}T} \text{ and } U_G > 0,$$
$$U_D \text{ and } U_{F+L} < 0 \text{ if } D \text{ and } F\text{+}L > 0, \text{ and}$$
$$U_D \text{ and } U_{F+L} > 0 \text{ if } D \text{ and } F\text{+}L < 0,$$

where $Y\text{-}T$ (equal to GDP, Y, minus tax revenue, T) is the private sector's disposable income; D is net domestic government borrowing,[7] G is total government expenditure, and $F\text{+}L$ is net foreign financing, consisting of grants (F) and loans (L), including external arrears accumulation or decumulation (net of amortization). The variables D and ($F\text{+}L$) can be either positive or negative, and thus the first derivatives of U with respect to D and ($F\text{+}L$) are either negative (D and $F\text{+}L > 0$) or positive (D and $F\text{+}L < 0$). All variables in the model are in real per capita term. The budget constraint faced by the decision maker is given by

$$T + F + L + D = G. \tag{2}$$

Expanding on Leuthold's (1991) applied tax model, it is assumed that the actual tax revenue-GDP ratio (T/Y) is a function of the desired tax revenue-GDP ratio $(T/Y)^*$ and the availability of certain tax bases (B), as well as the status of economic policies (E) and the level of corruption (C). That is,

$$T/Y = f\{(T/Y)^*, B, E, C\} \tag{3}$$

Desired tax revenue is determined by maximizing (1) subject to (2). Following Heller (1975), it is assumed that the utility function takes a quadratic form as follows:

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[7] The variable D includes net bank and nonbank financing, net domestic arrears, and, for simplicity, nontax revenue.

$$U = a_1(Y-T-Y_s) - \frac{a_2}{2}(Y-T-Y_s)^2 + a_3(G-G_s) - \frac{a_4}{2}(G-G_s)^2$$

$$- a_5 D - \frac{a_6}{2}D^2 - a_7(F+L) - a_8(F+L)^2 \qquad (4)$$

where the a's are positive constants, and Y_s and G_s are subsistence levels of income and government expenditure, respectively. Empirically, a quadratic utility function is preferable to a log-linear one because the terms D and $F+L$ can be either positive or negative. Since Y_s and G_s are not observable, following Leuthold (1991), it is assumed that they are simple linear functions of income, as follows:

$$G_s = g_0 + g_1 Y, \qquad (5a)$$

and

$$Y_s = y_0 + y_1 Y. \qquad (5b)$$

Maximizing (1) with respect to T, G, and D, subject to constraint (2), yields the following reduced form for the desired equation for the tax revenue-GDP ratio:

$$\left(\frac{T}{Y}\right)^* = \left(\frac{\alpha + a_4 g_0 - \beta y_0}{\beta + a_4}\right)\left(\frac{1}{Y}\right) - \left(\frac{a_4}{\beta + a_4}\right)\left(\frac{F+L}{Y}\right) + \left(\frac{a_4 g_1 - \beta y_1}{\beta + a_4}\right), \qquad (6)$$

where $\alpha = (-a_1 + a_3 - a_1 a_4/a_6 + a_4 a_5/a_6)$ and $\beta = a_2(a_4 + a_6)/a_6$. Combining (3) and (6) yields

$$T/Y = f(1/Y, (F+L)/Y, B, E, C). \qquad (7)$$

Since β is positive and α could be either positive or negative, $(T/Y)^*$ is a negative function of $(F+L)/Y$ and an ambiguous function of the inverse of per capita income $(1/Y)$.

The literature on the determinants of tax revenue provides a set of testable hypotheses. This paper focuses on those hypotheses—on income, the tax base, economic policies, corruption, and the external environment—that can be tested using available data for sub-Saharan African countries. The rest of this section briefly discusses the hypotheses relating to the actual variables used; detailed discussions are provided by Tanzi (1989), Farhadian-Lorie and Katz (1989), and Nashashibi and Bazzoni (1994). The Appendix gives the definitions and sources of the variables used in this study.

The theoretical model predicts an ambiguous effect of increases in per capita **income** on tax revenue. This effect stems from the differential impact of an increase in income on different categories of tax revenues. While a higher level of economic development would be

expected to raise the ratio of indirect tax revenue to GDP, it would be expected to lower the trade tax revenue-GDP ratio; thus, the effect on aggregate tax revenue is ambiguous. Farhadian-Lorie and Katz (1989) have noted that trade taxes have historically been a major source of government revenue during the early stages of economic development because they are easier to collect than domestic income or consumption taxes, owing to the rudimentary status of tax administration, as well as the limited availability of "tax handles." During the later stages of development, however, collection costs are expected to fall, dependence on trade taxes to decline, and dependence on indirect taxes to rise.

Elements of a country's **tax base**—better known as tax handles—considered in this study are the share of agriculture in GDP (*AGS*); the share of oil and non-oil mining activities in GDP (*OIL* and *MINE*); and the ratio of the sum of exports and imports to GDP (*OPEN*).[8] The sectoral composition of value added constitutes a key element of the tax base. In many sub-Saharan African economies, a large share of GDP results from agricultural activities (see, for example, Aguirre, Griffith, and Yücelik (1981)). However, the agricultural sector is difficult to tax owing to the prevalence of subsistence activities, which are largely informal. The administrative costs for the tax department of organizing and monitoring subsistence activities can be prohibitively high in relation to potential revenue yield. In general, therefore, a negative relationship would be expected between the tax revenue-GDP ratio and the share of agriculture in GDP. Mining activities, on the other hand, are organized, and thus easy to monitor and tax.[9] A positive correlation would be expected between the variable *OPEN* and the tax revenue-GDP ratio: as the international trade sector is a well-organized and monetized sector, administrative costs of the tax system related to this sector should be lower than others.

