An Econometric Analysis of the Fiscal Behavior of the Public Sector in Developing Countries: Aid, Investment and Taxation

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I

In the last decade, the public sector has played a role of considerable importance in the planning and implementation of development projects in most less developed countries (LDCs). A large share of the capital inflow from donor nations and private investors has been absorbed directly into and expended from the budget of the public sector. Most LDCs have increased the rate at which they mobilize domestic resources through taxation. In recent years, however, the importance of these government activities in the development process has been enveloped in controversy. Many critics have argued that foreign capital inflows have resulted in increased public or private consumption rather than increased investment, leading to a reduction in domestic savings, and contributing less to growth than the full amount of inflow would suggest.[1] Other critics have suggested that increases in the tax burden have only been squandered on nonproductive forms of public consumption.[2]

One remarkable aspect of this controversy is that most analyses of these issues focus only on particular elements of the public sector's activities. Taxes are analyzed for their impact on public savings and public consumption; aid for its impact on public investment. Yet the decision on any one of these variables is not made in isolation from the decisions

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[1]Much of this literature has been surveyed recently in [6]. In particular, see [14a], [14b], [9a], [2], [11].

[2]See [10a], [10b], [5].

made on all the others. Rarely has an analysis been made in which the fiscal interactions and constraints that impinge on public decision makers is placed in the larger context of an internally consistent model of the public sector. In this paper, we shall examine these issues by developing a cross-section time-series econometric model of the public sector of eleven African countries.

The model will examine the interactions among several types of public expenditure and will distinguish between tax and nontax revenues and domestic borrowing. It will also facilitate a more precise understanding of how aid affects the public sector. Since one would theoretically expect that the source and form of aid would affect the fiscal response of public decision makers, the econometric model will distinguish between both alternative types of aid--grants, loans and technical assistance, and alternative sources--bilateral and multilateral. It will also examine the effect of official aid within each of these groups.

The results confirm that increases in the tax burden are not likely to be used fully for investment, but will be allocated to public consumption as well.[3] The model also reveals that although aid flows lead to an expansion of public investment, it also allows a reduction in the level of domestic public saving effort. Finally, grants appear to be less effective than loans in assuring an increase in total investment effort.

In Section II, the theoretical model of public sector behavior which underlies the statistical analysis is developed. In Section III, the sources and concepts underlying the measurement of each variable are outlined. In part A of Section IV, there is a short discussion of the estimation procedure and the econometric problems that arise from the cross-section time-series character of the data. In part B, the statistical results are examined, and in Section V, they are evaluated for their policy and behavioral implications.

II

One approach to an understanding of the fiscal behavior of the public sector is to assume that it reflects the actions of a set of public

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[3] See [10a] and [10b].

decision makers (i.e., a Council of Ministers, the Minister of Finance, etc.).[4] We shall assume that they act within a utility maximizing framework, and that their utility is influenced by the distribution of total output between the private and public sectors. In addition, they are not indifferent as between alternative uses of public resources, such as expenditure for economic growth, for the provision of current social and economic services, and for the maintenance of political order and stability. Neither are they indifferent as between alternative revenue sources, such as borrowing, taxation or grants and loans from donor nations.

In any period t, let us assume their utility function is of the general form

$$U = F[I_g, (Y-T), G_c, G_s, B] \tag{1}$$

where I_g = public investment expenditure for development purposes,
$(Y-T)$ = gross domestic product (Y) less tax and nontax revenue (T), or the disposable income of the private sector,
G_c = public "civil" consumption,
G_s = public "socio-economic" consumption, and
B = public borrowing from domestic sources.
Each variable relates to time period t unless otherwise stated.

The breakdown into three public expenditure categories I_g, G_c, and G_s is an attempt to capture a functional distinction used by most African LDCs in the formulation of their budgets. The I_g is a proxy for the development budget, the expenditure (usually gross public capital formation) which provides the public sector contribution toward the achievement of economic growth targets. It reflects the developmental activism of the public sector in Africa and other LDCs throughout the world.

The distinction between G_s and I_g has more meaning in terms of internal accounting practices than in substance. "Socio-economic" consumption expenditure, a proxy for certain elements of the recurrent budget, includes all current, noncapital expenditures for such purposes as

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[4] In this respect, the model is a derivative of models used to explain the fiscal behavior of state and local governments in the United States; see [1] and [5].

the staffing of schools, hospitals and health centers, for the maintenance of roads and communication networks, and for the staffing of agricultural extension or agricultural research projects. Theoretically, one might expect that G_s has some impact on the rate of economic growth but in the eyes of public decision makers, it is usually regarded not as investment but as a form of consumption without developmental impact. This can be easily discerned by a perusal of the annual budget speeches of the Ministers of Finance in our sample of African countries.[5]

"Civil" consumption includes all other public expenditure. The bulk of this expenditure relates to the fundamental need of the state to maintain its political existence. This means expenditure for government administration, public debt service, a role in foreign affairs, and the preservation of internal and external security through the police, courts and military. A smaller fraction of this expenditure is for subsidies and transfers to households and other nongovernmental units.[6] A principal motive for distinguishing G_c from I_g or G_s is the assumption that expenditures on G_c have a primary claim on public resources. Accordingly, decisions on G_c are based on different decision rules than are I_g or G_s.

It shall be assumed that the set of public decision makers have a quadratic utility function of the form:

$$(2)\quad U = \alpha_1(I_g - I_g^*) - \frac{\alpha_2}{2}(I_g - I_g^*)^2 + \alpha_3(T - T^*) - \frac{\alpha_4}{2}(T - T^*)^2 + \alpha_5(G_c - \alpha_{11}G_{c,t-1}) - \frac{\alpha_6}{2}(G_c - \alpha_{11}G_{c,t-1})^2 + \alpha_7(G_s - G_s^*) - \frac{\alpha_8}{2}(G_s - G_s^*)^2 + \alpha_9 B - \frac{\alpha_{10}}{2}B^2,$$

where $\alpha_i \geq 0$ for all i, and where a starred variable indicates a target level for the given variable. The functional form chosen ensures diminishing marginal utility for each of the variables I_g, G_c, G_s, B and T. It also reflects a compromise between the need for heuristic accuracy (in the light of the budgeting priorities expressed by the Ministers of Finance

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[5] See Bibliography III.

[6] Although expenditure for the redistribution of income admittedly arises from a different kind of political motivation, these are not yet a major expenditure in the sample of African countries under analysis. It was felt that in a budgetary decision-making framework, the criteria applied to income redistribution would be most similar to that applied to the other G_c expenditure.

in our sample), and the need for a tractable functional form that could be easily estimated and had desirable utility function properties. It is deficient in that there is no interdependence between the utilities obtained from each policy variable.

Government investment expenditure is assumed to be made with reference to some target level of investment I_g^*, which has been set in the context of a long-term economic development plan. In any year, I_g^* will be a function of the desired rate of economic growth, the perceived role of the public sector in achieving it, the absorption capacity of the public sector and the relative productivity of public sector investment. Intuitively, one would expect asymmetrical losses arising from positive and negative deviations from I_g^*. However, the need for a continuously differentiable function has required the use of a quadratic form. Deviations on either side of I_g^* yield symmetrical gains or losses in utility determined by the parameter α_2.

Similarly, G_c is pegged to a scalar multiple of its value in the previous period (where one would expect $\alpha_{11} \geq 1$), reflecting the importance attached to realizing a basic level of these expenditures. The parameter α_6 performs a function comparable to α_2 in minimizing the deviation of G_c from the target level, although one would expect α_6 to be larger than α_2. Socio-economic consumption enters the model with an explicit target G_s^*, which should be a function of the amount of newly completed public investment in previous periods,[7] the level of $G_{s,t-1}$, and an expansion factor to reflect wage rate increases to the civil service.

If the government receives technical assistance aid, A_3, that can be substantially substituted for government financed services, this would tend to lower the level of G_s^*. In our sample, technical assistance principally finances operational positions within the government:[8] in teaching, medical care, research and administration. Although such aid may

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[7] One would expect that newly completed projects require current expenditure for operations and maintenance.

[8] In Kenya, nearly 90% of technical assistance aid is for the provision of operating services in agriculture, health, education and other socio-economic activities; see [3].

entail financial obligations, such as counterpart expenditures, there may nevertheless be a net saving of resources to the government.

Also included within the utility function are terms reflecting the level of tax and nontax revenues, T, and the level of domestic borrowing B by the public sector. In any given period, increases in the tax burden beyond a certain level become increasingly difficult for the public decision-maker, both because of the increased administrative costs of collection and because of the economic and political costs engendered in countries at a low level of development. The level of total income and the value of such tax handles as imports or exports will critically determine the target T* chosen in any year. Alternatively one could introduce T in terms of the tax share directly.

The choice of specification will not critically affect the ultimate behavioral mechanism derivable from our statistical results. Of primary importance is the fact that the choice of tax rate is a policy instrument available to public decision-makers. If one were to view the level of such revenues as an exogenous constraint on the actions of public decision makers, the T term will drop out of (2) and be included only within the constraint equations infra.

Public borrowing is traditionally viewed as fiscally responsible only if it occurs in limited amounts, and is used to finance public sector investment. In our specification, the parameters α_9 and α_{10} are intended to ensure diminishing utility beyond a small level of borrowing.[9] The restriction of borrowing for investment will be introduced in our constraint equations.

