United Nations University

WIDER

World Institute for Development Economics Research

Discussion Paper No. 2001/72

Public Finance and Economic Growth

Empirical Evidence from Developing Countries

Matthew O. Odedokun*

September 2001

Abstract

The study is an empirical test of the effects of different categories of government expenditure, revenue and deficits on economic growth in developing countries. It is based on panel data of annual series over the last three decades for 103 countries, which are further classified into low-income, high-income, mineral exports dependent, and foreign aid dependent groups. Our findings suggest that the effects of the fiscal variables on growth vary across these groups of countries. But broadly, capital expenditure have been detrimental to growth, just as current expenditure on goods and services, while expenditure on wages and salaries is growth-promoting. …/…

Keywords: fiscal policy, public finance, economic growth

JEL classification: O23, O40

* UNU/WIDER

This study has been prepared within the UNU/WIDER project on "New Fiscal Policies for Growth and Poverty Reduction". Project Director: Tony Addison

UNU/WIDER gratefully acknowledges the financial contribution to the project by the Government of Italy (Directorate General for Development Cooperation).

Also, functional expenditure on general administration and defense have retarded growth while spending on education and, to some extent, transport and communications sector are growth-friendly. Other economic and functional categories of spending generally have mixed effects, which are sometimes statistically insignificant. Non-tax revenue retards growth in only high-income and mineral exporting groups of countries. Taxes on income and profits are growth-retarding, just as taxes on domestic goods and services in all groups, except mineral exporting one. Taxes on international trade are found to be growth-promoting in only the low-income and foreign aid dependent groups of countries. Foreign grants promote growth in only the group of countries that heavily depend on them while fiscal deficits, whether domestically or foreign financed, retard growth.

Acknowledgements

Presented at the United Nations University/World Institute for Development Economics Research (UNU/WIDER) Project Meeting on Fiscal Policies for Growth and Poverty Reduction, Helsinki, Finland, 17-18 November 2000.

Comments provided by colleagues on the initial draft are gratefully acknowledged. But any errors and omissions are those of the author alone.

1 Introduction

Public expenditure accounted for over 25 percent of GDP in developing countries in the last three decades (see Table 1). Thus, while public expenditure and revenue do not capture the totality of public actions on the economy, they do account for the bulk of it. Therefore, an understanding of how public actions can be better shaped in improving the economy requires a knowledge of the direction and magnitude of the effects of government expenditure and revenue on economic growth—the promotion of which has always been a central objective of public finance.

For this reason, the role of public expenditure and their sources of finance on economic growth has been attracting some attention in the literature, particularly since early 1990s. At the theoretical level, the direction of effects of expenditure and taxation has been analyzed within both the neoclassical and endogenous growth frameworks, but with neither a categorical consensus nor unanimous conclusion as to whether the expenditure or taxation has unambiguous effect—whether positive or negative—on transitional growth rate (in the case of neoclassical paradigm) or steady-state growth path (within the endogenous growth approach). The ambiguity is even more pronounced at the empirical level, as mixed results pervade the literature. As aptly concluded by Agell *et al.*. (1997, p. 33), "...the theoretical and empirical evidence … is found to admit no conclusion on whether the relation is positive, negative or non-existent".

In an attempt to further narrow down the often conflicting empirical findings, efforts later moved from an analysis of the effects of aggregate government spending and revenue on economic growth to an examination of the effects of different categories of spending and revenue so as to identify which of them can be labeled "productive" and "unproductive". Studies reported by Easterly and Rebelo (1993) and Devarajan *et al.* (1996) were among the earliest under this category, when viewed from a multi-country and developing country perspective. But, even then, the lack of unanimity in the findings has still existed. In part, this is probably due to differences in the composition of countries sampled, as the effects of each item of government expenditure and revenue on growth is likely to be conditioned by the context or environment in which it takes place—e. g. whether it is in a low- or high-income country as well as whether it is in a country that depends on "windfall" or "gratuitous" external sources of finance.

Following from the foregoing, the present study would try to shed further light on the unresolved issues by focusing on different groups of developing countries, based on the level of per capita income as well as on the degree of dependence of the budget on external "windfall" and "gratuitous" sources of finance.[1] It will also present a more disaggregated analysis of the fiscal variables, and report an updated evidence from a more comprehensive list of developing countries, as most of the existing studies have

[1] The "windfall" external sources of finance in the budget is used here to mean dependence on revenue from export of petroleum and other minerals while "gratuitous" external sources refer to the proportion of expenditure financed through foreign grants. Strictly speaking, revenue from petroleum and other minerals are not derived from exports as such but from production, whether exported or not, in the form of royalties and profit tax.

been based on developed country data sets.[2] Annual panel data over 1970s to 1990s for over 100 developing countries are employed in the study.

The remaining discussion is organized into 4 sections. The next section is on literature review. In section 3, we spell out the rationale for the study, describe the model and method of its estimation; and discuss the data employed. The empirical results are presented in section 4 while section 5 is on summary and conclusion. An appendix listing the countries covered is provided at the end of the text.

2 Brief literature review

At the theoretical level, neoclassical growth model of different shades have been used in studying the effects of government expenditure and taxation on growth. A common feature of all neoclassical models is that policies, fiscal or otherwise, can only affect the level of income but not the steady state economic growth rate—which can only be affected by the rate of technological change and population (or labor force) growth. However, policies can affect the speed of transition from one steady state to another and, hence, economic growth during the transition. So, assumption of the economy being in transit from one steady-state to another has to be invoked for policies to be relevant in determining growth rate—see Barro and Sala-i-Martin (1995) and Temple (1999). As reviewed in Easterly and Rebelo (1993), some—e.g. Sato (1967) and Feldstein (1974)—used Solow's (1956) version while others—like Judd (1985) and Chamley (1986)—use the variant developed by Cass (1965) and Coopmans (1965).

More recently, however, the endogenous growth theory was developed by Romer (1986), Lucas (1988) and others. Within this framework, polices can affect steady-state growth rate and not just the growth rate during the transition from one steady-state to another. Following this development, a number of studies—e.g. Barro (1990) and Cashin (1995)—have tried to model the effects of government expenditure and taxes on steady state growth.

Whether based on the neoclassical or endogenous growth framework, the prediction emerging from many of the theoretical studies is that taxes on investment and income hinder growth, particularly by reducing returns to (and, hence, accumulation of) capital. Similarly, neutral or negative effects of government consumption expenditure and positive effects of government investment expenditure have often been predicted (Aschauer, 1989). But these outcomes depend on the assumptions made, as some other studies utilizing a different set of assumptions do generate contrary predictions. The prediction of the effects of fiscal deficits on growth is equally mixed, with negative effects being applicable—within the context of infinite horizon models - when a higher deficit today is assumed to be eliminated in future through taxes on income or consumption. Alogoskoufis and Ploeg (1991) employed an overlapping generation model to predict negative effects of fiscal deficits on savings rate and growth.

---

[2] Annual panel data over 1970s to 1990s for over 103 developing countries (see the appendix) are employed in the study—the most comprehensive of the limited number of studies based on developing countries ever reported in the literature.