Tanzi (1989) argues that one has to look beyond the traditional determinants of tax revenue—elements of the tax base—to obtain a satisfactory explanation of the wide fluctuations in tax ratios observed in several countries over short time periods; macroeconomic policy has plays an important role. The effect of **macroeconomic policy** is captured by the inflation rate (*INF*) and the percentage change in the real effective exchange

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[8]The concept of tax handles is explained by Musgrave (1987, p. 244). Leuthold (1991, p. 175) summarizes tax handles as "tax bases that lend themselves to taxation."

[9]Data on mining shares are incomplete for the set of countries included in this study. To circumvent this problem, two dummy variables are used to represent oil-producing countries (*OIL*), and non-oil producers whose average share of mining value added in GDP during 1985–95 was greater than or equal to 5 percent of GDP (*MINE*). The oil producers are Cameroon, Congo, Gabon, and Nigeria. The other mining countries are Botswana, Equatorial Guinea, Guinea, Namibia, Niger, Sierra Leone, Togo, Zambia, and Zimbabwe.

rate (*RERG*).[10] The effect of inflation on tax revenue can be registered through three main channels. First, according to the Tanzi-Olivera effect, in an inflationary environment, when actual tax payments lag the transactions to be taxed, tax obligations are lower in real terms at the time of tax payments (Tanzi, 1977). Second, excise duties on a number of products (e.g., tobacco, alcohol, and gasoline) may be levied at specific rates that may not necessarily be adjusted in line with inflation (Tanzi, 1989). Finally, high inflation rates reduce the tax base because in order to protect the real value of their wealth, economic agents make portfolio adjustments in favor of assets that typically escape the domestic tax net (such as land, livestock, jewels, and foreign capital). An appreciation of the real effective exchange rate is expected to raise imports and lower exports. The overall effect of a real effective exchange rate appreciation on tax revenue could be positive, given the greater dependence of tax receipts on import rather than export taxes. Nevertheless, an overvaluation of the real effective exchange rate—typically brought about by expansionary financial policies—would be expected to adversely affect overall economic activity, and thus to lower tax revenue.

Tax revenue can also be influenced by the implementation of **structural reforms** (*STRUC*). Such reforms, by improving economic efficiency and resource allocation, enhancing external competitiveness, expanding the productive capacity of the economy, and broadening the tax base, can raise tax revenue.[11] In recent years, a number of sub-Saharan African countries have made progress in the implementation of structural reforms. These have included (1) public enterprise restructuring and privatization; (2) retail and producer price decontrol; (3) exchange and trade liberalization; (4) financial sector reform; (5) tax reform; (6) civil service reform; and (7) legal reform. A number of countries that have made progress in structural reforms have benefited from technical assistance aimed at increasing voluntary compliance and self-assessment, expanding the use of final withholding, improving collection procedures, developing audit plans and procedures, and reorganizing tax administration along functional lines (Abed and others, 1998).

Finally, in the area of economic policies, it is hypothesized that, when taxpayers see the benefit of their tax payments in terms of **government's provision of public services**, proxied by improvements in an index of human capital development (*HCI*), their willingness to

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[10]In the empirical literature, the impact of macroeconomic policies on tax revenue has received little attention; the papers by Farhadian-Lorie and Katz (1989) and Nashashibi and Bazzoni (1994) are among the few exceptions.

[11]See Khan (1987) for a general analysis of structural reforms. The effects of these reforms are captured by the use of a dummy variable for countries classified as sustained adjusters, which are considered to have made relatively good progress in implementing structural reforms (see the Appendix).

pay taxes would be expected to increase.[12] In a number of developing economies, owing especially to weaknesses in the expenditure management process and the existence of corruption, part of the budgeted outlays do not reach their intended final destinations. Indeed, for the set of countries used in this study, there is a large positive correlation between declining corruption and rising human capital (a correlation coefficient of 0.48; see Appendix Table 3).[13] The index of human capital is intended to measure the visible impact of government expenditure on actual priority outlays.

It is hypothesized that **corruption** (*CORRUPT*) lowers the tax revenue-GDP ratio. Klitgaard (1998) notes that acts of corruption include (but are not limited to) bribery, extortion, influence peddling, nepotism, fraud, and embezzlement. Tanzi (1998) provides a set of factors that encourage fiscal corruption, including complicated tax laws, excessive discretionary power vested in tax administrators, the necessity for frequent contacts between taxpayers and tax officials, weak legal and judicial systems, lack of accountability and transparency in the tax administration, and low salaries in the public sector. Corrupt tax and custom officials allocate a proportion of their working hours to (1) collecting bribes in exchange for alleviating tax burdens of taxpayers offering these bribes; and (2) complicating procedures for taxpayers who refuse to participate in the bribery scheme, thus forcing them out of business or into the informal sector. These activities lower tax revenue for the public treasury.[14] Pervasive corruption in an economy is expected to lower investment and economic growth, and thus weaken the tax base.[15] The index of corruption used in this study is taken from the *International Country Risk Guide*, published by Political Risk Services Inc. in Syracuse, New York. This index, which takes integer values ranging from 0 (high corruption) to 6 (low corruption), measures the extent to which bribes are generally expected by government officials in relation to, inter alia, tax assessments, trade licenses, and exchange controls.[16]

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[12]Four social indicators are used to construct this variable—secondary school enrollment ratio, literacy rate, life expectancy at birth, and the infant survival rate. See the Appendix for a description of the procedure used for the aggregation.