The constraints on the actions of the public decision maker are both economic and institutional in character. The least restrictive assumption would be that all revenue inflows could be pooled and allocated among all categories of expenditure, so that

$$(3) \qquad T + B + A_1 + A_2 = I + G_s + G_c,$$

where A_1 = grants and grant-like flows to the public sector, and

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[9]Alternatively, one could capture this behavior by inversely relating utility to borrowing as a percentage of either total output or total government expenditure.

A_2 = loans to the public sector.[10]

This may be called the "perfect fungibility" form of the model. Institutionally, it is unrealistic. Most African LDCs not only reject borrowing for current expenditure, but plan a surplus on the recurrent budget, viz., $(T - G_s - G_c) \geq 0$, in order to provide further non-debt revenues for development. This surplus is often viewed by official donor institutions as a critical measure of "public saving" and "fiscal effort."

An alternative constraint set would be:

$$I_g \leq B + (1 - \rho_1)T + (A_1 + A_2) \tag{4.1}$$

$$G_s + G_c \geq \rho_1 T, \text{ and where} \tag{4.2}$$

$$0 \leq \rho_1 \leq 1. \tag{4.3}$$

Of primary importance in (4.1) and (4.2) is that $100\ (1 - \rho_1)\%$ of domestic non-debt revenues are constrained to be transferred to the development budget. The level of $(1 - \rho_1)$ reflects the government's belief as to the maximum it can realistically "save" from the recurrent budget. It is <u>not</u> to be seen as an additional policy variable. Second, constraint set (4) also implies that aid is not fungible as between consumption and investment; that in practice, all aid funds are made for development purposes and that donors are able to ensure they fit within (4.1). Assuming there is no relaxation of borrowing effort, aid flows are used only to finance government investment. If one argued that grants (A_1) are actually intended to finance the consumption budget, then (A_1) would be included only in (4.2).

In the "revisionist" literature[11] it is contended that there is greater substitutability, that aid inflows could <u>ex post</u> be allocated to increases in consumption as well as investment, and to a partial reduction in the tax burden. This may be expressed either by relating ρ_1 inversely to the level of $(A_1 + A_2)$ in a given period, or by including only $100\ (1 - \rho_2)\%$ of $(A_1 + A_2)$ in (4.1) and $100\ \rho_2\%$ in (4.2).[12] This middle

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[10] Technical assistance aid, A_3, is <u>not</u> included since it is controlled by the donor and never enters into the pool of allocable resources.

[11] See [2], [14a], and [14b].

[12] The only constraint on ρ_2 would be that total investment exceed the level of aid inflows and required counterpart expenditures. If the recipient must provide a proportion $100\ \rho_3\%$ of counterpart funds to obtain

position constraint may be stated as:

$$(5.1) \qquad I = B + (1 - \rho_1)T + (1 - \rho_2)\ (A_1 + A_2)$$

$$(5.2) \qquad G_s + G_c = \rho_1 T + \rho_2 (A_1 + A_2).$$

Maximizing U with respect to current policy variables I, G_s, G_c, T and B, given levels of A_1 and A_2, and subject to constraint set (5.1) and (5.2), yields:

$$(6.1) \qquad \frac{\delta U}{\delta I_g} = \alpha_1 - \alpha_2 (I_g - I_g^*) + \lambda_1 = 0,$$

$$(6.2) \qquad \frac{\delta U}{\delta G_c} = \alpha_5 - \alpha_6 (G_c - \alpha_{11} G_{c,t-1}) + \lambda_2 = 0,$$

$$(6.3) \qquad \frac{\delta U}{\delta G_s} = \alpha_7 - \alpha_8 (G_s - G_s^*) + \lambda_2 = 0,$$

$$(6.4) \qquad \frac{\delta U}{\delta T} = \alpha_3 - \alpha_4 (T - T^*) - \lambda_1 (1 - \rho_1) - \lambda_2 \rho_1 = 0,$$

$$(6.5) \qquad \frac{\delta U}{\delta B} = \alpha_9 - \alpha_{10} B - \lambda_1 = 0,$$

$$(6.6) \qquad \frac{\delta U}{\delta \lambda_1} = I - B - (1 - \rho_1)T - (1 - \rho_2)(A_1 + A_2) = 0, \text{ and}$$

$$(6.7) \qquad \frac{\delta U}{\delta \lambda_2} = G_s + G_c - \rho_1 T - \rho_2 (A_1 + A_2) = 0,$$

where λ_1 and λ_2 are the Lagrangian multipliers associated with constraints (5.1) and (5.2). Equation system (6) can be solved to obtain structural equations for our policy variables. We obtain:

$$(7.1) \qquad T = \frac{\beta_0}{\beta_1} + \frac{\alpha_4}{\beta_1} T^* + \frac{\alpha_{10}(1 - \rho_1)}{\beta_1} I_g + \frac{\rho_1 \alpha_6 \alpha_{11}}{\beta_1} G_{c,t-1} + \frac{\rho_1 \alpha_6}{\beta_1} G_s - \frac{\{\rho_1 \rho_2 \alpha_6 + \alpha_{10}(1 - \rho_1)(1 - \rho_2)\}}{\beta_1} (A_1 + A_2),$$

$$(7.2) \qquad I_g = \frac{\alpha_1 - \alpha_9}{(\alpha_2 + \alpha_{10})} + \frac{\alpha_2}{(\alpha_2 + \alpha_{10})} I_g^* + \frac{\alpha_{10}(1 - \rho_1)}{(\alpha_2 + \alpha_{10})} T + \frac{\alpha_{10}(1 - \rho_2)}{(\alpha_2 + \alpha_{10})} (A_1 + A_2),$$

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loans A_3, then total investment ex post must exceed $A_2(1 + \rho_3)$. A similar expression would hold if there are counterpart funds associated with A_1. Obviously a recipient cannot be investing less than its aid flows and counterpart commitments, as it would be faced with a credibility problem when attempting to obtain future aid. For our sample countries, this constraint is nonbinding: the level of investments exceeds the level of out flow.

$$(7.3)\quad G_s = \frac{\alpha_7 - \alpha_5}{(\alpha_8 + \alpha_6)} - \frac{\alpha_6\alpha_{11}}{(\alpha_8 + \alpha_6)} G_{c,t-1} + \frac{\alpha_6\rho_1}{(\alpha_8 + \alpha_6)} T + \frac{\alpha_8}{(\alpha_8 + \alpha_6)} G_s^* + \frac{\alpha_6\rho_2}{(\alpha_8 + \alpha_6)} (A_1 + A_2) ,$$

$$(7.4)\quad G_c = \frac{\alpha_5 - \alpha_7}{(\alpha_8 + \alpha_6)} + \frac{\alpha_6\alpha_{11}}{(\alpha_8 + \alpha_6)} G_{c,t-1} + \frac{\alpha_8\rho_1}{(\alpha_8 + \alpha_6)} T + \frac{\alpha_8\rho_2}{(\alpha_8 + \alpha_6)} (A_1 + A_2) - \frac{\alpha_8 G_s^*}{(\alpha_8 + \alpha_6)} ,$$

$$(7.5)\quad B = \frac{\alpha_1 - \alpha_9}{(\alpha_{10} + \alpha_2)} + \frac{\alpha_2}{(\alpha_{10} + \alpha_2)} I_g^* - \frac{\alpha_2(1-\rho_1)}{(\alpha_{10} + \alpha_2)} T - \frac{\alpha_2(1-\rho_2)}{(\alpha_{10} + \alpha_2)} (A_1 + A_2),$$

and where $\beta_0 = [\alpha_3 - \alpha_9(1-\rho_1) + \rho_1\alpha_5]$, and $\beta_1 = [\alpha_4 + \alpha_{10}(1-\rho_1)^2 + \rho_1\alpha_6]$.

The specification of these structural equations is obviously sensitive to the assumed constraint system imposed by the public sector decision maker and by aid donors. In sections IV and V, we shall examine the reasonableness of the specification, the results obtained from an estimation using this model, and the policy implications that can then be drawn.

III

The scarcity of studies on the behavior of the public sector in LDCs is partly attributable to the difficulty of extracting a data base which is conceptually meaningful and which is measured in comparable terms, over a period of time or across countries. In many countries, there have been shifts over time in (1) the activities included within the purview of the public sector, and the division of responsibility for public expenditures as between different levels of government;[13] (2) the statistical categories used to describe public revenue and expenditure; (3) financial accounting systems used, and (4) the fiscal period used by the government.[14] For a given LDC, the number of years for which a comparable data base can

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[13] In particular, this relates to the role of public enterprises, social security systems, health or educational institutions, etc.

[14] In practice the fiscal year may begin on January 1, April 1, or June 1.

be constructed is not very large. Indeed, for most African countries, the assumption of a constant utility function over time restricts the analysis to the post-independence period.

The shortage of time points for any one country necessitates a cross-sectional study. The cost of additional observations is that the conceptual problems involved are considerable. If one is to assume identical utility functions, one must be careful in the choice of countries. To assume such an identity for India, Korea, Zambia, Morocco, and Argentina would hardly be credible. Accordingly, our sample is constrained to include the post-independence period of eleven African countries, nine of which are English speaking or "Anglophone" (Nigeria, Ghana, Zambia, Kenya, Uganda, Tanzania, Malawi, Liberia, and Ethiopia), and of which seven are former British colonies. This should minimize the structural dissimilarity between budgetary processes of the countries in our sample. With certain exceptions (notably Zambia), there are also similarities in the structure of their economies (i.e., importance of agriculture relative to industry) and their level of development.