At the empirical level, there have been a number of studies testing for the effects of aggregate government spending (or, sometimes, government consumption and investment spending separately considered) and taxation on growth. Some of these are based on time series studies for a single country or a number of countries, as in Ram (1986) and Roy and Vadlamudi (1998), while others employ cross-country data, as in Barro (1991) and Odedokun (1997). Later, research efforts started to focus on an examination of the effects of different economic and functional categories of government expenditure as well as taxes on growth. A pioneering study along this line, within a multi-country context, is that of Easterly and Rebelo (1993). Others, like that of Devarajan *et al.* (1996), have since been reported and a most recent review of these is presented in Folster and Henrekson (1999). Here, we only highlight two features of these and earlier studies that have been reported. One of the features is the lack of unanimity in the empirical findings, which often conflict with one another. For instance, while some have identified growth-promoting effects of government investment spending and selected functional categories of government spending (particularly, on education and infrastructure), others have not. The second feature is the fewness of studies based on developing countries among those that are being reported, as researchers appear to be more at ease with the ready availability and high quality of fiscal data for developed countries and because of other reasons that have been adduced by Slemrod (1995) and Folster and Henrekson (1999). While some painstaking efforts have actually been made to cover developing countries in a number of studies, as in Easterly and Rebelo (1993), Devarajan *et al.* (1996) and Odedokun (1997), the number is relatively very few.

There is therefore the need to further shed light on the rather conflicting findings that have so far been reported and also to give an exclusive coverage to the developing countries. Accomplishing these are some of the objectives of the present study.

3 Rationale for the study, model specification and the data

3.1 Rationale for the study

The present study explores or tests for the effects of different categories of government spending and revenue on economic growth in developing countries. It also explores whether the developing country-wide effects vary between poorer and richer sub-groups as well as whether the effects depend on the extent to which the government depends on external "windfall" revenue from mineral exports and "gratuitous" receipts in the form of grants.

The reason for the focus on developing countries has been adduced above—most of the existing studies have been based on developed countries. As to the reason for the low- and high-income groups, the effects of public finance on growth are often said to vary according the level of per capita income. According to Folster and Henrekson (1999), "Yet, studies that mix rich and poor countries do not necessarily represent a good test of what theory predicts. Theoretical reasoning … point to an expectation of a negative effect in countries where the size of the government sector exceeds a certain threshold. In practice, we only observe very large public sectors in rich countries."

Concerning the separate treatments accorded the group of countries that depends on external "windfall" revenue from mineral exports and other one that depend on "gratuitous" receipts in the form of official transfers from abroad, the hypothesis to be tested is whether dependence on these sources of revenue affects the efficiency of their utilization. In these groups of countries, especially the group that depend heavily on revenue and royalties derived from mineral exploitation, the size of government is typically larger. Because of this and due to the fact that there are no specific tax payers for such revenue sources, the government may be less accountable (to taxpayers that do not really exist as such) and rent-seeking is likely to be more prevalent. It has been posited, e. g. by Olson (1982), that this type of scenario tends to give rise to evolution of organized interest groups that seek to promote legislations and government spending of the type that retards growth. This type of situation can also promote corruption of the type that leads to a diversion of government resources into unproductive uses.

3.2 Model specification

Whether based on the neoclassical or endogenous framework, the model often specified for testing the effects of fiscal variables on growth broadly consists of a regression equation with growth of per capita (or per labor) income as the dependent variable and a set of conditioning variables as well as the fiscal variables of interest as the regressors.[3] This same broad approach is adopted in the following study. Specifically, the equation specified for estimation is of the following form:

$$gy_{it} = \alpha Z_{it} + \beta X_{it} + u_{it} \quad \ldots\ldots (1)$$

where: gy = growth rate of per capita real GDP;

Z = vector of conditioning variables;

X = vector of fiscal variables—either on the expenditure or revenue sides of budget;

α = vector of parameters of the conditioning variables;

β = vector of parameters of the fiscal variables;

u = stochastic or random term; and

i, t subscripts = country and time subscripts, respectively—because of the use of panel data.

3.2.1 Conditioning variables

These are not the variables whose parameter estimates are of immediate interest in the study. But they are included so that the estimates of the fiscal variable parameters would

[3] The interpretations of the resulting parameter estimates, however, differ. Under the neoclassical setting, they represent transitional effects on growth rate that is moving from one steady-state to another while, under the endogenous growth framework, they are interpreted as permanent effects on the steady-state growth rates.

be purged, as far as feasible, from the imprecision due to errors of omitted variables. There is a wide array of such variables that have been postulated as determinants of growth rates. Here, we limit our consideration to those adjudged to be important ones which, at the same time, are unlikely to be highly correlated with fiscal policy variables.

One of these is the initial level of per capita income, which has always featured in practically all previous studies and it is particularly favored by the neoclassical approach. Higher-income economies are expected to grow more slowly than lower-income ones and its parameter estimate should therefore be negative. We also include a demographic variable—population dependency ratio. A high ratio is expected to deter growth. A third one is the degree of openness of the economy (proxied by the ratio of external trade to the GDP). We expect more open economies to record faster growth. Finally, terms of trade growth is included as an indicator of external shock, the expectation being that a country's growth would be enhanced by a favorable terms of trade movement.[4]

3.2.2 Fiscal variables

These are considered and tested for at various levels of aggregation but, in all cases, government spending and their sources of finance do not feature simultaneously in a particular equation to avoid what could amount to "double" counting. An overview of these fiscal variables and their magnitudes are as shown in Table 1.

On the expenditure side, at the highest level of aggregation, total expenditure is included. This is followed by a disaggregation into just two economic classifications, current and capital expenditure and, then, a further disaggregation of the current expenditure into five, viz: spending on goods and services; wages and salaries; interest payments; subsidies and other transfers; and others (miscellaneous). In an alternative specification, the total expenditure is disaggregated on a functional basis into seven, viz: expenditure on general administration; defense; education; health; transport and communications; other economic services; and others (miscellaneous).

On the other side of the budget, and at the highest level of aggregation, the total sources of finance is simply disaggregated into just revenue (including grants) and deficits. This is followed by a further disaggregation of the revenue into three—tax; non-tax and grants. A further disaggregation is accomplished by breaking the tax revenue into income and profits tax; domestic tax on goods and services; taxes on international trade; and other (residual or miscellaneous) taxes. The only disaggregation of fiscal deficit considered is domestic and foreign sources of deficit financing.

As to the expected direction of the effects of the above fiscal variables on economic growth, the existing theories do not provide specific or definitive predictions. Hence, it

---

4 Unlike in some previous studies, we deliberately exclude the share of investment in GDP as a conditioning variable. This is for a number of reasons. Investment includes a sizeable amount of government investment spending. In addition, the channels through which fiscal policy actions can influence growth are through changes in the rate of capital accumulation and efficiency of its utilization. Inclusion of the share of investment spending in the equation means the first channel is being controlled for, so that only the effects of fiscal variables on growth through the efficiency channel can be identified.

is safer to let them be data-determined or empirically observed. All we can do at this stage is to review the reasons why some of them might have positive effects and others, negative effects. Government spending of the type that corrects for the existence of market failures (including provision of collective goods and goods with externalities as well as goods that are typically produced through natural monopolies) are likely to promote growth and this type of government spending are being referred to in the literature as “productive” government expenditure. Similarly, if the income effect of higher income taxes is opposite to and sufficiently very high to offset the (growth-retarding) substitution effect on labor supply, then it too can promote growth. On the other hand, government spending would be growth-retarding if it crowds out private investment and private production; is bedeviled with rent-seeking and corruption; or the requisite expenditure administrative capacity is lacking. In the same vein, taxation would likely be detrimental to growth by creating a gap between gross and net returns on saving and by being a disincentive to labor supply. This apart, poor tax administration too can lead to the same result.