[13]Tanzi (1998) discusses how spending decisions are affected by corruption.

[14]See Chand and Moene (1997) for an analysis of this phenomenon.

[15]Empirical evidence provided by Mauro (1996) suggests that large economic payoffs can be achieved by reducing corruption.

[16]Data on the level of corruption are available for only 27 of the 39 countries included in the study. See the next section for the methodology used to estimate the data for the countries for which data are missing.

With respect to the **external environment**, the theoretical model predicts a negative effect of increases in external financing on the domestic tax revenue-GDP ratio. Two variables are used to capture this effect—the ratio of external grants to GDP (*GRANTY*) and the change in the debt stock-GDP ratio (*CHDETY*).[17] The effects of changes in the terms of trade on the tax revenue-GDP ratio are ambiguous. If a large proportion of a country's imports is price inelastic, a deterioration in the terms of trade owing to an increase in import prices could improve the tax base. However, if the deterioration in the terms of trade is due to a decline in export prices and the country depends on revenue from export taxes, the tax base would be expected to shrink. In addition, the decline in income associated with a decline in the terms of trade would be expected to lower the tax base.

III. Empirical Framework and Results

A. Empirical Framework

An empirical counterpart of equation (7) for the *i*th sub-Saharan African country at time *t* is written as follows:

$$\begin{aligned} TRY_{it} = {} & a_0 + t_1 \log_e(1/PCI_{it}) + t_2 AGS_{it} + t_3 OPEN_{it} + t_4 OIL_i + t_5 MINE_i \\ & + n_1 INF_{it} + n_2 RERG_{it} + n_3 STRUC_i + n_4 HCI_{is} + n_5 CORRUPT_{it} \\ & + n_6 GRANTY_{it} + n_7 CHDETY_{it} + n_8 TTG_{it} + u_i + v_t + e_{it}, \end{aligned} \tag{8}$$

where *TRY* is the tax revenue-GDP ratio; *PCI* is per capita income;[18] *AGS* is the share of agriculture in GDP; *OPEN* is the ratio to GDP of the sum of exports and imports; *INF* is the rate of inflation; *OIL* is a dummy variable that takes a value of 1 if the *i*th country is an oil producer; *MINE* is a dummy variable that takes a value of 1 if the *i*th country is not an oil producer but whose mining share is at least 5 percent of GDP; *RERG* is the percentage change in the real effective exchange rate; *STRUC* is a dummy variable capturing the implementation of structural reforms by the *i*th country; *HCI* is an index of human capital; *CORRUPT* is an index of corruption that varies from 0 (high corruption) to 6 (low corruption); *GRANTY* is the external grants-GDP ratio; *CHDETY* is the change in the stock of external debt-GDP ratio; and *TTG* is the percentage change in the terms of trade. The subscript *s* for *HCI* denotes that this variable is time-invariant over two subperiods (1985–90 and 1991–96). The coefficients t_1–t_5 broadly capture the effects of variables related to income and the tax base that are typically used in the literature. The coefficients n_1–n_8 are intended to capture the effects of variables related to economic policies and corruption, typically ignored

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[17]A large stock of external public debt can lower the tax base (Tanzi, 1989).

[18]The best equation fit was obtained when the natural logarithm of (1/*PCI*) was used in the estimation of equation (8).

in the empirical literature. The Appendix provides the definitions and sources of the variables; Appendix Table 3 provides the matrix of correlation coefficients for these variables; and Appendix Table 4 provides the period averages of the data.

A regression framework is used to estimate the tax equation, with an unbalanced panel data set for 39 countries covering the period 1985–96.[19] As the data are in panel form, the error term for equation (8) accordingly has three components: u_i and v_t, which capture country- and time-specific effects, respectively, and e_{it}, which is an error term common to all observations. To deal with time effects, the data are processed to remove the time means from the series, and the resulting model is estimated without an intercept. Country heterogeneity is captured by the inclusion of country-specific information in the indicators for the level of human capital development, the stance of economic policies, changes in the terms of trade, the levels of external indebtedness and grants, and the level of corruption. In addition, dummy variables for subgroups of countries (*CFA*, *STRUC*, *OIL*, *MINE*) are used to account for the possibility of fixed effects stemming from a priori information regarding country characteristics and institutional arrangements.