Tunisia and Morocco have also been included partly to test for behavioral differences, and partly because they are rare among French-speaking or "Francophone" countries in the degree to which their fiscal system is autonomous from that of France. In other Francophone African countries, an important share of expenditure is not included in the country's budget and any record of it is buried within the budget statistics of the French government.[15] In what follows, the statistical categories chosen to reflect the variables in the model (which are consistent across the sample countries) are briefly outlined.[16]

Although the constraint equations assume the possibility of a transfer of resources from the "recurrent budget" to the "development budget," the use of the "development" and "recurrent" budgets as conceptually consistent measures of government consumption and investment across

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[15] See [15]

[16] The sources of data are listed in Bibliography II. Copies of the data series and further discussion of the precise series used for each country can be obtained from the author upon request.

countries has been rejected. Instead, an "economic" classification of these variables has been used. The reason is that in practice, what is included in or excluded from the development budget is rarely consistent, either among countries or over time. For example, an agricultural extension project clearly is a "development" project but is not typically included within the usual measure of gross capital formation in the public sector. Whether or not it is included within a country's development budget is dictated less by the particular accounting system per se than by the institutional situation within a Ministry at a given point in time. Often a Ministry's claim to resources may be bolstered if it is shielded from the constraints often imposed on the expansion of the recurrent budget.

Government consumption will include the following economic categories: (i) current expenditure on goods and services, (ii) interest payments, (iii) subsidies, and (iv) transfers to (a) households, (b) private institutions, (c) other governmental agencies and (d) the rest of the world. This corresponds to the definition used by the United Nations in compiling its budgetary statistics and which is used by the Anglophone countries in their published statistics on the public sector. Included within (i) are wages, salaries and purchases of other goods and services. Nevertheless, this is an aggregation over a range of different types of expenditures, some of which are far more developmental in character than others. Hence, we have distinguished between "socio-economic" and "civil" consumption.

"Civil" consumption expenditure is defined to include categories (ii), (iii), (iva), (ivb), and (ivd) and expenditure, both consumption and capital on general administration (the executive and the legislature), justice and police, foreign affairs, and defense. Thus, it includes all expenditure related to the maintenance of political stability and national independence, and to the achievement of income distributional goals as opposed to specific development programs. Conceptually, elements of each of these categories may be developmental in character, but the developmental factor cannot be isolated.

"Socio-economic" consumption expenditure is defined as total government consumption less civil consumption. Thus, it includes expenditure on social and economic services (such as education, health, transport, and

agriculture). It also includes transfers to local governmental units, since a large proportion of such transfers are used to subsidize this type of expenditure.

Our measure of government investment, I_g, includes gross capital formation in the public sector (i.e. buildings and construction, transport equipment, draft animals, dairy cattle, etc.) and net loans and advances to other sectors of the economy. Thus, I_g is conceptually less inclusive than expenditures normally observed within the development budget as it excludes any socio-economic consumption. It also excludes capital formation in those activities included in civil consumption.

Government revenue data have been divided into three categories: (1) tax revenue, (2) non-tax revenue, and (3) domestic borrowing. Tax revenue includes direct, indirect and property tax revenue (income taxes, customs and excise duties, export taxes, mineral royalties, etc.). Non-tax revenue includes all other revenue, such as sales and receipts from the provision of government social services, license fees, interest, dividends, and profits received by the government, and current transfers from the private sector (i.e. fines). The sum of tax and non-tax revenues will hereafter be referred to as nondebt revenue. Domestic borrowing includes the sale of long-term securities by the Central government to either the Central Bank or the private sector.

Statistics on the inflow of foreign capital to the public sector can be obtained in three different forms. First, individual country statistics include data on external loans (gross)[17] and grants to the government from private and public sources. These include PL480 aid, suppliers' credits and more conventional forms of grants and loans from donor countries, and they are a measure of total capital inflows, $(A_2 + A_3)_{tot}$, to the government. Secondly, the Organization for Economic Cooperation and Development (O.E.C.D.) compiles and publishes data on the amount of bilateral and multilateral aid to each African country from member governments and international institutions, broken down by grants and loans.[18]

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[17] Amortisation and interest payments of the LDCs have not been deducted from this measure.

[18] Again, loan data can be obtained either gross or net of amortization and interest. Grants include both "grant-like" flows (net) and net official grants, reparations and indemnification payments.

This provides a measure of official capital inflows, $(A_2 + A_3)_{off}$, to the government. Third, the O.E.C.D. has published statistics on the value of technical assistance flows to a smaller sample of countries over a 5-year period.

The measure of total aid derived from individual country statistics includes private as well as official grants and loans, and is based on the same fiscal year as the public expenditure and tax data. On the other hand, what is actually included in the country-provided statistics is not clear and is not subject to comparable definitions across countries. All O.E.C.D. data are on a calendar year basis and are consistent.

The distinction between the fiscal year and the calendar year leads to difficulties since it results in different fiscal periods being employed within the sample. The convention adopted was to match all variables calculated on a calendar basis (GDP, exports, etc.) to the fiscal year beginning in that calendar year. Hence, for Kenya, public expenditures during its fiscal year June 1969 - June 1970 are matched with statistics computed on a 1969 calendar year basis. This clearly complicates the interpretation of regression coefficients since for other countries, the public expenditures are themselves calculated on a calendar year basis. The justification for this procedure is primarily pragmatic. Obtaining a moving average of calendar year data would have sacrificed at least one degree of freedom for each country, and it is not clear that this would have been conceptually more appropriate. Although this procedure raises questions as to actual magnitude of the coefficients, this is not expected to lead to significant differences in the results obtained.

The remaining data, such as population, foreign exchange reserves, exports, imports, private sector investment, gross domestic product (GDP), total output in the monetary and subsistence sectors of agriculture, primary school enrollments, number of hospital beds, GDP price deflators, and foreign exchange rates were obtained from the statistical publications of each government, the United Nations or the International Monetary Fund. These variables are used as instruments in the estimation of the target variables I^*_g, G^*_s, and T^*.

All data has been deflated to constant 1966 prices, using each country's own GDP deflator. In order to provide an alternative measure

of the real value of aid flows, the aid variables have also been deflated by an export price deflator for the donor countries. The results are not significantly affected by the choice of the deflator for aid.

To obtain readily interpretable coefficients, all variables have been converted to dollars using the current year exchange rate. Thus, variables initially estimated in local currencies are sensitive to any exchange rate fluctuations, and this may distort the nature of the observed statistical relationship if it imposes variations in variables which are not actually affected by the devaluation, particularly where the structural relationships are dynamic. The appropriateness of this conversion will depend upon (i) the proportion of government purchases in a particular expenditure category on foreign goods and services, and the source of these foreign goods; (ii) whether aid flows (which were initially expressed in dollars) are pegged to some target level of real purchasing power or to an absolute level of local or foreign currency; (iii) the frequency and severity of devaluations with respect to each country's primary trading partner; (iv) the degree of bias introduced by using only a GDP deflator rather than a deflator specific to each expenditure category; and (v) the degree of currency overvaluation and the policy instruments used to ration foreign exchange between the public and private sectors.

With the exception of Ghana, there were no significant changes in the exchange rates prevailing during the period which would create spurious shifts in expenditures arising from this conversion to the dollar.[19] The revaluations that occurred with respect to the British pound would pose a problem only to the extent that both a substantial proportion of imported goods and services to the public sector were of British origin, and any price increases that arose were not sufficiently corrected by deflation with the GDP deflator.

IV

Part A: Econometric Estimation Procedure

The simultaneous equation system outlined in equations (7.1 - 7.5) constitutes the structural equations used in the estimation procedure. There

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[19] For the period under study, there were only four devaluations with respect to the dollar among all the sample countries.

are four econometric problems that must be resolved to estimate this system. First, the data on each country are not sufficient to estimate separate equations for each country; this necessitates a pooling of the time series data across all the countries. The mean and variance of the error term that may arise from such a pooling of time series data may cause both considerable bias and inefficiency in the estimation of the coefficients if corrective measures are not taken. Second, if the uncorrected values of the variables are used, a heteroscedasticity problem is encountered since there is a positive correlation between the variance of the error term and the absolute GDP level of the sample countries. Third, the inclusion of such time-correlated variables as income and public expenditure might suggest an autocorrelation problem. Fourth, since our model in (7) is a simultaneous-equation system, this suggests the need for a simultaneous equation estimation procedure to obtain consistent estimators for the structural coefficients. Since our system is overidentified, two stage least squares (2SLS) was used for each equation.

The heteroscedasticity problem is clearly evident from an examination of the residuals of equations estimated using the original values of the variables (deflated to constant U.S. dollars). The problem can be corrected sufficiently by reestimating the equations with the variables expressed in per capita terms. This clearly lowers the relative dispersion in the variance of the error term for the observation of each country. Testing for autocorrelation is not possible with the usual Durban-Watson statistic, since the data is a pooling of cross-section and time-series data. Theoretically, an estimation of the autocorrelation parameter[20] δ_i for the error term of each of the N countries (i = 1, ..., n) might be more appropriate and would yield N parameters which could be used in a generalized least square (GLS) estimation of the model. Unfortunately, the number of observations for each country is only minimally adequate to estimate this $\{\delta\}$ set.

For each set of observations, we estimated δ_i and the multiple correlation coefficient of the autocorrelation function for a one period lag. The correlation coefficient is quite low for most countries ($r^2 < .3$),

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[20]The δ_i is normally referred to as ρ_1 in the econometrics literature.

implying there is probably not sufficient autocorrelation to justify a further GLS correction of the data. It is conceivable that our correction for heteroscedasiticity may have reduced the severity of the autocorrelation problem. Undoubtedly the population series for any country was based on extrapolations of past trends in the birth and mortality rates, and the observed growth in population embodies a constant time trend. By dividing by population, one is essentially removing part of any time trend from the data itself.