Table 1: Mean values of components of government expenditure and their sources of finance (percent of GDP)

	All countries	Low-income	High-income	Mineral exporters	Sizeable foreign aid receivers
Functional expenditure classif.—total	25.72	23.50	27.41	28.44	24.10
Gen. Administration	3.45	3.92	3.14	3.67	4.20
Defense	3.17	2.52	3.58	5.22	2.31
Education	3.46	3.20	3.65	3.67	3.42
Health	1.63	1.28	1.87	1.59	1.49
Transportation	1.85	1.96	1.79	1.82	2.39
Other economic services	3.96	4.12	3.90	4.37	4.11
Economic expenditure classif.					
Goods & services	12.11	11.86	12.20	13.76	12.55
Wages & salaries	6.96	6.60	7.16	7.83	7.01
Interest payments	2.57	2.37	2.70	2.65	2.07
Subsidies & other current transfers	5.93	3.84	7.23	5.07	3.42
Capital expenditure	5.67	6.52	5.15	7.09	7.04
Current revenue & grants—total	23.30	19.90	25.98	27.28	20.81
Taxes on income and profits	5.15	4.16	5.96	7.33	3.67
Taxes on domestic goods & services	4.67	4.22	5.04	3.08	3.92
Taxes on international trade	4.33	4.85	3.96	3.28	5.60
Other taxes	2.24	0.99	3.22	1.67	0.97
Non-tax revenue	5.27	3.35	6.76	10.83	3.12
Grants	1.59	2.30	1.04	0.99	3.57
Sources of fiscal deficit financing—total	3.54	5.07	2.41	2.34	4.23
Domestic	1.77	2.64	1.11	1.41	3.02
Foreign	2.09	2.64	1.67	2.15	1.41

Notes: (i) The components may not add up to the aggregates because they generally have different number of observations.

(ii) Deficits are represented by positive numbers.

3.3 Estimation methodology

We are very conscious of the possibility of endogeneity of the right-hand variables, i.e. reverse causation from economic growth to the fiscal variables and most of the conditioning variables discussed above. Most of the previous empirical studies on the subject have been faulted by subsequent reviewers on this ground. To cater for this, we refrain from relating contemporaneous growth rate with the contemporaneous right-hand variables. Instead, the initial values of the latter (i. e., during year t) are used as regressors in the equation containing 5-year moving average growth rate (i. e. over year t+1 to year t+5) as the dependent variable. The only exception is the terms of trade growth, whose contemporaneous value (also measured as 5-year average growth rate) is expected to be truly independent of contemporaneous economic growth.[5]

The study is based on time series (annual) data pooled across the countries into a panel. To derive the estimates, we employ fixed-effect method of panel data estimation. This technique caters for the existence of country-specific factors that do affect economic growth by allowing the intercept term to vary across countries.

Also, due to the existence of large variation in the values of the regressors across countries, we correct for possible existence of heteroscedasticity by employing White's (1980) homoscedasticity-consistent estimation technique.[6]

3.4 Measurement, scope and sources of the data

The fiscal variables are from the IMF's Government Finance Statistical Yearbook (GFSY). The terms of trade data are froman unpublished IMF source, just as the information used in determining the proportion of merchandise exports accounted for by petroleum. All other data are from the World Bank's Economic Development Indicators (electronic format).

The study is based on annual data over 1970 to 1998 for those developing countries for which fiscal data are available form the GFSY for at least five consecutive years over the period and the end-1998 population is not less than half a million.. They total 103 countries and their list is provided in the Appendix.

All the fiscal variables are expressed as ratios of GDP. Economic growth is the 5-year moving average growth of real GDP per capita, exactly the same approach favored and utilized by Devarajan *et al.* (1996, p. 322) "so as to eliminate short-term fluctuations induced by shifts in public expenditure, and by choosing a moving average, we are able to increase the number of time series observation in our panel data." The same approach is used in computing the terms of trade growth.

---

5 The 5-year moving average growth rate of each of the per capita GDP and terms of trade is computed through the least-squares method.

6 The employment of moving average growth rate of per capita GDP as the dependent variable makes the Durbin-Watson statistic to be much lower than the ideal value of 2. But, because of the panel data employed, especially whereby the time series for most of the countries pooled are interrupted with missing values, the use of DW statistic is hardly applicable in diagnosing serial correlation of the residuals. Diagnosing the existence of serial correlation of residuals within the context of panel data is still far from being perfectly resolved in econometric literature.

3.5 Classification of countries

As already pointed out before, separate estimates are derived for all the 103 countries combined as well as different classifications of these countries. One classification is on the basis of per capita income, which is used to divide the countries into poor and rich groups of developing countries. The real per capita income (at 1995 US $) cut-off used for this purpose is $1,000. The other classification is based on the extent of revenue from mineral (crude petroleum and metallic) exploitation - and, hence, mineral exports. The countries regarded as belonging to this category are those having the sum of petroleum and metallic mineral exports accounting for not less than 20 percent of total merchandise exports. The third category is the countries that depend much on foreign official transfers (grants) in financing the budget and a country is so classified if the official transfers account for not less than 20 percent of total government expenditure.[7] The rationale for the above classifications has been discussed earlier.

4 Empirical Results

4.1 Broad view of the results

The estimates of the economic growth equations are presented below in Tables 2 to 9. In all cases, the explanatory power of the equations is only modest, judging by the modest values of the adjusted R^2. This is not unexpected and neither is it uncommon, given the heterogeneity of the countries covered.

The estimates of the conditioning variables are explicitly reported in only Tables 2 and 3. While they are included in deriving the results reported in Tables 4 to 9, their estimates are not reported there for brevity and to save space, since these estimates are found to be essentially the same as those reported in Tables 2 and 3. It can be seen from these Tables 2 and 3 that the estimates of the conditioning variables are broadly in line with expectation. Particularly, the initial level of per capita income enters all equations with negative and statistically significant coefficients. The same is true for the population age dependency ratio, except in the equation for substantial aid receiving group of countries where it is not statistically significant. Also, the terms of trade growth enters all equations with the expected positive coefficient that is statistically significant except for low-income and sizeable foreign aid receiving groups of countries. It is only the openness of economy regressor that does not enter the equations with statistical significance.

Concerning the effects of the aggregate fiscal variables on growth, these are very clearly portrayed in Tables 2 and 3, from where it can be seen that higher share of total government spending in GDP has statistically significant negative coefficients in the equations for the groups of countries considered. The same applies to each of total revenue and fiscal deficit in relation to GDP. The only exception is the group of countries that have received substantial foreign transfers, where neither total

---

7 Under each of these classifications, a country can belong into a category only during a part of the entire period. For instance, if the per capita real income crossed the $1,000 threshold in 1990, it would be classified as a poor country before 1990 and as a rich country thereafter.

government spending nor total revenue (including grants) is found to have any statistically significant effect on growth and while fiscal deficit is found to have negative statistically significant effect on growth there, both the magnitude and statistical significance of the effect are less than for other groups of countries. This finding suggests that high total expenditure, total revenue and fiscal deficits all have growth-retarding effects, except (in the case of total expenditure and revenue) in countries that have depended much on foreign transfers. Further lights will be shed on this finding through a consideration below of the disaggregated government spending and revenue.