In order to correct for possible simultaneity bias stemming from the variables *PCI*, *OPEN*, *INF*, *STRUC*, and *CORRUPT*, an instrumental variables technique is used.[20] Since the variable *STRUC* is binary (0,1), a logistic model of the following type is used obtain its predicted values: $\log_e(p/(1-p)) = a + bX$, where $p = \Pr(Y = 1 \mid X)$ is the response probability to be modeled, Y is the binary (0,1) response, X is the vector of instruments, and b is the vector of coefficients. To deal with the problem of heteroscedasticity, a feasible instrumental variables generalized least squares (IV-GLS) procedure is used.[21]

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[19]With a one–period lag used for instruments, one observation is lost per country. Thirty-one countries have data for the full period (1986-96); out of the eight remaining countries, four have data for the period 1987–96, two have data for 1988–96, and two have data for 1989–96. A total of 415 observations are available for the regression estimation.

[20]The instruments used are the contemporaneous, squared, and lagged values of population, population growth, urbanization rate, growth in the terms of trade, agriculture share, the external grants-GDP ratio, the change in external debt-GDP ratio, the external debt-GDP ratio, and growth in the real effective exchange rate. In addition, an index of human capital (*HCI*), *HCI* squared, the lagged broad money-GDP ratio, *CFA*, *OIL*, and *MINE* are used.

[21]This procedure is implemented in two steps. First, an instrumental variables technique is used to estimate the regression equation with pooled data. Second, the residuals from this step are used to calculate the standard deviation for each country; the inverse of the country-specific standard deviations are then used to weigh all the included variables (including predicted ones), and the equation is reestimated with the pooled transformed data.

As noted above, the data on the level of corruption are available for only 27 of the 39 countries. To avoid losing of observations in the regression analysis, the instrumental variables mentioned above are used to estimate the missing data for this variable. As shown in Table 4, this set of instruments reproduces the available data fairly accurately, thereby providing a reasonable degree of confidence in the data that are generated for the countries with no available data. The correlation coefficient between the generated corruption (*CORRUPTP*) and actual corruption (*CORRUPT*) variables is 0.74 (Appendix Table 3).

B. Econometric Results

The regression results are given in Table 2. Following the traditional empirical literature, regression (1) includes only variables related to income and the tax base; this is taken to be the base regression. Regressions (2)–(4) also use variables related to macroeconomic and structural policies, the extent of public services provided by the government, corruption, and the external environment. The last column of Table 2 provides an indication of the relative importance of the explanatory variables in explaining the tax revenue-GDP ratio, as captured by the beta coefficients using the results of regression (4). The following observations can be made based on the results.

- The results of the base regression are broadly consistent with those available in the empirical literature. They indicate that the tax revenue-GDP ratio grows with an increase in income, a decline in the share of agriculture in GDP, greater openness of the economy, and the existence of oil and non-oil mining sectors.[22] As indicated by the beta coefficients, among the variables capturing the effects of income and the tax base, the degree of openness (*OPEN*) exerts the largest impact on the tax ratio, followed by the income variable (1/*PCI*), the existence of an oil sector (*OIL*), the agricultural share (*AGS*), and the existence of a non-oil mining sector (*MINE*).

- When the base regression is augmented to include other variables, the main results relating to income and the elements of the tax base do not change by much. Nevertheless, owing to the high degrees of correlations between human capital (*HCI*), on the one hand, and the inverse of per capita income (*PCI*) and the agriculture share (*AGS*), on the other—correlation coefficients of -0.72 and -0.66, respectively (see Appendix Table 3)—the magnitude and statistical significance of the impact of $\log_e(1/PCI)$ and *AGS* on the tax ratio fall.

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[22]See, for example, Tanzi (1981, 1987, and 1992); Leuthold (1991); and Stotsky and WoldeMariam (1997). See also Farhadian-Lorie and Katz (1989) for an analysis with respect to trade taxes.

Table 2. Estimates of the Tax Equation and Beta Coefficients 1/

Explanatory variables 2/	Regression Number (1)	(2)	(3)	(4)	Beta Coefficients 3/
Income					
$\log_e(1/PCI)$	-3.223 ***	-1.248 **	-2.407 ***	-1.696 ***	-0.190
	(8.83)	(2.51)	(6.72)	(3.38)	
Tax base					
Share of agriculture in GDP ratio (*AGS*)	-0.078 ***	-0.105 ***	-0.045 **	-0.065 ***	-0.121
	(4.41)	(5.59)	(2.22)	(2.89)	
Openness (*OPEN*)	0.127 ***	0.106 ***	0.122 ***	0.118 ***	0.412
	(17.51)	(12.59)	(13.10)	(12.57)	
Dummy variable for oil-producing countries (*OIL*)	2.384 ***	3.031 ***	4.456 ***	4.044 ***	0.144
	(3.96)	(4.76)	(6.79)	(5.91)	
Dummy variable for non-oil mining countries (*MINE*)	1.643 ***	2.184 ***	1.501 ***	1.722 ***	0.088
	(5.38)	(5.31)	(3.58)	(4.01)	
Economic policies					
Inflation (*INF*)		-0.096 ***	-0.082 ***	-0.084 ***	-0.284
		(7.24)	(5.69)	(5.87)	
Percentage change in real effective exchange rate (*RERG*)		0.010	0.015	0.015	0.025
		(0.92)	(1.42)	(1.35)	
Structural reforms (*STRUC*)		1.292 ***	1.443 ***	1.132 ***	0.066
		(3.36)	(3.84)	(2.83)	
Provision of public services, proxied by human capital index (*HCI*)		0.149 ***		0.080 **	0.005
		(4.44)		(2.08)	
Corruption *(CORRUPTP)*			1.686 ***	1.242 ***	0.143
			(5.24)	(3.28)	
External environment					
External grants-GDP ratio (*GRANTY*)		-0.092 **	-0.080 **	-0.030 **	-0.002
		(2.51)	(2.44)	(2.54)	
Change in external debt-GDP ratio (*CHDETY*)		0.020	0.021	0.019	0.027
		(1.07)	(1.09)	(0.99)	
Percentage change in terms of trade (*TTG*)		0.001	0.007	0.005	0.009
		(0.14)	(0.76)	(0.58)	
Dummy variable for CFA franc countries *CFA*	-3.706 ***	-5.149 ***	-4.815 ***	-4.659 ***	-0.263
	(16.13)	(10.69)	(9.16)	(8.78)	
MSE 4/	0.947	0.947	0.975	0.964	
F-value 5/	486.84 ***	212.79 ***	228.96 ***	216.33 ***	
N 6/	415	415	415	415	