The actual equations estimated are modified in certain cases to remove variables which seemed to induce considerable multicollinearity. Although this undoubtedly introduces specification bias in the coefficients of the included variables, this was judged to be preferable than the indeterminacy which multicollinearity could introduce in the coefficients.

The pooled nature of the data set necessitates assumptions with respect to both the stochastic process generating the error term for each equation, and the similarity of fiscal behavior across the countries. Because of the shortness of the time series for each country, the existence of such behavioral similarity must be assumed viz., that the coefficients of each equation will be the same <u>across</u> countries. Although this might be reasonable for the Anglophone countries, the assumption is stretched when we include Morocco and Tunisia, or even Ethiopia. We will attempt to verify the validity of pooling all the countries by also estimating separate equations for the Anglophone countries.

Using an error components approach in which the error term ε_{it} is broken down into two terms u_i and v_{it}, where $i = 1, \ldots, N$ and $t = 1, \ldots, T$ (where N is the number of countries, and T the number of years), the choice of estimation procedure depends on our assumptions about the covariance matrix of ε_{it}, and in particular, the assumed randomness of u_i.[21] <u>A priori</u>, one would expect this breakdown to be legitimate, i.e., that regardless of behavioral similarity (viz., equal slopes), there may be differences in each country's intercepts (reflecting different levels of development). If it is expected that the country-specific intercepts would not change as new points are added to each country's data set, it could be

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[21] See [8a], [13], and [7].

assumed that u_i was (i) not random, and (ii) could be estimated along with the other parameters via a dummy variable procedure. On the other hand, one might expect that u_i was random, or at least was subject to some time trends over the period in question. In this case, the dummy variable approach may not be as efficient in terms of the relative mean square error of the estimators $\hat{\beta}$ (the remaining equation coefficients) and the amount of small sample bias.

One method suggested to determine the appropriate estimation procedure is to estimate a measure of the proportion ν of the variance of ε_{it} which is explained by the variance of u_i.[22] An estimate $\hat{\nu}$ can be obtained by the methods suggested by Nerlove and Swamy. Swamy's method requires a transformation of the error sums of squares obtained in separate regressions on the group mean data and on the deviations from the group mean data. Nerlove obtains $\hat{\nu}$ by estimating the variance $\hat{V}^2_{u_i}$ of the dummy term coefficients as a proportion of the total variance, (which is $\hat{V}^2_{u_i}$ plus the remaining variance $\hat{V}^2_{v_i}$ in the dummy variable equation). Since the Swamy and Nerlove estimates of $\hat{\nu}$ prove to be considerably different in several cases, the estimate of $\hat{\nu}$ used was the average of the alternative estimates. Given alternative values for ν, the number of time periods and the number of countries, the Monte Carlo studies of Nerlove and Swamy provide small-sample measures of the relative efficiency of (i) ordinary least squares, (ii) ordinary least squares with dummy variables, and (iii) a generalized least squares (GLS) procedure using $\hat{\nu}$.

In general, if ν is close to 1, the use of dummy variables is the best estimation procedure; if ν is close to zero, ordinary least squares dominates. We have calculated $\hat{\nu}$ values for our equations, and estimated the second state of the 2SLS estimation procedure according to the procedure indicated as most efficient in the Swamy-Nerlove studies. In describing the results, the parameter ν and the estimation procedure applied is indicated for each equation.

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[22] In the econometric literature, this is referred to as $\rho = \sigma^2_u/(\sigma^2_u + \sigma^2_v)$, but in order to avoid confusion with our parameter ρ in our model, we shall use ν.

Part B: Econometric Results

Government Nondebt Revenue

Equation (7.1) in our model shows nondebt revenue, T, as a positive function of GDP, government investment and government consumption, and as a negative function of aid flows. Imports of the previous period were added as an additional instrument for predicting nondebt revenue since a large share of tax revenue is derived from import duties. Separate estimates were made of the tax revenue component of T.[23]

The results (Table 1) verify the basic structure of equation (7.1). Foreign loans negatively affect nondebt revenues, with a coefficient of -0.84 for official loans ($A_{2,off}$) and -0.94 for total foreign loans ($A_{2,tot}$). In the smaller sample of Anglophone countries, the coefficient of $A_{2,off}$ falls to -1.37. Nondebt revenues are thus extremely sensitive to the level of official loans. Equations F through H indicate that the principal reduction falls on tax revenues, particularly for the Anglophone countries.

Although the coefficients of "official" loans and "total" loans on total nondebt revenues are almost equivalent, the former effect a reduction primarily in tax revenues. Since total loans have an impact on both tax and nontax revenues, one can only infer that foreign private assistance to the public sector is more likely to effect a revenue reduction through nontax sources, perhaps in the form of reduced licensing fees.

More surprising is the response of T to official grants. Theoretically, grants would be expected to have a greater potential substitutability than loans, since they are less restrictive in their financial implications. The results are ambiguous. For the pooled sample, both official and total grants have a negative but hardly significant effect, whereas in the Anglophone sample, the effect of grants is positive.

Since taxes and aid are both in current year terms, the specification of this equation suggests alternative interpretations of the results.

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[23] By subtracting the coefficients obtained in the tax revenue equations from those obtained in the nondebt revenue equations, an estimate of the effect of each independent variable on nontax revenue can be obtained.

Table 1

NONDEBT REVENUE EQUATIONS

Dependent Variable and Estimation Technique	Sample	$A_{1,OFF}$	$A_{2,OFF}$	$A_{1,TOT}$	$A_{2,TOT}$	A_{BIL}	A_{MUL}	Y_t	M_{t-1}	I_g	G_s	$G_{c,t-1}$	R^2 (N)
TOTAL REVENUES													
A. NS-2SLS ν=0.45	Total	-0.32 (-0.58)	-0.84 (-1.98)					0.23 (4.54)	-0.39 (-3.40)	1.03 (3.37)	-0.71 (-2.24)	1.51 (6.25)	0.89 (57.00)
B. NS-2SLS ν=0.45	Anglophone	1.12 (2.26)	-1.37 (-2.60)					0.35 (6.60)	-0.39 (-2.80)	0.77 (2.08)	-0.56 (-1.33)	0.84 (2.86)	0.96 (44.00)
C. NS-2SLS ν=0.51	Total			-0.08 (0.147)	-0.93 (-3.27)			0.25 (-4.67)	-0.46 (4.97)	1.05 (4.20)	-0.56 (-2.33)	1.39 (6.65)	0.937 (61.00)
D. NS-2SLS ν=0.58	Total					-0.54 (-2.13)	-0.696 (-0.54)	0.12 (2.58)		0.05 (0.18)	0.49 (1.48)	1.67 (6.16)	0.862 (66.00)
E. NS-2SLS ν=0.58	Anglophone					-1.08 (-4.30)	-3.06 (-2.30)	0.25 (4.32)		0.86 (1.75)	0.04 (0.47)	0.83 (2.32)	0.92 (51.00)
TAX REVENUES													
F. NS-2SLS ν=0.42	Total	-0.68 (-1.38)	-0.89 (-2.35)					0.13 (3.03)	-0.19 (-1.80)	0.93 (3.50)	-0.31 (-1.11)	1.29 (6.08)	0.89 (57.00)
G. NS-2SLS ν=0.42	Anglophone	0.83 (2.03)	-1.73 (-3.99)					0.24 (5.44)	-0.10 (-0.87)	0.30 (1.98)	-0.54 (-1.56)	0.93 (3.81)	0.96 (44.00)
H. NS-2SLS ν=0.48	Total			-0.24 (-0.48)	-0.45 (-1.85)			0.20 (3.76)	-0.33 (3.71)	0.67 (2.67)	-0.43 (-1.83)	1.34 (6.50)	0.92 (61.00)
I. NS-2SLS ν=0.48	Anglophone			0.17 (0.43)	-1.20 (-2.50)			0.21 (3.40)	-0.30 (-2.87)	0.40 (1.34)	-0.49 (1.37)	1.57 (4.67)	0.97 (49.00)
J. NS-2SLS ν=0.58	Anglophone					-0.00 (-2.88)	-0.37 (-0.36)	0.08 (2.05)		0.17 (0.68)	0.40 (1.49)	1.61 (7.32)	0.88 (66.00)

NS: estimated using the Nerlove-Swamy G.L.S. procedure, see (8b) and (12)

2SLS: two stage least squares;

$\nu = \{\nabla^2_{u_i} / (\nabla^2_{u_i} + \nabla^2_{v_{it}})\}$

Either aid allows a relaxation of tax effort, or higher aid flows occur in response to a lower level of expected nondebt revenues and thus offset shortfalls in public sector saving. Each equation in Table 1 was therefore re-estimated using a lagged value for A_1 and A_2. The negative coefficients remain, the coefficients of $A_{1,off}$ and $A_{2,off}$ being -0.2 and -0.72, respectively, with little difference arising between the two samples. This would support the interpretation that aid is the exogenous variable.[24]

With respect to the other independent variables, total output enters with a positive coefficient as expected. Imports in the previous period (M_{t-1}) have a surprisingly negative coefficient, which can only be explained by the multicollinearity that exists between Y_t and M_{t-1}. Among expenditures, government investment and the target for current "civil" consumption have the strongest stimulative effect on nondebt revenues, with coefficients of 1.03 and 1.5, respectively (Equation A). Surprisingly, the positive effect of $G_{c,t-1}$ is offset by the negative coefficient (often significant) of socio-economic consumption, G_s. The coefficients of investment and aid are consistent. Foreign loans and public investment are both clearly tied to the investment budget. The results clearly indicate both the ex ante importance, at the margin, of nondebt revenues for that investment, and the effect of aid in relaxing the need for tax-financed investment.