Table 2: Empirical results on the effect of total government expenditure on growth

	All countries	Low-income	High-income	Mineral exporters	Sizeable foreign aid receivers
Initial per capita income (in log)	-0.055	-0.034	-0.068	-0.084	-0.048
	(-11.9)	(-4.2)	(-12.6)	(-7.0)	(-4.6)
Initial openness of economy (in log)	0.003	-0.002	0.004	-0.004	-0.009
	(0.5)	(-0.3)	(0.6)	(-0.5)	(-1.3)
Terms of trade growth	0.038	0.016	0.070	0.047	0.002
	(3.1)	(0.9)	(4.4)	(2.1)	(0.1)
Initial age dependency ratio (in log)	-0.072	-0.096	-0.082	-0.088	-0.062
	(-7.8)	(-3.5)	(-7.8)	(-4.2)	(-1.3)
Initial total govt. Expenditure	-0.093	-0.077	-0.115	-0.165	-0.022
	(-5.8)	(-4.0)	(-4.3)	(-4.8)	(-0.8)
Adjusted R^2	0.176	0.111	0.244	0.333	0.112
No. of data points	1176	491	685	203	264

Notes: (i) The dependent variable is 5-year forward moving average growth rate of per capita real GDP.

(ii) The figures in parentheses below the parameter estimates are the t-values. A parameter estimate is statistically significant at 10%; 5%; and 1% levels if its t-value exceeds (in absolute sense) 1.6; 2.0; and 2.5.

Table 3: Empirical results on the effects of total revenue & grants and fiscal deficits on growth

	All countries	Low-income	High-income	Mineral exporters	Sizeable foreign aid receivers
Initial per capita income (in log)	-0.058	-0.039	-0.071	-0.088	-0.057
	(-13.2)	(-5.2)	(-13.7)	(-7.8)	(-5.2)
Initial openness of economy (in log)	0.004	-0.001	0.005	-0.001	-0.012
	(1.0)	(-0.2)	(0.9)	(-0.2)	(-1.8)
Terms of trade growth	0.039	0.015	0.070	0.040	0.025
	(3.2)	(0.7)	(5.0)	(2.1)	(0.9)
Initial age dependency ratio (in log)	-0.069	-0.089	-0.077	-0.055	-0.033
	(-8.1)	(-3.7)	(-7.8)	(-2.7)	(-0.8)
Initial total revenue & grants	-0.097	-0.052	-0.114	-0.156	0.024
	(-5.1)	(-1.8)	(-4.4)	(-4.3)	(0.6)
Initial fiscal deficit	-0.100	-0.127	-0.105	-0.120	-0.072
	(-5.3)	(-5.3)	(-3.5)	(-2.9)	(-2.5)
Adjusted R^2	0.182	0.117	0.253	0.336	0.141
No. of data points	1342	554	788	238	292

Notes: (i) The dependent variable is 5-year forward moving average growth rate of per capita real GDP.

(ii) The figures in parentheses below the parameter estimates are the t-values. A parameter estimate is statistically significant at 10%; 5%; and 1% levels if its t-value exceeds (in absolute sense) 1.6; 2.0; and 2.5.

(iii) Fiscal deficit is entered positively, and surplus negatively.

4.2 Effects of various economic categories of government expenditure on growth

As discussed earlier, the first level of disaggregation, on economic basis, of total government spending is to break it into just current and capital expenditure. The results of estimating the equation containing these two expenditure variables are as reported in Table 4 below. Next, the current expenditure is further disaggregated into five—expenditure on goods and services; wages and salaries; interest payments; subsidies and transfers; and other (miscellaneous). Including these, together with the capital expenditure, as the fiscal variables in the estimated equation produces the results reported in Table 5 below.

Table 4 results show that both current and capital expenditure retard economic growth in the equation for all the countries combine, just as in high-income and especially mineral exporting countries. In the equations for these groups of countries, the coefficients of the current and capital expenditure are negative and statistically significant. The same applies to current spending, but not capital expenditure, in the low-income countries. But no significant effect is recorded for the group of countries

that are large receivers of foreign grants. A probable explanation of the observed negative effect of capital expenditure on growth is that, apart from the possibility of it crowding-out private investment, it is more vulnerable or prone to rent-seeking and graft than current spending, the result of which would be to reduce the productivity of the expenditure. It can also be due to the long gestation period required for public investment projects to yield output. That it is not found to have negative effects in the aid-receiving countries could be due to project-tying of aid and other monitoring devices that the foreign donors often put in place to reduce injudicious capital spending by the receiving governments. Concerning explanation of the just noted effects of current spending, further insights into this are provided by examining the effects of its various components as discussed next paragraphs.

Based on Table 5 results, the following are the observed effects of different components of current spending on growth: current spending on goods and services has detrimental effects on growth in all groups of countries, as its coefficients are negative and statistically significant in all cases. The reverse is the case for current expenditure on wages are salary, the coefficients of which is positive in all equations and exhibit statistical significance except in the equation for mineral exporting group of countries. Concerning current spending on interest payments, while its coefficients are negative in all equations, it is only in the equation for low-income countries where it is statistically significant to some extent. It is also only in this same group of countries where current spending on subsidies and transfers is found to have fairly significant effect on growth—but, this time, a positive effect. Other (miscellaneous) current expenditure is found to have no significant effect on growth, except in the high-income group of countries where significant positive effect is recorded.

A probable reason for the observed detrimental effects on economic growth of current spending on goods and services and the simultaneous positive effects of current spending on wages and salaries is also in terms of the rent-seeking syndrome. Corrupt practices and other rent-seeking vices are likely to be more characteristic of supply of goods and services to the government sector (particularly, in typical cases where government procurement as well as custody or storage procedures are weak) than in the case of payment of wages and salaries.[8] Current spending on interest payments appear to have significantly hindered economic growth of only the poorest countries probably because they are the ones that feel the pinch of the burden more, especially interest payments on external debts. Concerning subsidies and other current transfers that is found to promote growth of substantial aid-receiving countries, probably such transfers are better targeted and more needed in such countries. Other (miscellaneous) current spending assumes a sizeable dimension only in the high-income countries and this probably explains why it has a significant (positive) effect on growth in only this group of countries.

8 For instance, payroll fraud (typically) by rank and file of civil servants might be less detrimental than executive frauds that often characterize award of contracts for government projects and procurement of goods and services.

Table 4: Empirical results on the effects of government current and capital expenditures on growth

	All countries	Low-income	High-income	Mineral exporters	Sizeable foreign aid receivers
Initial current Expenditure	-0.096	-0.095	-0.099	-0.155	-0.040
	(-4.4)	(-3.3)	(-3.2)	(-2.8)	(-1.0)
Initial capital expenditure	-0.076	-0.021	-0.160	-0.174	-0.006
	(-2.8)	(-0.7)	(-3.5)	(-2.7)	(-0.1)
Adjusted R^2	0.185	0.132	0.242	0.321	0.109
No. of data points	1097	427	670	189	228

Notes: (i) The dependent variable is 5-year forward moving average growth rate of per capita real GDP.

(ii) The figures in parentheses below the parameter estimates are the t-values. A parameter estimate is statistically significant at 10%; 5%; and 1% levels if its t-value exceeds (in absolute sense) 1.6; 2.0; and 2.5.