1/ An instrumental variables generalized least squares (IV-GLS) procedure is used for estimation. The numbers in parentheses below the estimated coefficients are the absolute values of the t-ratios. Three, two, and one asterisk(s) besides the estimated coefficients denote statistical significance at the 0.01, 0.05, and 0.10 levels, respectively.

2/ See the Appendix for definitions and sources of variables used.

3/ Beta coefficients using the estimated coefficients reported in regression (4). The beta coefficient of an explanatory variable X, for example, is the ratio of the product of its estimated coefficient and its standard error to the standard error of the dependent variable.

4/ Mean square error.

5/ Test statistic for the test of the null hypothesis that the joint effect of all variables included on the right-hand side of the estimated equation is zero.

6/ Number of observations.

- The results support the theoretical view provided by Tanzi (1989) and some existing empirical evidence that the macroeconomic policy environment matters for tax revenue performance.[23] An increase in inflation (a proxy for expansionary financial policies) lowers the tax ratio. An appreciation of the real effective exchange rate has a positive although statistically insignificant effect on the tax ratio.

- Structural reforms (*STRUC*) have positive and significant effects on the tax revenu-GDP ratio. This result indicates that, on average, countries that made progress in the implementation of structural reforms were able to raise their average tax revenue-GDP ratios higher than countries that did not.

- The effect of human capital development (*HCI*), another economic policy-related variable used as a proxy for the provision of public services by the government, is positive and significant. It could be inferred from this result that, when taxpayers see the benefits of their tax contributions, their willingness to voluntarily comply with their tax obligations increases. It should be noted that *HCI* is measured in such a way as to avoid the problem of causality and simultaneity bias (see Appendix).

- As shown by the beta coefficients, of the economic policy-related variables, inflation exerts the largest impact on the tax revenue-GDP ratio, followed by the implementation of structural reforms. Thus, economic policies that emphasize a prudent financial stance and the implementation of structural reforms can be expected to raise tax revenue. The relative impact of the provision of public services by the government is small.

- There is strong evidence that an increase in the level of corruption (as captured by a decline in *CORRUPTP*) lowers the tax revenue-GDP ratio. The important role played by corruption in influencing tax revenue is confirmed by its relatively high beta coefficient. Thus, efforts to lower corruption would be expected to increase tax revenue significantly.

- As the levels of corruption and human capital development are highly correlated (see Appendix Table 3), when these two variables are included in the same regression the magnitude and statistical significance of their impact fall.

- Increases in external grants lower tax revenue. While this result could be indicative of substitution between domestic tax revenue mobilization and the availability of external grants, it could also reflect a reverse causality problem, whereby countries with lower tax revenue-GDP ratios have been recipients of larger amounts of grants. Several factors guide the flow of grants, including the level of development, the status of

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[23]Empirical evidence is provided by Farhadian-Lorie and Katz (1989) and Nashashibi and Bazzoni (1994).

implementation of macroeconomic and structural policies, and the level of corruption. The regression analysis controls for these factors and still finds a significant independent effect of external grants on tax revenue, indicating that, on average, grants tend to substitute for domestic tax revenue mobilization.

IV. Conclusions and Policy Implications

This paper analyzes tax revenue performance in sub-Saharan Africa, using panel data for 39 countries in the region during 1985–96. A relatively large set of factors that can potentially influence tax revenue performance—income, the structure of value added, macroeconomic and structural policies, the extent of provision of public goods by the government, the level of corruption, and the external environment—is considered in the econometrics analysis. The effect of corruption, which is typically defined as the abuse of public power for private benefit, is captured by an index that measures the extent to which bribes are generally expected by government officials in relation to, inter alia, tax assessments, trade licenses, and exchange controls.

Confirmation is provided of the important role played by income and the elements of the tax base in influencing the tax revenue-GDP ratio. The latter rises with income and the level of openness of the economy, as well as with reductions in the share of agriculture in GDP. The results also indicate that a number of other factors typically not considered in the empirical literature significantly influence the tax ratio. In particular, the economic policy environment and the level of corruption matter for the tax revenue-GDP ratio: the latter declines with rising inflation—a proxy for expansionary financial policies—and corruption. Also, there is evidence that countries that have implemented structural reforms on a sustained basis have raised their tax revenue higher than countries that have not. Furthermore, an increase in the level of human capital—a proxy for the extent of public service provided by the government—is associated with an increase in tax revenue. In addition, increases in the level of external grants are associated with lower tax ratios.