With respect to government consumption, the distinction between "civil" and "socio-economic" expenditure appears justified by the large difference in the coefficients of G_s and $G_{c,t-1}$. The assumption that "civil" consumption has "priority" claim on the government's resources is borne out by its high coefficients relative to I_g and G_s. The insignificant, and occasionally negative, coefficient of G_s would suggest that the level of G_s in any year is determined by an alternative, less flexible decision process than was previously suggested. If increases in G_s are regarded as of secondary importance, and are provided for by "across the board" increases which are determined by the relative availability of funds,

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[24]This test is only valid if the time-series variation accounts for a large proportion of the total error variance. If the cross-sectional variation is dominant, substituting $(A_2 + A_3)_{t-1}$ for $(A_2 + A_3)_t$ will not clarify the ambiguity of the results.

then one would not expect increases in G_s to generate increases in nondebt revenues. The causality would more likely operate in the other direction. Although this is a more rigid decision rule, it provides a more credible interpretation of the results obtained in the G_s and T equations.

Finally, the revenue equation was also estimated distinguishing between bilateral and multilateral aid. One would expect bilateral aid to be less rigorously supervised, and to offer greater latitude for substitutability than does multilateral aid. Equations D and J bear this out. Although the coefficient of multilateral aid on total revenue is higher, it is hardly significant. Both variables have negative coefficients. A dollar of bilateral aid leads to a reduction of 66¢ from nondebt revenues, the bulk of the reduction falling on tax revenues.

Government Investment

By structural equation (7.2), government investment is a function of two exogenous variables--the "target" investment level I_g^* and aid flows--and one endogenous variable-nondebt revenues, T. In the first stage of the 2SLS estimation, an instrument for revenue was obtained using such exogenous variables in the model as aid, GDP, previous period imports, agricultural output, and primary school enrollment.

The target investment level I_g^* may be specified in several ways. It was initially hoped that the investment targets embodied in each country's development plan would serve as a proxy for I_g^*. This was not feasible since annual targets are often unavailable and are not expressed in comparable terms. Alternatively, in a Harrod-Domar framework, one can assume government planners aim for a total investment level, public and private, which ensures a target level of economic growth. Assuming capital-output coefficients for public and private sector capital formation, one would then expect I_g^* to be positively related to private sector investment, I_p. One could also apply an accelerator model, where change in total output becomes a variable. A problem with either specification is that there is only limited data on private sector investment. Inclusion of I_p significantly reduces the degrees of freedom in the estimation. Accordingly, the equations are estimated using both specifications (viz., with and without private investment). Since it is argued that depletion of foreign exchange reserves may dampen investment effort, this variable was included as an

Table 2

GOVERNMENT INVESTMENT AND DOMESTIC BORROWING

Dependent Variable and Estimation Technique	Sample	$A_{1,OFF}$	$A_{2,OFF}$	$A_{1,TOT}$	$A_{2,TOT}$	A_{BIL}	A_{MULT}	T	Y_{t-1}	$(Y_t - Y_{t-1})$	I_p	$R^2_{(N)}$
GOVERNMENT INVESTMENT												
A. NS-2SLS ν=0.65	Total	0.70 (3.21)	0.24 (1.65)					0.49 (11.10)	-0.02 (-1.23)			0.89 (61.00)
B. NS-2SLS ν=0.45	Anglophone	0.21 (0.84)	0.25 (1.74)					0.59 (11.84)	-0.05 (2.79)			0.93 (48.00)
C. NS-2SLS ν=0.57	Total			-0.03 (-0.09)	0.62 (3.61)			0.37 (6.96)	-0.01 (-0.34)			0.75 (67.00)
D. NS-2SLS ν=0.64	Total					0.37 (3.33)	-0.96 (-1.89)	0.40 (12.70)		0.01 (-0.25)		0.78 (75.00)
E. NS-2SLS ν=0.57	Total					0.37 (2.28)	-1.40 (2.47)	0.39 (5.66)		-0.05 (-1.61)	0.08 (0.48)	0.84 (48.00)
F. NS-2SLS ν=0.64	Anglophone					0.52 (2.12)	-0.67 (-0.86)	0.23 (2.97)		-0.10 (-2.65)	0.48 (2.32)	0.90 (35.00)
DOMESTIC BORROWING												
G. Dummy-2SLS ν=0.75	Total	-0.34 (-1.90)	0.03 (0.43)					0.03 (1.20)	0.01 (0.39)			0.81 (63.00)
H. Dummy-2SLS ν=0.75	Anglophone	-0.50 (-2.10)	0.01 (-0.11)					0.01 (0.05)	0.03 (0.67)			0.85 (50.00)
I. NS-2SLS ν=0.61	Total			-0.39 (2.17)	-0.29 (2.87)			-0.05 (-1.89)	0.04 (4.13)			0.28 (75.00)
J. NS-2SLS ν=0.61	Anglophone			-0.56 (2.91)	-0.24 (1.58)			-0.09 (-2.90)	0.06 (1.83)			0.41 (45.00)
K. NS-2SLS ν=0.65	Total					-0.06 (-0.81)	0.32 (0.98)	-0.03 (-0.96)	-0.03 (2.01)			0.08 (75.00)

additional predictor of I^*_g. It proved insignificant.

The results repeatedly indicate that aid has a positive effect on investment, but at a level far below unity. In equations A and B of Table 2, we observe coefficients for $A_{2,off}$ of 0.24 in both samples. Net grants have a significantly positive effect of 0.70 but only in the pooled sample, implying that the significance of grants arises primarily from the Tunisia and Morocco data. The coefficient for official loans is lower than that obtained using the measure of total loans, the coefficient of $A_{2,tot}$ rising to 0.62 in both samples (equations C and D). Grants remain insignificant in their effect. This implies a greater tied effect arising from private capital assistance to the public sector, and may reflect the direct investment realization embodied in loans in the form of suppliers' credits.

Again, bilateral aid is more significant than multilateral aid. The bilateral aid coefficient ranges from 0.36 to 0.52 and is roughly within the range observed for the two measures of loans. Multilateral aid yields a negative coefficient for the pooled sample, but again is insignificant for the Anglophone sample. This difference in effect is not surprising, because multilateral aid is a small proportion of total aid during the period under analysis. In fact, the coefficient for bilateral aid appears to be a good proxy for the total effect of official aid flows.

What is puzzling in the investment equation is the negative value obtained for the coefficient of both Y_{t-1} and $(Y_t - Y_{t-1})$, the alternative instruments for predicting I^*_g. One explanation is that the absence of I_p results in a specification error to the coefficient of the included variable. If the coefficient of I_p were negative as hypothesized above, and if there is a high correlation between I_p and Y_{t-1}, one would then observe a coefficient for Y_{y-1}, in the absence of I_p, considerably lower than its true coefficient. This might be sufficient to lower the coefficient below zero.

Unfortunately, introduction of private investment hardly rectifies this problem. In equations E and F, we observe that the coefficient of $(Y_t - Y_{t-1})$ remains significantly negative, and indeed private investment has a significantly positive coefficient in the Anglophone equation F. This may reflect technological and planned complimentaries between public and private investment: statistically, equations C and F have lower degrees

of freedom and there is considerable multicollinearity arising from the collinearity of our revenue instrument and private investment.

Finally, an increase in nondebt revenues has a surprisingly high marginal impact on the level of investment (per capita) with a coefficient ranging from 0.36 to 0.58.

Domestic Borrowing

Our estimation of the domestic borrowing equation was specified according to (7.5), and is identical to our investment equation. Comparing (7.5) and (7.2), it should be noted that (i) we should observe equal coefficients for I_g^* and (ii) the sum of the absolute value of the coefficients of T, and $(A_1 + A_2)$, respectively, offer estimates of our parameters $(1-\rho_1)$ and $(1-\rho_2)$, respectively. The estimates of these equations leave a much higher proportion of the variance unexplained relative to other equations. Since $\nu = .75$ in equations G and H, it is more accurate to estimate these equations with a dummy variable technique.[25]

Among our aid variables, official grants have a significantly negative impact on borrowing, whereas "official" loans have an insignificant effect. These are mixed results. One would definitely anticipate a negative impact on borrowing arising from the receipt of aid, but one would expect substitution as between domestic and foreign loans. When we substitute our measure of total foreign loans and grants, both the grant and loan coefficients have the expected negative sign. Private loans appear to strengthen the fiscal effect observed. Nevertheless, the level of these coefficients is surprisingly low, particularly with respect to the coefficients of the aid variables in the tax equations. It indicates that these countries have a lesser "fiscal" apprehension of a certain level of borrowing than one might expect from the "fiscally" conservative views often propounded in their budget documents.

To obtain a measure of $(1-\rho_2)$, the proportion of official aid flows maintained in the investment budget, we can use the coefficient of bilateral aid (in equations E and K), and obtain a value between 0.35 and 0.50. Using

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[25]The high R^2 in equations G and H relative to equation I, J, and K, reflect the inclusion of dummy variables in the former set.

our total grant and loan variables in equations C and I, we obtain values of $(1-\rho_2)$ of 0.40 for total grants and 0.89 for total loans, implying a composite effect in between.[26] Likewise, the sum of the coefficients of the total revenue term in the investment and borrowing equations yields an estimate of $(1-\rho_1)$, the share of total revenue diverted to the investment budget. The coefficient of T is quite small in the borrowing equation, implying a low marginal impact of nondebt revenues on domestic borrowing. The value of $(1-\rho_1)$ ranges from 0.4 to 0.5, which appears surprisingly high.