(iii) For brevity, estimates of the parameters of the controlling variables (viz: initial per capita income level; openness of economy; terms of trade growth; and age dependency ratio) are not reported – although their estimates are very similar to those reported in Tables 2 and 3.

Table 5: Empirical results on the effects of various economic types of expenditure on growth

	All countries	Low-income	High-income	Mineral exporters	Sizeable foreign aid receivers
Initial current expenditure on goods & services	-0.216	-0.228	-0.232	-0.258	-0.227
	(-5.6)	(-4.8)	(-3.9)	(-2.7)	(-4.9)
Initial current expenditure on wages & salaries	0.309	0.306	0.683	0.448	0.274
	(1.5)	(2.2)	(3.4)	(0.5)	(1.8)
Initial current expenditure on interest payments	-0.075	-0.188	-0.055	-0.055	-0.101
	(-1.8)	(-1.8)	(-1.2)	(-0.9)	(-0.8)
Initial current expenditure on subsidies & transfers	0.001	0.025	0.027	-0.024	0.249
	(0.02)	(0.3)	(0.5)	(-0.3)	(1.9)
Initial other current expenditure	0.097	-0.096	0.548	0.125	-0.139
	(0.5)	(-0.8)	(3.0)	(0.1)	(-1.7)
Initial capital expenditure	-0.083	-0.028	-0.172	-0.203	-0.019
	(-3.0)	(-0.9)	(-3.9)	(-2.9)	(-0.5)
Adjusted R^2	0.218	0.168	0.283	0.435	0.124
No. of data points	978	372	606	164	189

Notes: (i) The dependent variable is 5-year forward moving average growth rate of per capita real GDP.

(ii) The figures in parentheses below the parameter estimates are the t-values. A parameter estimate is statistically significant at 10%; 5%; and 1% levels if its t-value exceeds (in absolute sense) 1.6; 2.0; and 2.5.

(iii) For brevity, estimates of the parameters of the controlling variables (viz: initial per capita income level; openness of economy; terms of trade growth; and age dependency ratio) are not reported – although their estimates are very similar to those reported in Tables 2 and 3.

4.3 Effects of various functional categories of government expenditure on growth

The alternative level of disaggregation of total government spending is to break it into functional categories. As discussed previously, seven such categories are identified and related to economic growth in this study. They are government spending on general administration; defense; education; health; transport and communication; other economic services; and other (miscellaneous). The estimates of the economic growth equations where these fiscal variables feature as regressors are as reported in Table 6 below.

The results show that government expenditure on general administration retards growth in all groups of countries, except in mineral exporting countries where the positive effect on growth is not statistically significant. In the same vein, defense spending is found to retard growth in all group of countries except in the group of countries that are sizeable foreign aid receivers—where the effect, though positive, is not statistically significant. On the other hand, higher government spending on education is found to

promote growth in all groups of the countries, with statistically insignificant positive effect recorded only for mineral exporting group of countries. Health expenditure, which is least in magnitude (see Table 1), is found not to promote growth in these countries and, in fact, it is observed to retard growth in high-income group of countries. Expenditure on transport and communication is found to have positive effects on growth only in high-income and sizeable foreign aid receiving groups of countries but no discernable effect in the low-income and mineral exporting countries. High government spending on other economic services is found to hinder growth substantially in high-income countries but without any significant or discernable effects on growth in other groups of countries. The other or miscellaneous functional expenditure category does not appear to have any effect on growth except in mineral exporting group of countries where negative effect, which is statistically significant only at the margin, is recorded.

That higher spending on general administration retards growth could be due to the fact such spending is not often determined by economic consideration and may also be devoid of financial prudence. While defense spending can conceptually promote growth by creating security necessary for economic activities, the observed negative effect—which is in conformity with the findings generally reported in the empirical literature—suggests that defense spending in these countries have generally not often been directed towards this end. The non-negative effect recorded by aid-receiving group of countries could be due to some donor-induced restraints on possibly reckless and aggressive defense spending. The observed growth-promoting effect of education spending shows the importance of human capital development to economic growth of developing countries. That no such growth-promoting effect is observed in the case of health expenditure could be due to a number of reasons. Probably, health spending is more vulnerable to rent-seeking than education spending. Also, health spending is typically undertaken by lower-levels of government to a greater extent than education spending and our data covers only central government health spending—which might focus more on tertiary health care (which would have less impact on human capital formation). Expenditure on transportation and communication is expected to strengthen the physical infrastructures that are supposed to facilitate production and this explains its observed growth-promoting effect in the high-income and sizeable aid receiving groups of countries. However, this explanation is weakened by the fact that the positive effect is not observed in low-income and mineral exporting countries. Concerning spending on other economic services, one would have expected it to promote growth but this is not in line with the results reported in the Table, from where it can be seen that it even retards growth in high-income group of countries. This apparent paradox could be due to the fact that such spending is not often focused; the economic projects are not being targeted or scrutinized on the basis of economic criteria; and is dominated by political consideration as well as prone to rent-seeking. That the other (miscellaneous) expenditure does not have significant effects on growth could be due to its miscellaneous nature and the small magnitudes of the amounts involved.

Table 6: Empirical results on the effects of various functional types of expenditure on growth

	All countries	Low-income	High-income	Mineral exporters	Sizeable foreign aid receivers
Initial general administration expenditure	-0.150	-0.153	-0.133	0.171	-0.301
	(-2.5)	(-1.9)	(-1.6)	(1.3)	(-2.5)
Initial defense expenditure	-0.348	-0.223	-0.396	-0.451	0.262
	(-4.4)	(-1.8)	(-3.9)	(-3.9)	(1.4)
Initial education expenditure	0.342	0.349	0.305	0.051	0.756
	(3.5)	(1.9)	(2.1)	(0.2)	(3.5)
Initial health expenditure	-0.344	-0.101	-0.423	-0.835	-1.017
	(-2.3)	(-0.2)	(-2.6)	(-1.2)	(-2.0)
Initial expenditure on transportation	0.190	-0.154	0.357	-0.243	0.215
	(2.3)	(-1.5)	(2.9)	(-1.4)	(1.6)
Initial other economic services expenditure	-0.095	-0.034	-0.117	-0.040	-0.131
	(-2.2)	(-0.4)	(-11.9)	(-0.5)	(-1.4)
Initial other expenditure	-0.066	-0.071	-0.063	-0.099	-0.065
	(-2.0)	(-1.4)	(-1.4)	(-1.8)	(-0.7)
Adjusted R^2	0.225	0.136	0.293	0.388	0.213
No. of data points	1016	406	610	198	226

Notes: (i) The dependent variable is 5-year forward moving average growth rate of per capita real GDP.

(ii) The figures in parentheses below the parameter estimates are the t-values. A parameter estimate is statistically significant at 10%; 5%; and 1% levels if its t-value exceeds (in absolute sense) 1.6; 2.0; and 2.5.

(iii) For brevity, estimates of the parameters of the controlling variables (viz: initial per capita income level; openness of economy; terms of trade growth; and age dependency ratio) are not reported – although their estimates are very similar to those reported in Tables 2 and 3.