An analysis of beta coefficients indicates that, among the economic policy-related variables, inflation has the largest impact on the tax revenue-GDP ratio, followed by the implementation of structural policies. Thus, for a given tax regime and rate, economic policies that promote a noninflationary environment (through a prudent financial stance) and the implementation of structural reforms, can be expected to raise tax revenue. Also, the evidence strongly suggests that measures taken to reduce corruption would be expected to enhance tax revenue significantly. Among the variables capturing the effects of income and the tax base, the degree of openness of the economy exerts the largest impact on the tax ratio, followed by income and the agricultural share.

Although measures taken to promote economic reforms and reduce corruption would be expected to enhance tax revenue, a number of caveats are in order. The fight against corruption takes time, needs to be undertaken on several fronts, and can be costly (Tanzi, 1998). In addition, the implementation of policies to lower inflation and promote structural

reforms may encounter resistance both from the government (which stands to lose seignorage revenue) and special interest groups (which stand to lose certain privileged positions, such as monopoly power). Thus, projections of large tax revenue gains over a short time period through economic policy reforms and measures to reduce corruption (including through the reform of tax administration) may not be realistic. Finally, in view of the generally low levels of development of sub-Saharan African economies, as well as of the agricultural and informal character of these economies, caution must be exercised in projecting revenue improvements that can reasonably be expected in many of these countries (Heller, 1997).

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Definitions and Sources of Variables[24]

Tax revenue

TRY Total tax revenue-GDP ratio (in percent, in real terms).

Income

PCI Per capita income, calculated as per capita real GDP, converted into U.S. dollars using 1990 nominal exchange rate.

Tax base

AGS Share of agriculture in GDP (in percent). Source: World Bank, World Development Indicators database.

OPEN The ratio to GDP of the sum of exports and imports (in percent).

OIL A dummy variable that takes a value of one for oil-producing countries—Cameroon, Gabon, Congo, and Nigeria—and zero otherwise.

MINE A dummy variable that takes a value of one for non-oil mining countries—Botswana, Equatorial Guinea, Guinea, Namibia, Niger, Sierra Leone, Togo, Zambia, and Zimbabwe—and zero otherwise.

Macroeconomic and structural policies

INF Rate of change of the consumer price index (in percent).

RERG Percentage change in the real effective exchange rate (*RER*). A positive value for *RERG* denotes an appreciation of the *RER*. Owing to data limitations for Comoros and São Tomé and Príncipe, the following proxy is used: *CPI/(ERI*WPIUS)*, where *CPI* is the domestic consumer price index, *ERI* is an exchange rate index, and *WPIUS* is the U.S. wholesale price index. Source for *RER*: IMF, Information Notice System.

STRUC A dummy variable for capturing the effects of structural reforms. It takes a value of one for sustained adjusters and zero otherwise. Two sets of countries are included. First, there are 5 countries with small macroeconomic imbalances

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[24]Unless otherwise indicated, data are from the IMF, World Economic Outlook database. The data on tax revenue were obtained from the IMF's African Department database. See Table 1 for a list of countries included in this study. Angola, Cape Verde, the Democratic Republic of Congo (former Zaire), Eritrea, and Liberia are excluded from the study owing to data limitations.

during 1985–96—Botswana, Mauritius, Namibia, Seychelles, and Swaziland—that implemented structural reforms without Fund-supported programs. Second, there are 19 countries that successfully implemented Structural Adjustment Facility (SAF)/Enhanced Structural Adjustment Facility (ESAF)-supported programs on a sustained basis. This country group includes countries that have completed three years of SAF/ESAF-supported programs and excludes countries with large undrawn balances at the expiration or cancellation of the programs. The dummy variable takes a value of one starting in the first year of the IMF program to the end of the period. The sustained adjusters and their first program years are as follows: Benin (1989), Burundi (1987), Burkina Faso (1993), Côte d'Ivoire (1994), Ethiopia (1993), The Gambia (1987), Ghana (1988), Guinea (1992), Kenya (1988), Lesotho (1988), Malawi (1988), Mali (1989), Mozambique (1987), Niger (1987), Senegal (1987), Tanzania (1988), Togo (1987), Uganda (1987), and Zimbabwe (1993). Burundi and The Gambia are taken to be sustained adjusters only through 1993, owing to political difficulties during 1994–96. Other countries that had SAF/ESAF-supported programs during the period 1985–97 but which are not classified as sustained adjustors are Cameroon, Central African Republic, Comoros, Equatorial Guinea, Madagascar, and Sierra Leone.

Provision of public services by government

HCI Index of human capital development. Four variables are used to construct this index (secondary school enrollment ratio; literacy rate; life expectancy at birth; and one thousand minus the infant mortality rate).[25] These variables are available only at irregular intervals for most countries and fluctuate substantially over time. For each variable, averages are computed over two subperiods: 1985–90 and 1991–96. These averages are transformed such that their mean values are equal to 100 and their standard deviations are equal to ten. The average of these four transformed variables is used for *HCI*.[26] Source: World Bank, World Development Indicators database, 1997.

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[25]Infant mortality rate is the number of infants per thousand live births who die before reaching one year of age.