Government "Socio-Economic" and "Civil" Consumption

The final set of equations to be estimated were (7.3) and (7.4), for the two categories of government consumption. Their specification is identical: aid, nondebt revenues, GDP, lagged civil expenditures and a target G_s^* serve as the independent variables. As instruments for G_s^* we have used primary school enrollment and in some cases, an accelerator $(Y_t - Y_{t-1})$ comparable to that used in our investment equations. Technical assistance was introduced as a variable but it had no discernable impact. The high correlations obtained in the "socio-economic" consumption equations arise from the influence of the dummy variables also included in these equations (which were used because of the high value of ν).[27] The "civil" consumption equation has been estimated with the Nerlove-Swamy technique due to the lower value of ν.

These equations provide an alternative set of estimators of ρ_1 and ρ_2, which can be obtained from the sum of the coefficients of T and $(A_1 + A_2)$, respectively. In addition, one test on the theoretical validity of (7.3) and (7.4) is the equality of the absolute value of the coefficients of $G_{c,t-1}$.

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[26] It should be noted that this appears to be contradictory with the sum of the coefficients of official grants in equations A and G, where $(1-\rho_1)$ would be close to one. The coefficient of grants in the investment equation appears to be high relative to that observed in the Anglophone sample and the other equations using the total grants available.

[27] The value of ν obtained for these equations was uniformly above 0.8. In presenting these equations, the coefficient of the country dummy terms has not been included.

Table 3

"CIVIL" AND "SOCIOECONOMIC" CONSUMPTION

Dependent Variable and Estimation Technique	Sample	$A_{1,OFF}$	$A_{2,OFF}$	$A_{1,TOT}$	$A_{2,TOT}$	A_{BIL}	A_{MULT}	T	$G_{c,t-1}$	(in 10,000) Primary School Enrollment	Y	$(Y_t - Y_{t-1})$	R^2 (N)
"SOCIOECONOMIC" CONSUMPTION													
A. Dummy-2SLS	Total	-0.15 (-0.77)	0.27 (1.16)					0.36 (2.91)	-0.76 (-2.93)	1.58 (4.93)	0.001 (0.01)	0.08 (4.22)	0.98 (58.00)
B. Dummy-2SLS	Anglophone	0.24 (1.40)	0.09 (0.47)					0.13 (1.40)	-0.27 (1.32)	0.08 (0.28)	0.04 (1.88)		0.95 (45.00)
C. Dummy-2SLS	Total			0.17 (0.63)	-0.19 (-1.40)			0.41 (3.33)	-0.88 (-3.42)	1.96 (7.70)	-0.003 (-0.10)		0.98 (62.00)
D. Dummy-2SLS	Anglophone			0.02 (0.11)	0.10 (0.49)			0.24 (2.27)	-0.21 (1.95)	0.64 (2.25)	0.06 (2.52)		0.96 (50.00)
E. Dummy-2SLS	Total					0.34 (3.00)	0.98 (2.01)	0.15 (0.98)	-0.49 (-1.57)	1.30 (4.40)	0.03 (0.99)	0.06 (3.11)	0.98 (67.00)
F. Dummy-2SLS	Anglophone					0.25 (2.20)	1.15 (2.51)	0.06 (0.64)	-0.21 (0.96)	0.47 (1.85)	0.03 (1.37)		0.97 (52.00)
"CIVIL" CONSUMPTION													
G. NS-2SLS ν=0.34	Total	-0.16 (-0.67)	-0.37 (-2.24)					0.29 (3.79)	0.44 (2.80)		0.003 (-0.22)		0.82 (61.00)
H. NS-2SLS ν=0.34	Anglophone	0.58 (2.34)	-0.32 (-2.20)					0.37 (5.68)	0.39 (2.10)		0.09 (0.61)		0.92 (48.00)
I. NS-2SLS ν=0.51	Total			0.25 (0.76)	-0.43 (-3.02)			0.23 (1.96)	0.50 (2.32)	0.16 (-0.76)	-0.01 (-0.25)		0.82 (62.00)
J. NS-2SLS ν=0.51	Anglophone			0.44 (1.40)	-0.39 (-1.20)			0.32 (1.95)	0.20 (0.49)	0.07 (0.27)	0.01 (0.44)		0.90 (50.00)
K. NS-2SLS ν=0.46	Total					0.03 (0.20)	-1.06 (-2.04)	0.21 (1.62)	0.30 (1.14)	-0.18 (-0.57)	0.03 (1.14)		0.73 (67.00)
L. NS-2SLS ν=0.46	Anglophone					-0.10 (-1.02)	-2.10 (-4.80)	0.18 (1.65)	0.21 (0.91)	-0.40 (-1.51)	0.09 (4.04)		0.91 (52.00)

The equation for "socio-economic" consumption displays coefficients which appear reasonable in the context of the model. Nondebt revenues have a significant positive effect ranging from 0.12 to 0.41, with the higher effect observed in the pooled sample. A general limitation on the overall consumption budget is revealed in the consistently negative impact of lagged civil consumption (which is proportional to the "target" value for such consumption in the current period). The degree of competition is less in the Anglophone sample, with a coefficient of approximately -0.25 (Table 3, equations H and J) as opposed to a total sample coefficient of approximately -.08. The impact of loans and grants appears insignificant, regardless of the aid measure included. Paradoxically, bilateral and multilateral aid are both significant, but since this is at the expense of a reduction in the significance of the T term, these aid coefficients should be treated warily.

In the "civil" consumption equation, loans have a consistently negative impact and grants a positive, but only sporadically significant, effect. The former result is contrary to the model, and the behavioral mechanism which would rationalize this is not readily apparent. It may be an econometric artifact arising from the presence of a lagged endogenous variable. Again, bilateral and multilateral aid have a significant positive effect, with values that appear to be inordinately higher than would be anticipated.

The effect of $G_{c,t-1}$ is positive and below unity, as would be predicted from its parameter in (7.4). Equally interesting, its coefficient is fairly close to the negative of its coefficient in the G_s equations, particularly for equations B, C, H, J, K, and L. In the civil consumption equation, the coefficient of $G_{c,t-1}$ is centered between 0.4 and 0.5; there is greater variance in the "socio-economic" consumption equation. If the coefficient is 0.4, it implies a ratio of α_6 to α_8 of 1.5, or that the marginal disutility of an expansion in the "socio-economic" consumption budget is one and half times the marginal disutility of an overachievement (or shortfall) in the "civil" consumption budget. Since the value of the coefficient of $G_{c,t-1}$ in the Anglophone sample is lower, this would raise the ratio of the relative disutility of G_s relative to G_c.

Total revenues have a positive, significant impact on G_c, with a coefficient between 0.28 and 0.37. Adding this to the coefficient of T in the G_s equation yields a value of ρ_1 ranging from 0.5 in the Anglophone

sample to 0.65 in the pooled sample. This confirms the earlier estimates obtained from the I_g and B equations.

Likewise, in the earlier equations, we obtained estimates for ρ_2 of 0.11 and 0.57 for total loans and bilateral aid, respectively. In the consumption equation, addition of the significant coefficients yields a negative value for ρ_2 for total loans. Although lower than anticipated, we can assume that it implies that external loans remain wholly within the investment budget. The coefficients of bilateral aid, our proxy for total aid, imply a value of ρ_2 equal to 0.34 or slightly lower than the earlier estimate.

The results for grants are less satisfying. Using A_1, the coefficients are hardly significant and are not close to the value of ρ_2 of 0.6 implied earlier. Using $A_{1,off}$ we get contradictory results for the two samples. The pooled sample results indicate a value of ρ_2 close to zero; the Anglophone sample, a value between 0.5 and 0.7.

V. Conclusion

The results obtained from estimation of the model in Section IVB are encouraging. They are instructive of the dynamics of the fiscal process of the public sector in Africa, and shed light on some policy assertions which have been the subject of recent controversy. The study offers insights into the "revisionist" controversy surrounding aid, although it does not offer a fully conclusive judgment on the distribution of aid receipts between a reduction in government taxes and borrowing, and increases in alternative expenditure categories. This section will examine the policy and behavioral implications which may be drawn from the results of the estimation of the model.

1. The most reassuring aspect of the results is the confirmation of the basic assumptions of the model as it relates to fiscal behavior (ignoring, for the moment, the effect of aid flows). Both the sign and magnitude of the coefficients of the fiscal variables are reasonable in terms of the most basic behavioral assumptions. Nondebt revenues have a positive impact on each of the expenditure categories, with a total effect on

expenditures of close to unity.[28] With the exception of G_s, all other fiscal variables have the expected impact on nondebt revenue. The only significant coefficients of nondebt revenue on borrowing reveal an inverse relationship. If the results had shown consistently perverse signs for these relationships, the basic structure of the model would have been highly suspect.

2. The coefficients of the nondebt revenue variable in equations (7.2) through (7.5) imply that a one dollar increase in these revenues per capita leads to an increase in investment of approximately 37¢ to 49¢ per capita. In the pooled sample, the remainder is distributed fairly evenly, with "socio-economic" consumption obtaining a slightly larger share than "civil" consumption, and with only a small reduction in domestic borrowing. These results are not significantly affected by specifying the variables as shares of total output instead of on a per capita basis. In the smaller Anglophone sample, there is greater variability in the effect on investment (23¢ to 56¢), and "civil" consumption receives a slightly larger share of the remainder. These results would appear to verify Stanley Please's contention that an increase in the tax burden is not likely to be fully used for investment.