4.4 Effects of current revenue and grants on growth

The observed negative effects of current revenue (including grants), as noted in sub-section 4.1, are analyzed further by disaggregating the revenue into tax revenue, non-tax revenue and grants. The results of estimating the economic growth equation where these feature as the fiscal variables (with deficit being the other fiscal variable) are as presented in Table 7 below. A further disaggregation is effected by breaking down tax revenue into four—taxes on income and profits; domestic taxes on goods and services; taxes on international trade; and other (miscellaneous). The results of this disaggregation are reported in Table 8.

From Table 7, it can be seen that tax revenue has significant growth-retarding effect in high-income countries and insignificant effects on growth in other groups of countries. High non-tax revenue, on the other hand, is seen to hinder growth in high-income and mineral exporting countries while high level of grants significantly retards growth in only mineral exporting countries. Positive, though mild, effect is recorded in those countries that are substantial receivers of grants (Tables 7 and especially Table 8).

Further insights on the effects of tax revenue are provided by examining its further disaggregation, as discussed next paragraph. Concerning the observed negative effect of non-tax revenue in only high-income and mineral exporting groups of countries, this could be due to the fact that it is only in these two groups where the amounts collected of non-tax revenue accounts for a high fraction of the budget and also of the GDP (see Table 1).[9] The amounts involved are relatively small in other groups of countries to make much impact on growth. The mild positive effect of grants in those countries that receive substantial aid could be due to the effect of monitoring, by donors, of their disbursements. That the same grants retard growth in mineral exporting countries might be because these countries typically do not receive much of the routine aid and the little they receive is often dictated mainly by political considerations, making the utilization to be hardly amenable to oversight or monitoring by the donors.

The results presented in Table 8 show that high income tax ratio has statistically significant negative effects on growth in all groups of countries, except in the group that depend substantially on foreign aid, where the negative effect is not significant. Similarly, high taxes (in relation to GDP) on domestic goods and services too retard growth in all groups of countries except in mineral exporting group where it does not have a negative effect. On the other hand, taxes on international trade are observed to have positive effects on growth in low-income as well as substantial foreign aid receiving groups of countries while marginally significant negative effect is recorded in mineral exporting group and insignificant effect in high-income group. The other (miscellaneous) taxes are found to have insignificant effect on growth in all cases except in mineral exporting group of countries where positive effect is recorded.

That high income (and profit) tax ratio is found to hinder growth is not unexpected, as it is often regarded as a deterrent to supply of labor, efforts and enterprise. This is in addition to the usually high costs of collection and administration that bedevils this type of tax in most developing countries. Also, that its negative effect is statistically insignificant in the aid-receiving group of countries could be due to the fact that income tax ratio is lowest there (see Table 1). The negative effect of high domestic taxes on goods and services could be due to the evolving nature of the culture and system of this tax (which might have made it cumbersome and its administration inefficient) in many developing countries—e.g. standard value-added tax system hardly existed, during most of the years covered by the study, in many of the countries sampled. It is hoped that, with the passage of time, the countries would perfect the system and make it growth-conducive. That mineral exporting countries depend less on this type of tax (see

---

9 Mineral exporters depend a lot on this class of revenue (as royalties) and, since most of them are classified under high-income group, this also explains why the latter group too records high ratio of non-tax revenue.

Table 1) probably explains while its effect is insignificant there. Concerning the observed growth-promoting effect of taxes on international trade in low-income and aid-receiving groups of countries, this is probably due to the fact that these countries have depended over a relatively long time on this source of revenue more than any other (see Table 1) and have therefore attained some degree of perfection in its collection and administration. Again, the relative statistical insignificance of its effect on growth in high-income and mineral exporting groups of countries could be because these countries depend less on it, as compared with other countries, in financing the budget (see Table 1).

Table 7: Empirical results on the effects of tax revenue, non-tax revenue, grants and deficit on growth

	All countries	Low-income	High-income	Mineral exporters	Sizeable foreign aid receivers
Initial tax revenue	-0.083	-0.050	-0.111	-0.085	0.012
	(-3.3)	(-1.4)	(-3.3)	(-1.4)	(0.2)
Initial non-tax revenue	-0.101	-0.025	-0.108	-0.100	-0.009
	(-4.5)	(-0.4)	(-4.0)	(-2.9)	(-0.1)
Initial grants	-0.119	-0.053	-0.165	-0.674	0.091
	(-2.1)	(-0.9)	(-1.4)	(-4.5)	(1.4)
Initial deficit	-0.101	-0.129	-0.102	-0.116	-0.073
	(-5.2)	(-5.3)	(-3.3)	(-2.6)	(-2.4)
Adjusted R^2	0.179	0.110	0.252	0.392	0.139
No. of data points	1339	552	787	238	292

Notes: (i) The dependent variable is 5-year forward moving average growth rate of per capita real GDP.

(ii) The figures in parentheses below the parameter estimates are the t-values. A parameter estimate is statistically significant at 10%; 5%; and 1% levels if its t-value exceeds (in absolute sense) 1.6; 2.0; and 2.5.

(iii) For brevity, estimates of the parameters of the controlling variables (viz: initial per capita income level; openness of economy; terms of trade growth; and age dependency ratio) are not reported—although their estimates are very similar to those reported in Tables 2 and 3.

Table 8: Empirical results on the effects of various types of taxes on growth

	All countries	Low-income	High-income	Mineral exporters	Sizeable foreign aid receivers
Initial income tax	-0.105	-0.183	-0.106	-0.125	-0.017
	(-2.9)	(-2.7)	(-2.4)	(-2.0)	(-0.2)
Initial domestic tax on goods & services	-0.212	-0.277	-0.230	0.057	-0.260
	(-4.3)	(-3.7)	(-3.5)	(0.4)	(-2.9)
Initial taxes on international trade	0.148	0.216	0.020	-0.160	0.294
	(3.2)	(3.6)	(0.3)	(-1.6)	(3.3)
Initial other taxes	-0.107	-0.020	-0.077	0.588	-0.069
	(-1.5)	(-0.1)	(-1.0)	(2.1)	(-0.2)
Initial non-tax revenue	-0.111	0.056	-0.120	-0.104	0.140
	(-5.0)	(0.9)	(-4.4)	(-2.7)	(1.7)
Initial grants	-0.120	0.002	-0.187	-0.645	0.131
	(-2.1)	(0.1)	(-1.6)	(-4.1)	(2.3)
Initial deficit	-0.104	-0.105	-0.111	-0.125	-0.046
	(-5.3)	(-4.5)	(-3.6)	(-2.8)	(-1.5)
Adjusted R^2	0.201	0.157	0.256	0.394	0.292
No. of data points	1337	550	787	238	0.190

Notes: (i) The dependent variable is 5-year forward moving average growth rate of per capita real GDP.

(ii) The figures in parentheses below the parameter estimates are the t-values. A parameter estimate is statistically significant at 10%; 5%; and 1% levels if its t-value exceeds (in absolute sense) 1.6; 2.0; and 2.5.

(iii) For brevity, estimates of the parameters of the controlling variables (viz: initial per capita income level; openness of economy; terms of trade growth; and age dependency ratio) are not reported—although their estimates are very similar to those reported in Tables 2 and 3.

4.5 Effects of domestic and foreign sources of deficit financing on growth

It is noted above in sub-section 4.1 that high deficit financing is detrimental to growth. Here, we only wish to explore whether both or just one of the domestic and foreign sources is growth-retarding and this is accomplished by breaking the total deficits into these two categories in our growth equation. The results of this are as presented below in Table 9.