[26]For Namibia and São Tomé and Príncipe, only three out of the four human capital indicators were available. The average of the three transformed indicators is defined as *HCI* for these two countries. For a few countries, no data were available for one of the two subperiods. In such a case, the value of *HCI* for the subperiod for which the data were available is used for the other subperiod.

Corruption

CORRUPT An index of corruption, which takes integer values ranging from 0 (high corruption) to 6 (low corruption). Source: *International Country Risk Guide*, published by Political Risk Services Inc. in Syracuse, New York.

CORRUPTP Data on the level of corruption are available for only 27 of the 39 countries included in the study. In order to avoid the loss of valuable data in the regression analysis, a methodology is used to estimate the data for the countries for which data are missing (see text).

External environment

GRANTY External grants-GDP ratio (in percent, in real terms).

CHDETY Net external indebtedness (including arrears accumulation or decumulation), as measured by the change in the external debt-to-GDP ratio (in percent). In order to exclude the impact of revaluation stemming from changes in exchange rates, dollar values are used in the estimation of this variable. Source: World Bank, World Development Indicators database.

TTG Percentage change in the terms of trade.

Dummy variable

CFA A dummy variable that takes a value of one for the CFA franc countries—Benin, Burkina Faso, Cameroon, Central African Republic, Chad, Comoros, Republic of Congo, Côte d'Ivoire, Equatorial Guinea, Gabon, Mali, Niger, Senegal, and Togo—and zero otherwise.

Table 3. Matrix of Correlation Coefficients 1/

	ATRY	$\log_e(1/PCI)$	*AGS*	*OPEN*	*INF*	*RERG*	*GRANTY*	*CHDETY*	*TTG*	*HCI*	CORRUPT	CORRUPTP
$\log_e(1/PCI)$	-0.63 ***	1.00										
AGS	-0.74 ***	-0.81 ***	1.00									
OPEN	0.67 ***	-0.36 ***	-0.52 ***	1.00								
INF	-0.16 ***	0.29 ***	0.16 ***	-0.05	1.00							
RERG	0.08	-0.12 **	-0.13 **	0.04	-0.10 **	1.00						
GRANTY	-0.26 ***	0.36 ***	0.22 ***	-0.06	0.19 ***	-0.08	1.00					
CHDETY	-0.10 **	0.14 **	0.08	0.03	0.21 ***	-0.16 ***	0.37 ***	1.00				
TTG	0.15 **	-0.14 **	-0.15 **	0.08	-0.04	0.10 **	-0.03	0.00	1.00			
HCI	0.64 ***	-0.72 ***	-0.66 ***	0.39 ***	-0.14 ***	0.08	-0.21 ***	-0.03	0.14 **	1.00		
CORRUPT	0.27 ***	-0.11	-0.24 ***	0.16 **	-0.11	0.05	0.06	-0.12 **	0.02	0.37 ***	1.00	
CORRUPTP	0.43 ***	-0.28 ***	-0.44 ***	0.20 ***	-0.05	0.05	-0.07	-0.19 ***	-0.01	0.48 ***	0.74 ***	1.00
CFA	-0.27 ***	-0.10 **	0.10 **	-0.17 ***	-0.37 ***	0.03	-0.01	-0.06	-0.03	-0.26 ***	-0.25 ***	-0.39 ***
STRUC	0.27 ***	-0.05	-0.09	0.30 ***	-0.09	0.00	-0.07	-0.21 ***	0.03	0.18 ***	0.20 ***	0.37 ***
OIL	0.09	-0.31 ***	-0.23 ***	-0.01	-0.07	0.01	-0.25 ***	0.01	0.00	0.08	-0.33 ***	-0.25 ***
MINE	0.22 ***	-0.19 ***	-0.23 ***	0.14 **	0.10 **	0.04	-0.20 ***	-0.10 **	0.03	0.02	0.18 **	0.08

1/ See the Appendix for the definitions and sources of the variables. Three, two, and one asterisks(s) besides the estimated coefficient denote(s) statistical significance at the 0.01, 0.05, and 0.10 levels, respectively.