3. The results verify the fiscal interdependence between the recurrent and capital budgets. With α_1 equalling 0.5 to 0.65, one-third to one-half of tax and nontax revenues are used to finance the investment budget. If there were complete separability in the budgets (as embodied in constraint set (4.1) and (4.2)), nondebt revenues would have no impact on the investment equation, and vice versa; both possibilities can be clearly rejected. The opposite extreme of complete fungibility between all revenue sources and expenditures appears equally false. From the results of equation (7.5), nondebt revenues and domestic borrowing are obviously not fully substitutable. The sharp differences between loans, grants, and taxes would indicate that only a partial pooling of resources occurs, and that the amount of pooling depends on the balance between loans and grants.[29]

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[28] Adding the coefficients of taxes on the other fiscal variables, we obtain sums ranging from 1.01 to 1.13 for the pooled sample, and 0.7 to 1.09 in the Anglophone sample.

[29] With a perfect fungibility assumption, the coefficients of I_g, $(A_2 + A_3)$ and $(\alpha_1 G_{c,t-1} + G_s)$ would be the same, thus pooling them into a

4. Given the estimates of ρ_1 and ρ_2, we can then derive estimates of the relative value of the utility parameters associated with the quadratic terms of the utility function. For example, the ratio of the revenue coefficients in (7.2) and (7.5) yield an estimate of (α_{10}/α_2). The following results are indicated. First, there is a high rate of diminishing utility to borrowing (α_{10}), relative to the disutility (α_2) of not achieving the desired investment target $(\alpha_2/\alpha_{10} = 0.07)$. Second, shortfalls or excesses in civil consumption are associated with greater diminishing utility than deviations from the investment target $(\alpha_2/\alpha_6 = 0.05)$, implying that realization of internal order and security objectives take priority over investment realization. Third, deviations from "socio-economic" consumption expenditure targets are subject to more rapidly diminishing returns than deviations from the government revenue target. Finally, deviations from the revenue target are considerably less costly than excessive borrowing $(\alpha_4/\alpha_{10} = 0.14)$, implying a greater disposition at the margin, to use tax finance than borrowing to finance development.

5. The results dealing with the impact of aid flows are not fully conclusive. Certain broad conclusions can be drawn. First, one should be wary on drawing <u>any</u> inference from this study as to the relative impact of bilateral and multilateral forms of aid. The results are often inconsistent and counterintuitive. One can only speculate that the level of multilateral aid during the period was too small to significantly affect the actions of the public decision maker. The consequences of a dramatic change in the mix of bilateral and multilateral aid cannot be inferred from this study.

Second, the following recurring results should be noted: (1) the sharp negative impact of aid on nondebt revenues, with very significant coefficients quite close to unity (and often exceeding it); (2) the significant positive effect of aid, particular loans and bilateral aid, on investment, with coefficients usually less than .6 and often lower; (3) the negative impact of total aid on domestic borrowing, although this appears

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measure of the net fiscal demand on the public sector. With complete separability, $\rho_4 = 1$ and $\rho_2 = 0$; both I_g and $(A_2 + A_3)$ would disappear from equation (7.1). Similarly, complete separability implies that T ought not to be in the equation for I_g, (7.2); complete fungibility would lead to a pooling of the effect of aid, taxes, and other consumption, yielding a measure of the fiscal surplus available for investment.

to arise principally from the effect of private capital flows and official grants; (4) the weak positive effect of aid on "socio-economic" consumption, and (5) the positive impact of grants, and the negative impact of loans, on "civil" consumption.

Third, the study would suggest that loans and grants differ in their effects and that the balance between private and public loans will also affect the ultimate fiscal consequences of aid. The grants variable has its primary impact in raising "civil" consumption and in reducing domestic borrowing. Although grants also raise investment, this is an effect not consistently observed throughout the study, and disappears in the smaller Anglophone sample.

Loans offer a far more consistent picture which closely matches the above description on the overall impact of aid. Comparing official loans to total loans, the latter has a stronger effect on raising investment and lowering the level of borrowing and domestic taxation. From the estimates of ρ_2, the average share of loans allocated to the capital budget is close to 90%; the results from the Anglophone sample indicate a much lower share of grants (30% to 50%) flow to the capital budget.

The problem in judging the implication of these ρ_2 values for the "revisionist" controversy on aid is that it is generally agreed that some proportion of aid, particularly grants, are intended at the outset to be used for government consumption. To justify the revisionist position, it is the size of the deviation from that unknown proportion that one would have to evaluate. Similarly, a value of ρ_2 close to unity for loans implies only that loans are not used to finance additional government consumption. The revisionist position is bolstered by the fact that a principal effect of loans is to lower taxation and borrowing.

It would be of obvious interest to obtain a breakdown of the relative impact of a unit of aid as between increases in expenditure and reductions in nondebt revenues and borrowing. This may be done at two levels. First, one can sum up the coefficients of aid on each of the variables to obtain the net increase in revenues (ΣR_1) and expenditures (ΣE_1) arising from a unit increase in aid. This reflects the immediate impact, embodying only the partial derivatives, and not the full impact arising from the

subsequent effects of a change in one fiscal variable on all the others.[30] At this level a unit of loans leads to a negligible ΣE_1, and an ΣR_1 which varies from -0.10 to 0.16. The fall in borrowing and nondebt revenue offsets the aid inflow, and the rise in investment is offset by a fall in other forms of government consumption. This relates to both samples, although ΣR_1 is lower in the Anglophone case.

Grants have a more substantial ΣR_1 (0.44 to 0.61), with a comparable increase in ΣE_1. In this case, only borrowing is reduced, and consumption, primarily civil, is responsible for the corresponding increase in ΣE_1. These results imply that loans lead less to an expansion of the government's role, than to a shift in the mix of expenditures from consumption to investment. Grants lead to an increase in consumption and a reduction in borrowing.

Another measure of the ultimate impact of aid would be the value of the total derivative of each variable with respect to aid (yielding sums denoted as ΣE_2 and ΣR_2).[31] With the exception of bilateral aid, which is our proxy for total aid, the results are less satisfactory in terms of the consistency of ΣR_2 and ΣE_2 obtained. Using bilateral aid in the pooled sample, values of 0.63 and 0.48 are observed for ΣR_2 and ΣE_2 respectively, with expenditure increases divided between "socio-economic" consumption and investment. Only nondebt revenues decline. In the Anglophone sample, both ΣR_2 and ΣE_2 are reduced to .13 and .22 respectively; the major difference is a more substantial reduction in nondebt revenue and a reduction in civil consumption. In general, the Anglophone sample yields a lower ΣR_2 and ΣE_2 than is obtained in the pooled sample.

The results obtained for the loan variables are fairly consistent in yielding a ΣR_2 of approximately .4, although the private loan component shifts the reduction away from nondebt revenues and toward borrowing. The total derivatives on the expenditure side yield a much lower ΣE_2 varying from -.61 to -.22, and it is in this sense that these results are unsatisfactory. This effect is due to the unexpectedly negative coefficients of

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[30] We can define $\Sigma R_1 = 1 + \frac{\delta T}{\delta A} + \frac{\delta B}{\delta A}$, and $\Sigma E_1 = \frac{\delta G_s}{\delta A} + \frac{\delta G_c}{\delta A} + \frac{\delta I_g}{\delta A}$.

[31] We can define $\Sigma R_2 = 1 + \frac{dT}{dA} + \frac{dB}{dA}$ and $\Sigma E_2 = \frac{dG_s}{dA} + \frac{dG_c}{dA} + \frac{dI_g}{dA}$.

aid on civil consumption.

Although less satisfactory, these results nevertheless provide further confirmation that aid is used to substitute for domestic resource mobilization, and that even the net increase in mobilized resources is only partially used for investment. This would appear to strengthen the case of the critics of aid, at least with regard to the savings and investment activities of the public sector.

6. Finally, this study suggests that further research on the fiscal activities of the public sector might be fruitful. Our equation system is relatively simple and remains highly aggregative. A more detailed breakdown of the revenue sources and expenditure uses of the public sector, with a more detailed specification of the determinants of each, would be desirable. By further disaggregation, one would be able to better comprehend the decision process of the public sector, and the way in which it is affected by foreign capital inflows.

BIBLIOGRAPHY I

[1] Gramlich, Edward M. "State and Local Governments and their Budget Constraint." International Economic Review. Vol. 10, no. 2 (June, 1969):

[2] Griffin, K. B. and Enos, J. L. "Foreign Assistance: Objectives and Consequences." Economic Development and Cultural Change (April, 1970), pp. 313-337.

[3] Heller, Peter S. The Dynamics of Project Expenditures and the Planning Process: with Reference to Kenya. Unpublished Ph.D. dissertation, Harvard University, 1971.

[4] Henderson, James H. "Local Government Expenditures: A Social Welfare Analysis." Review of Economics and Statistics (May, 1968), pp. 156-163.

[5] Krishnamurty, K. Savings and Taxation in Developing Countries: An Empirical Study. International Bank for Reconstruction and Development, Economics Department Working Paper No. 23, August 28, 1968.

[6] Mikesell, Raymond F. and Zinzer, James E. "The Nature of the Savings Function in Developing Countries: A Survey of the Theoritical and Empirical Literature." The Journal of Economic Literature, Vol. XI, no. 1 (March, 1973): 1-26.

[7] Maddala, . "The Use of Variance Components Models in Pooling Cross-Section and Time Series Data." Econometrica, Vol. 39, no. 2 (March, 1971): 341-358.