These results show that it is both components that have significant negative relationship with growth and this is so in all groups of countries, except in aid-receiving group where the negative effect is not significant.

Table 9: Empirical results on the effects of different sources of deficit financing on growth

	All countries	Low-income	High-income	Mineral exporters	Sizeable foreign aid receivers
Initial total revenue	-0.104	-0.065	-0.128	-0.132	-0.012
	(-5.2)	(-1.9)	(-4.9)	(-3.8)	(-0.3)
Initial grants	-0.131	-0.089	-0.172	-0.774	0.092
	(-2.1)	(-1.4)	(-1.4)	(-5.0)	(1.4)
Initial domestic sources of deficit financing	-0.126	-0.167	-0.105	-0.214	-0.049
	(-5.1)	(-5.1)	(-2.9)	(-3.4)	(-1.3)
Initial foreign sources of deficit financing	-0.122	-0.085	-0.185	-0.203	-0.107
	(-4.2)	(-2.2)	(-4.4)	(-4.2)	(-2.5)
Adjusted R^2	0.188	0.117	0.277	0.471	0.141
No. of data points	1160	494	666	199	254

Notes: (i) The dependent variable is 5-year forward moving average growth rate of per capita real GDP.

(ii) The figures in parentheses below the parameter estimates are the t-values. A parameter estimate is statistically significant at 10%; 5%; and 1% levels if its t-value exceeds (in absolute sense) 1.6; 2.0; and 2.5.

(iii) For brevity, estimates of the parameters of the controlling variables (viz: initial per capita income level; openness of economy; terms of trade growth; and age dependency ratio) are not reported—although their estimates are very similar to those reported in Tables 2 and 3.

5 Summary and conclusion

Public finance can be regarded as the centerpiece of public actions or policies directed at promoting economic growth and such policies would be facilitated through a knowledge of the direction of the effects of various components of government spending and revenue. To this end, a number of theoretical and empirical attempts have been made to shed lights on this. However, such attempts, in addition to being limited in scope, have failed to provide unanimous predictions or reach definitive conclusions. The study reported in this paper is an attempt to rectify this and shed an additional light on the issue.

In particular, we focus exclusively on developing countries, sampling annual data over the last three decades over 100 countries and carry out separate analyses for different groups of countries—poor; rich; foreign aid dependent; and mineral export dependent groups of countries. Effects of very disaggregated functional and economic components of government spending on economic growth were tested for. The same is done for revenue, especially taxes and, to a limited extent, deficits. The highlights of the results of estimating our model are as follows:

(i) High level of capital expenditure is found to hinder economic growth in high-income and mineral exporting groups of countries and have no discernable effects in

low-income and foreign aid dependent groups. Possible explanations for this are provided in terms of rent-seeking phenomenon; crowding-out of private investment; and long gestation period needed for government capital spending to translate into higher output.

(ii) High level of overall current government spending is detrimental to growth, except in foreign aid dependent group of countries where no discernable or significant effect on growth is recorded. A disaggregation of this overall current spending into various economic categories shows that high level of current expenditure on goods and services is detrimental to growth in all groups of countries while the reverse is the case for high level of expenditure on wages and salaries. Other categories of current spending have mixed and often insignificant effects, depending on the group of country under consideration. Again, a possible explanation of this observation is in terms of rent-seeking related phenomenon—to which expenditure on goods and services are more prone to, vis-à-vis others, especially expenditure on wages and salaries.

(iii) Concerning the various functional categories of total spending, a high level of spending on education and, to a limited extent, transport and communications is found to be growth-friendly while high level of spending on general administration as well as on defense is found to have the opposite effect. Other functional categories of spending have mixed and often insignificant effects, depending on the group of country under consideration.

(iv) High level of non-tax revenue is found to deter economic growth in high-income and especially mineral exporting countries—where (in the form of royalties) it accounts for a high ratio of GDP. It has insignificant effects in other groups of countries. High level of overall tax, on the other hand, significantly retards growth in only high-income group of countries. But when the total tax is further disaggregated, it is found that a high level of taxes on income and profits retards growth—except, perhaps, in the foreign aid dependent group of countries where the negative effect is not statistically significant. This evidence is in line with most previous findings. Also, a high level of taxes on domestic goods and services has similar growth-retarding effect, except in the mineral exporting group of countries where statistically insignificant effect is recorded. This could be because, during most of the three decades covered by the study, many developing countries were yet to put in place modern system of taxes on domestic goods and services (e. g. VAT) and effective arrangement for administering whatever system they might have. On the other hand, taxes on international trade are found to be positively related to growth in foreign aid dependent and low-income groups of countries—but not in other groups of countries where statistically insignificant effects are recorded. This is probably because poor countries, by being highly dependent on this form of tax in the past, have attained some degree of efficiency in its collection and administration *vis-à-vis* other forms of tax.

(v) Grants are positively and significantly related to growth in foreign aid dependent group of countries, while the reverse is the case in mineral exporting and, to some extent, high-income groups of countries. It has no discernable effect in low-income countries. A possible explanation is in terms of the efforts by donors to monitor the utilization of their disbursements in those countries that depend much on their donations.

(vii) A high level of fiscal deficit is found to have retarded growth and this is the case whether domestically or externally financed.

But some caveat have to be noted here in connection with our findings. In particular, given the limited guidance provided by theory, our "explanations" of the findings, as provided in the text, are hardly nothing more than conjectures. More important, our analysis is based on public finance statistics that must have been compiled and classified under different methodologies, despite the fact that we obtained them from the IMF's Government Finance Statistics (GFS) Yearbook. This is not to talk of missing values and lack of continuity in the series for each country. In addition, as rightly pointed out by Easterly and Rebello (1993, p. 421) in a similar study, "GFS, which is our main source of fiscal data suffers from two relevant shortcomings: (i) it includes only central government activities and thus excludes local government and public enterprises … and (ii) for some years and some countries the GFS statistics are based on budget data."

However, having said that, it is hoped that such caveats are not so serious to invalidate some of the findings of this study. Many of such findings are expected to be an eye-opener as to how public finances can be improved to enhance growth. For instance, that government capital spending has been negatively related to growth in these countries in the past is not necessarily a basis for discontinuation with government investment spending. It only implies that measures should be taken to make government capital spending to be productive. The same interpretation applies to other findings.

Appendix: list of sampled countries

1. Albania
2. Algeria
3. Argentina
4. Bahamas
5. Bahrain
6. Bangladesh
7. Barbados
8. Benin
9. Bhutan
10. Bolivia
11. Botswana
12. Brazil
13. Bulgaria
14. Burkina Faso
15. Burundi
16. Cameroon
17. Chad
18. Chile
19. China (Mainland)
20. Colombia
21. Congo (Demo. Rep.)
22. Congo (Rep.)
23. Costa Rica
24. Cote d'Ivoire
25. Cyprus
26. Czech
27. Dominican Rep.
28. Ecuador
29. Egypt
30. El Salvador
31. Ethiopia
32. Fiji
33. Gabon
34. Gambia
35. Ghana
36. Guatemala
37. Guinea
38. Guinea Bissau
39. Guyana
40. Haiti
41. Honduras
42. Hungary
43. India
44. Indonesia
45. Iran
46. Israel
47. Jamaica
48. Jordan
49. Kenya
50. Korea
51. Kuwait
52. Lebanon
53. Lesotho
54. Liberia
55. Madagascar
56. Malawi
57. Malaysia
58. Mali
59. Malta
60. Mauritania
61. Mauritius
62. Mexico
63. Mongolia
64. Morocco
65. Myanmar
66. Namibia
67. Nepal
68. Nicaragua
69. Niger
70. Nigeria
71. Oman
72. Pakistan
73. Panama
74. Papua New Guinea
75. Paraguay
76. Peru
77. Philippines
78. Poland
79. Romania
80. Rwanda
81. Senegal
82. Seychelles
83. Sierra Leone
84. Singapore
85. Somalia
86. South Africa
87. Sri Lanka
88. Sudan
89. Swaziland
90. Syria
91. Tanzania
92. Thailand
93. Togo
94. Trinidad and Tobago
95. Tunisia
96. Turkey
97. Uganda
98. United Arab Emirates
99. Uruguay
100. Venezuela
101. Yemen, Rep.
102. Zambia
103. Zimbabwe

References

Alogoskoufis, G. and R. van der Ploeg (1991), Endogenous Growth and Overlapping Generations, mimeo (Birbeck College, London).