Table 4. Period Average of Data by Variable and Country, 1986-96 1/

Country	*TRY*	*PCI*	*AGS*	*OPEN*	*INF*	*RERG*	*GRANTY*	*CHDETY*	*TTG*	*HCI*	*CORRUPT*	*CORRUPTP*	*SUS 2/*	*CFA*	*OIL*	*MINE*
Benin	10.2	408	35.8	45.1	6.4	-1.3	4.6	4.9	-1.8	95	...	2.6	0.7	1	0	0
Botswana	37.4	2,844	5.4	89.5	11.3	0.3	1.3	1.1	6.0	110	3.7	3.8	1.0	0	0	1
Burkina Faso	9.9	300	34.6	29.1	3.4	-4.0	5.7	2.9	3.3	91	3.6	3.8	0.4	1	0	0
Burundi	14.2	200	54.7	26.0	9.2	-4.5	5.2	5.8	0.4	94	...	3.3	0.6	0	0	0
Cameroon	14.0	959	28.3	27.0	5.4	-1.3	0.2	7.5	-5.7	105	2.5	2.0	0.0	1	1	0
Central African Republic	8.5	473	45.7	26.4	3.1	-2.9	6.1	4.2	-3.1	97	...	2.5	0.0	1	0	0
Chad	7.5	214	40.9	39.5	4.6	-5.0	12.4	6.3	5.0	93	...	2.6	0.0	1	0	0
Comoros	11.4	525	38.8	28.3	5.2	2.0	14.0	2.9	-3.1	101	...	2.8	0.0	1	0	0
Congo, Republic of	23.9	1,243	11.8	72.0	6.7	-0.8	0.3	11.9	5.3	104	3.0	3.1	0.0	1	1	0
Cote d'Ivoire	17.5	899	31.4	55.3	6.5	0.5	0.3	8.8	-3.7	101	3.5	3.0	0.3	1	0	0
Equatorial Guinea	13.0	430	56.1	87.1	3.6	-5.0	1.9	12.6	-0.6	95	...	2.1	0.0	1	0	1
Ethiopia	10.3	167	55.7	17.7	7.5	-8.1	2.9	3.6	-3.8	93	2.6	2.9	0.4	0	0	0
Gabon	23.0	4,990	8.9	59.5	4.7	-3.0	0.3	6.8	-1.1	101	1.6	1.9	0.0	1	1	0
Gambia, The	19.4	308	29.3	87.4	14.0	-2.5	5.4	6.2	-4.6	92	3.1	3.0	0.6	0	0	0
Ghana	13.2	421	48.1	40.2	31.1	-8.5	2.9	5.7	-3.1	106	3.0	3.2	0.8	0	0	0
Guinea	11.6	489	23.8	47.9	17.0	0.3	3.5	6.6	2.8	89	3.6	2.8	0.5	0	0	1
Guinea-Bissau	6.2	225	45.1	34.4	55.2	-7.5	17.7	19.5	-4.9	90	2.0	2.1	0.0	0	0	0
Kenya	21.5	324	30.3	40.8	16.3	-2.0	1.5	3.5	3.5	107	3.0	3.8	0.8	0	0	0
Lesotho	37.0	358	15.8	133.0	13.0	-0.6	6.7	7.5	1.5	106	...	3.7	0.8	0	0	0
Madagascar	8.8	253	34.5	27.2	19.8	-3.8	2.8	5.8	-2.0	103	4.0	3.4	0.0	0	0	0
Malawi	17.7	213	43.0	41.7	27.9	-1.1	0.3	7.8	-2.9	93	3.6	3.2	0.8	0	0	0
Mali	10.5	288	46.0	42.3	3.0	-4.6	1.7	7.4	-1.6	92	1.9	2.1	0.7	1	0	0
Mauritius	19.7	2,302	11.4	93.3	7.2	-1.6	0.4	4.1	4.2	119	...	3.9	1.0	0	0	0
Mozambique	17.2	101	39.3	60.1	57.4	-9.4	16.6	19.7	1.0	92	4.0	3.6	0.9	0	0	0
Namibia	30.0	1,816	12.3	93.2	12.1	-1.0	3.4	0.2	-3.1	110	4.4	4.3	1.0	0	0	1
Niger	7.4	312	36.8	29.9	3.2	-6.0	4.8	1.8	-1.6	90	3.5	2.9	0.9	1	0	1
Nigeria	13.1	369	33.4	46.4	34.5	-5.5	0	4.1	-3.8	101	2.0	2.2	0.0	0	1	0
Rwanda	8.7	337	38.0	19.9	13.4	-2.8	4.1	3.2	-1.1	93	...	3.4	0.0	0	0	0
Sao Tome and Principe	11.1	509	27.1	57.0	38.9	-3.6	15.2	46.1	-6.0	113	...	4.0	0.0	0	0	0
Senegal	13.8	747	21.0	38.1	3.8	-3.7	1.8	2.9	-2.1	98	2.9	3.0	0.9	1	0	0
Seychelles	33.8	5,178	4.3	50.9	1.6	-1.6	1.5	2.6	3.4	126	...	6.0	1.0	0	0	0
Sierra Leone	8.6	196	44.6	30.8	65.7	-5.6	0	6.6	3.5	84	1.6	2.0	0.0	0	0	1
South Africa	24.7	2,758	5.2	40.6	12.8	-0.6	0	0.1	-0.8	116	5.2	4.7	0.0	0	0	1
Swaziland	28.4	1,080	12.9	140.4	11.4	-0.9	0.8	0.5	0.6	109	...	3.9	1.0	0	0	0
Tanzania	12.8	156	56.8	44.3	29.8	-9.9	3.1	6.1	-3.6	100	3.6	2.9	0.8	0	0	0
Togo	15.8	423	36.4	56.3	6.0	-2.1	1.8	4.4	-0.7	100	2.0	2.7	0.9	1	0	1
Uganda	6.7	207	53.5	21.7	62.0	-3.2	2.9	4.8	-6.3	96	2.8	3.2	0.9	0	0	0
Zambia	17.0	442	19.6	61.0	88.5	1.8	4.2	13.8	0.9	100	2.7	3.0	0.0	0	0	1
Zimbabwe	31.8	671	14.2	59.2	20.4	-4.4	1.7	3.5	2.2	111	3.5	3.8	0.4	0	0	1

1/ See the Appendix for definitions and sources of variables.

2/ Proportion of time during the 11-year sample period characterized by sustained adjustment.