[8a] Nerlove, M. and Balestra, P. "Pooling Cross-Section and Time Series Data in the Estimation of a Dynamic Model: The Demand for Natural Gas." Econometrica, Vol. 34 (July, 1966): 585-612.

[8b] _____. "Further Evidence on the Estimation of Dynamic Economic Relations from a Time Series of Cross-Sections." Econometrica, Vol. 39, no. 2 (March, 1971): 359-382.

[9a] Papanek, G. F. "Aid, Foreign Private Investment, Savings and Growth in Less Developed Countries." Journal of Political Economy, Vol. 81, no. 1 (January, February, 1973): 120-130.

[9b] _____. "The Effect of Aid and Other Resource Transfers on Savings and Growth in Less Developed Countries." Economic Journal, 327 (September, 1972):

[10a] Please, Stanley. "Savings Through Taxation - Mirage or Reality." Finance and Development, 4 (March, 1967): 1-10.

[10b] _____. The Please Effect Revisited. International Bank for Reconstruction and Development, Economics Department Working Paper, No. 82, July, 1970.

[11] Rahman, H. A. "Foreign Capital and Domestic Savings: A Test of Haavelmo's Hypothesis with Cross-Country Data." Review of Economics and Statistics, Vol. 50 (February, 1968): 137-138.

[12] Swamy. Statistical Inference in Random Coefficient Models. Springer-Verlay, 1972.

[13] Wallace, T. D. and Hussain, A. "The Use of Error Component Models in Combining Cross-Section with Time Series Data." Econometrica, Vol. 37 (January, 1969): 55-72.

[14a] Weisskopf, Thomas. "The Impact of Foreign Capital Inflow on Domestic Savings in Underdeveloped Countries." Economic Development Report No. 156 (July, 1970), Harvard University.

[14b] _____. "An Econometric Test of Alternative Constraints on the Growth of Underdeveloped Countries." Economic Development Report No. 155 (June, 1970), Harvard University.

[15] Wolfson, Dirk J. and van de Ven, Petrus J. "Problems of Budget Analysis and Treasury Management in French Speaking Africa." International Monetary Fund (DM/68/28).

BIBLIOGRAPHY II: DATA SOURCES

Government of Ethiopia. Central Statistics Office. Statistical Abstract 1966, 1967, 1968.

Government of Ethiopia. National Bank of Ethiopia. Seventh Annual Report 1970.

Government of Ethiopia. Quarterly Bulletin, no. 23 and 27.

Republic of Ghana. Quarterly Digest of Statistics, vol. XVI, no. 4, 1967; and, vol. XIX, no. 3, 1970.

Republic of Ghana. Statistical Yearbook, 1970.

Republic of Kenya. Ministry of Economic Planning and Development. Statistical Abstract 1966 through 1971, Nairobi.

Republic of Kenya. Ministry of Finance. Appropriation Accounts, 1970/71.

Republic of Liberia. Department of Planning and Economic Affairs. Economic Survey of Liberia, 1970.

Republic of Liberia. Quarterly Statistical Bulletin of Liberia, no. 7-72, (March 1972).

Republic of Malawi. Government Printer. Public Sector Financial Statistics 1969, 1970, Zomba, Malawi.

Republic of Malawi. National Accounts Record 1964-1968.

Republic of Malawi. National Statistics Office. Compendium of Statistics 1970, Zomba, Malawi.

Kingdom of Morocco. Annuaire Statistique du Maroc, 1968.

Kingdom of Morocco. Bulletin Economique et Sociale XXI-115, Oct.-Dec. 1969.

Kingdom of Morocco. Economic Intelligence Unit. The Economist.

Kingdom of Morocco. Ministère d'état chargé du Plan et de la formation des Cadres. Situation Economique, 1968, 1969, 1970.

International Bank of Reconstruction and Development. Evolution et Perspectives Economiques du Maroc. Report no. EMA 276.

Federal Republic of Nigeria. Central Bank of Nigeria. Economic and Financial Review, 1970.

Federal Republic of Nigeria. Fed Office of Nigeria. Annual Abstract of Statistics.

Government of Northern Rhodesia. Economic Report 1964.

The United Republic of Tanzania. Bureau of Statistics. National Accounts of Tanzania: 1964-1970, Dar es Salaam, Tanzania.

Republic of Tunisia. Annuaire Statistique de la Tunisie.

Republic of Tunisia. Banque Centrale de Tunisie. Annual Reports.

Republic of Tunisia. Budget de Fonctionnement (Titre I), Recettes et Dépenses, Mai 1972.

Republic of Tunisia. Les Comptes de la Nation, tome II, 1960 à 1964.

Republic of Uganda. Statistics Division, Ministry of Planning and Economic Development. Government Accounts of Uganda, 1959/60-1964/65.

Republic of Uganda. Statistics Division, Ministry of Planning and Economic Development. Statistical Abstract, 1969, 1971.

Government of Zambia. Economic Report 1969, 1970, 1971.

Agency for International Development. AID Country Book: Africa, 1967, 1970.

International Monetary Fund. Balance of Payments Yearbook.

International Monetary Fund. Surveys of African Economies, vol. 2. (Washington, D.C., 1970).

United Nations. Monthly Statistical Bulletin.

United Nations. Statistical Yearbook 1970.

United Nations. Yearbook of National Accounts Statistics, 1970.

Organization for Economic Cooperation and Development. Geographical Distribution of Financial Flows to Developing Countries, 1960-1964, 1965-1966, 1967, 1968. Paris.

Organization for Economic Cooperation and Development. Development Cooperation 1969, 1970, 1971. Paris.

BIBLIOGRAPHY III

Republic of Ghana. 1965 Budget Statement by K. Amoako-Atta, Minister of Finance. Government Printing Department, Accra, Ghana.

Republic of Ghana. Budget Statement for 1966-67 by Lt.-Gen. J.A. Ankrah, Chairman. State Publishing Corporation, Accra-Tema, Ghana.

Republic of Ghana. Budget Statement for 1967-68 by Brigadier A.A. Afrifa, Ministry of Finance. State Publishing Corporation, Accra-Tema, Ghana.

Republic of Ghana. Budget Statement for 1968-69 by Brigadier A.A. Afrifa, Ministry of Finance. State Publishing Corporation, Accra-Tema, Ghana.

Republic of Ghana. Budget Statement for 1969-60 by Mr. J.H. Mensah, Ministry of Finance. Ghana Publishing Corporation, Accra-Tema, Ghana.

Republic of Ghana. Budget Statement for March to June 1972 by Col. I.K. Acheampong, Chairman of the National Redemption Council. Ministry of Finance and Economic Planning. Ghana Publishing Corporation, Accra-Tema, Ghana.

Republic of Kenya. Budget Speech for the Fiscal Year 1971/72 (1st July - 30th June) by The Hon. Mwai Kibaki, Minister for Finance and Economic Planning. Government Printer, Nairobi.

Republic of Malawi. Budget Statement 1967 presented by The Honourable J.Z.U. Tembo, M.P., Minister of Finance.

Malawi Government. 1968 Budget presented by The Honourable J.Z.U. Tembo, M.P., Minister of Finance.

Malawi Government. 1969 Budget Statement presented by The Honourable J.Z.U. Tembo, M.P., Minister of Finance.

Malawi Government. 1971 Budget Statement presented by The Honourable A.K. Banda, Minister of Finance.

Federal Republic of Nigeria. The Mobilisation Budget, 1962, by Chief the Honourable Festus Sam Okotie-Eboh, Federal Minister of Finance. Federal Ministry of Information, Lagos.

Federal Republic of Nigeria. Budget Speech by the Federal Minister of Finance, Chief the Hon. Festus Sam Okotie-Eboh, 1964. Federal Ministry of Information, Lagos.

Federation of Nigeria. Budget Speech 1966 by His Excellency Major-General J.T.U. Aguiyi-Ironsi. Federal Printing, Lagos.

The United Republic of Tanzania. Speech by the Honourable the Minister for Finance Introducing the Estimates of Revenue and Expenditure 1967/68 to the National Assembly. Dar es Salaam.

The United Republic of Tanzania. Speech by the Honourable the Minister for Finance Introducing the Estimates of Revenue and Expenditure 1969/70 to the National Assembly. Dar es Salaam.

The United Republic of Tanzania. Speech by the Minister for Finance Introducing the Estimates of Public Revenue and Expenditure for 1971/72 to the National Assembly. Dar es Salaam.

Uganda Government. Budget Speech delivered in the National Assembly on the 15th June, 1966 by the Honourable L. Kalule-Settala, Minister of Finance. Entebbe, Uganda.

Uganda Government. Budget Speech delivered in the National Assembly on the 14th June, 1967, by the Honourable L. Kalule-Settala, Minister of Finance. Entebbe, Uganda.

The Republic of Uganda. Budget Speech delivered in the National Assembly on the 18th June, 1968, by the Honourable L. Kalule-Settala, Minister of Finance. Entebbe, Uganda.

The Republic of Uganda. Budget Speech delivered in the National Assembly on the 19th June, 1969, by the Honourable L. Kalule-Settala, Minister of Finance.

The Republic of Uganda. Budget Speech delivered in the National Assembly on the 17th June, 1970, by the Honourable L. Kalule-Settala, Minister of Finance. Entebbe, Uganda.

The Republic of Uganda. Budget Speech delivered in the National Assembly Chamber Kampala, on Thursday, 15th June, 1972 by the Minister of Finance, Planning and Economic Development, Hon. E. B. Wakhweya. Entebbe, Uganda.

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