Aschauer, D. (1989), "Is Public Expenditure Productive", *Journal of Monetary Economics*, vol. 23, 177-200.

Barro, R. J. (1991), "Economic Growth in a Cross-section of Countries", *Quarterly Journal of Economics*, vol. 106, 2, 407-43.

Barro, R. J. and N. G. Sala-i-Martin (1995), *Economic Growth*, McGraw Hill, New York.

Bleaney, M., N. Gemmell and R. Kneller (2001), "Public expenditure, taxation and growth: Testing the endogenous growth model", *Canadian Journal of Economics*, (forthcoming).

Cashin, P. (1995), "Government spending, taxes and growth", *IMF Staff Papers*, Vol. 42, 2, pp. 237-69.

Cass, D., (1965), "Optimum Growth in an Aggregative Model of Capital Accumulation", *Review of Economic Studies*, vol. 32, 233-40.

Chamley, C. (1986), "Optimal Taxation of Capital Income in General Equilibrium with Infinite Lives", *Econometrica*, vol. 54, 607-22.

Devarajan, S., V. Swaroop and H. Zou (1996), "The composition of public expenditure and economic growth", *Journal of Monetary Economics*, 37, 1996, pp. 313-44.

Easterly, W. and S. Rebelo (1993), "Fiscal policy and economic growth", *Journal of Monetary Economics*, 32, 1993, pp. 417-58.

Feldstein, M. (1974), "Tax Incidence in a Growing Economy with Variable Labor Supply", *Quarterly Journal of Economics*, vol. 88, 551-73.

Folster, S. and Henrekson, M. (1999), "Growth and the public sector: A critique of the critics", *European Journal of Political Economy*,15 (2), June 1999, pp. 337-58.

Gerson, P. (1998), "The impact of fiscal policy variables on output growth", *IMF Working Paper*: WP/98/01, 1998.

Ghali, K. H. (1997), "Government spending and economic growth in Saudi Arabia", *Journal of Economic Development*, 22 (2), Dec. 1997, pp. 165-72.

Haan, J. De, J. Sturm and B. Sikken (1996), "Government capital formation: Explaining the decline", *Weltwirtschaftliches Archiv*, 132, 1996, pp. 65-74.

Hanson, P. and M. Henrekson (1994), "A new framework for testing the effect of government spending on productivity", *Public Choice*, 81, 1994, pp. 381-401.

Hutchinson, G. A. and U. Schmacher (1997), "Fiscal expenditure policy and economic growth: Evidence from Latin America and the Caribbean", *Social and Economic Studies*, 46(4), Dec. 1997, pp. 1-16.

Jones, C. (1995), "Time series tests of endogenous growth models", *Quarterly Journal of Economics*, May 1995, 110, pp. 495-525.

Judd, K. (1985), "Redistributive Taxation in a simple perfect Foresight Model", *Journal of Public Economics*, vol. 28, 59-83.

Kneller, R., M. Bleaney and N. Gemmell (1999), "Public policy and the government budget constraint: Evidence from the OECD", *Journal of Public Economics*, Nov. 1999, 74, pp. 171-90.

Kocherlakota, N. and K. M. Yi (1997), "Is there endogenous long-run growth? Evidence from the US and UK", *Journal of Money, Credit and Banking*, 29, 1997, pp. 2235-62.

Koopmans, T. (1965), On the Concept of Optimal Economic Growth, in "The Econometric Approach to Development Planning", *Pontific Acad. Sci*. (North Holland, Amsterdam, 225-87.

Lucas, R. (1990), "Supply side Economics: An Analytical Review", *Oxford Economic Papers*, vol. 42, 293-316.

Miller, S. and Russek, F. (1997), "Fiscal structures and economic growth: international evidence", *Economic Inquiry*, 35 (3), July 1997, pp. 603-13.

Odedokun, M. O. (1997), "Relative Effects of Public versus Private Investment Spending on Economic Efficiency and Growth in Developing Countries", *Applied Economics*, vol. 29, 10, 1325-36.

Ram, R. (1986), "Government Size and Economic Growth: Anew Framework and some Evidence from Cross-section and Time-series Data", *American Economic Review*, vol. 76, 1, 191-203.

Romer, P. (1986), "Increasing Returns and Long-run Growth", *Journal of Political Economy*, vol. 94, 1002-1037.

Roy, K. C. and Y. R. Vadlamudi (1998), "Government expenditure and economic growth under economic change: Selected developing countries", *Indian Journal of Quantitative Economics*, 13 (1), 1998, pp. 90-109.

Slemrod, J. (1995), "What cross-country studies teach about government involvement, prosperity and economic growth?" *Brookings Papers on Economic Activity*, Vol O, No 3, 1995, pp. 373-415.

Sato, K. (1967), "Taxation and Neoclassical Growth", *Public Finance*, 22, 346-70.

Solow, R. (1956), "A Contribution to the Theory of Economic Growth", *Quarterly Journal of Economics*, vol. 70, 65-94.

Tanzi, V. and H. H. Zee (1997), "Fiscal policy and long-run growth", *IMF Staff Papers*, 44, 1997, pp. 2179-2209.

Temple, J. (1999), "The new growth evidence", *Journal of Economic Literature*, vol. 37(1), March 1999, pp. 112-56.

White, H. (1980), "A Heteroscedasticity-consistent Covariance Matrix Estimator and Direct Test for Heteroscedasticity", *Econometrica*, vol. 48, pp. 817-38.

UNU World Institute for Development Economics Research (UNU/WIDER) was established by the United Nations University as its first research and training centre and started work in Helsinki, Finland in 1985. The purpose of the Institute is to undertake applied research and policy analysis on structural changes affecting the developing and transitional economies, to provide a forum for the advocacy of policies leading to robust, equitable and environmentally sustainable growth, and to promote capacity strengthening and training in the field of economic and social policy making. Its work is carried out by staff researchers and visiting scholars in Helsinki and through networks of collaborating scholars and institutions around the world.

UNU World Institute for Development Economics Research (UNU/WIDER)
Katajanokanlaituri 6 B, 00160 Helsinki, Finland

Camera-ready typescript prepared by Adam Swallow at UNU/WIDER
Printed at UNU/WIDER, Helsinki

ISSN 1609-5774
ISBN 952-455-268-X (printed publication)
ISBN 952-455-269-8 (internet publication)