THE IMPACT OF GOVERNMENT EXPENDITURE ON ECONOMIC GROWTH IN BARBADOS: A DISAGGREGATED APPROACH

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ABSTRACT

Traditionally the examination of the impact of government expenditure on the growth rate has been conducted in terms of the level of aggregate government expenditure. This paper used Barbadian data and the cointegration methodology to examine the effects of the composition of government expenditure on economic growth by disegregating the level of government expenditure into functional and economic categories. The results indicate that there is a positive relationship between capital expenditure, agriculture, housing and community, road and communication and health expenditures on growth, respectively. The effects of education and current expenditure are negative.

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INTRODUCTION

The large size of the fiscal deficit of less developed countries (LDCs) and its deleterious effects on the macroeconomy has become one of the hottest economic and political issues in these countries during the 1980s and 1990s. Commentators from both domestic and international institutions generally agree that focussing only on revenue reforms is not enough to mitigate the deficit since most of these countries have reached their optimal revenue capacity. Public expenditure policies aimed at increasing public expenditure productivity, though not sufficient, is desirable.

Given this, many researchers have examined the effects of aggregate public expenditure on economic growth with mixed results: some support the hypothesis that the share of public spending is negatively associated with economic growth (Landau (1986)); others have found that public spending is positively correlated with economic growth (Ram (1986)); and some have found no significant relationship (Kormendi and Meguire (1985)). In general, as noted by Levine and Renelt (1992), studies on the relationship between aggregate public expenditure and economic growth have not yielded robust results. In fact they are very sensitive to small changes in the model specification.

This has led to, and rightfully too, a number of studies testing the effects of certain public expenditure components on economic growth. These results have also been contradictory. For example, most studies have found a strong positive correlation between education indicators and growth (Barro (1991), Easterly and Rebelo (1993) and Otani and Villanvera (1990)) while, in contrast, others have reported a statistically insignificant relationship between economic growth and public investment (Barro (1991)).

This paper falls into this latter set of studies. Specifically it uses the analytical framework of Devarajan et al (1994) to determine which components of government expenditure in Barbados are growth inducing and which are growth retarding for a given level of government expenditure. The results indicate that there is a positive and statistically significant relationship between economic growth and capital, agriculture, transport, health and housing expenditure, respectively. By contrast, the relationship between the current component of public expenditure and economic growth is negative. A similar result is obtained for the share of expenditure devoted to education. Section two discusses the empirical model to be estimated. Section three presents the data, empirical methodology and the results. Conclusions are made in the final section.

THE EMPIRICAL MODEL

The empirical model used in this study is based on the optimising framework developed by Devarajan (1994) et al. The model expresses the difference between productive and unproductive expenditure by how a shift in the mix of the two alters the economy's long term growth rate. Productive government expenditure is classified as that component of public expenditure, an increase in whose share will raise the steady-state growth rate of the economy. Likewise, unproductive government expenditure is defined as that component which, if its share is increased, will lead to a lower growth rate. Therefore, these conditions imply that transferring resources from "unproductive" to "productive" expenditures will raise the steady state growth rate. Rather than a priori classification of expenditure into productive or unproductive, the data determines the categories under which the classification falls.

The model to be estimated is:

$$DGDP_t = \beta_o + \sum_k \beta_k \ (G_k / TEXP)_t + \beta_6 SHOCK_t + \beta_7 TEXPGDP_t + \beta_8 DOM_t + \mu_t \qquad (1)$$

$DGDP_t$ is the growth rate of real per capital gross domestic product. The term

$$\sum_k \beta_k \ (G_k/TEXP)_t = \beta_1 \ AGRTEXP + \beta_2 \ HOMEXP + \beta_3 \ HLTMEXP + \beta_4 \ ROADEXP + \beta_5 \ EDUCEXP$$

where AGRTEXP is the ratio of agriculture expenditure to total expenditure, HOMEXP is the ratio of housing and community amenities to total expenditure, HLTHEXP is the ratio of health expenditure to total expenditure, ROADEXP is the ratio of roads and other transport expenditure to total expenditure and EDUCEXP is the ratio of education expenditure to total expenditure. We expect that these components of public expenditure will have a positive sign, implying that they are productive expenditures.

The variable $SHOCK_t$ represents external shocks on the economy and is defined as a weighted average of changes in the world real interest rate (R), the export price index (PX) and the import price index (PM). Explicitly we have

$$SHOCK_t = (R_t - R_{t-1}) \ (DEBT/GDP)_t + (PX_t - PX_{t-1}) \ (X/GDP) + (PM_t - PM_{t-1}) \ (M/GDP)$$

where X/GDP is the ratio of exports to nominal GDP, M/GDP is the ratio of imports to nominal GDP and DEBT/GDP is the ratio of debt to nominal GDP. The larger the

shock, the more distorted the economy, the worst its growth performance. Hence, the sign on the SHOCK variable is a priori negative. DOM_t is also a control variable but representing domestic policies. Several proxies were used to measure this variable but none proved significant. However, we do report the results of the money and credit proxies for the reader perusal. The variable $TEXPGDP_t$ is the ratio of total expenditure to nominal GDP and is used to control for level effects and also for the effects of financing government expenditure. This sign is expected to be positive if the productivity of government spending exceeds the deadweight loss associated with the distortionary taxes required to pay for it **(see Devarajan et al (1994).** Finally, μ_t is an error term assumed to be identically independently normally distributed with zero mean and constant variance.

In an attempt to isolate the effects of the broad economic expenditure categories on growth we also estimated the following equation:

$$DGDP_t = \beta_o + \beta_1\ CAPTEXP_t + \beta_2\ TEXPGDP_t + \beta_3\ SHOCK_t + DOM_t + \mu_t \qquad (2)$$

where CAPTEXP is the ratio of capital expenditure to total expenditure. Public expenditure on capital goods is supposed to add to a country's physical capital (mainly infrastructure - roads, bridges, etc.) which, in turn, could complement private sector productivity and increase growth in the process. The sign of this variable should therefore be positive.

Equation (2) was also re-estimated with current expenditure replacing capital expenditure, that is:

$$DGDP_t = \beta_o + \beta_1\ CURTEXP_t + \beta_2\ TEXPGDP_t + \beta_3\ SHOCK_t + DOM_t + \mu_t \qquad (3)$$

where CURTEXP is the ratio of current expenditure (net of interest payments) to total expenditure. Since most current expenditures are for consumption purposes an increase in this ratio should reduce growth (Barro (1991)).

DATA, METHODOLOGY AND EMPIRICAL RESULTS

The data used in this study is annual and covers the period 1969-1992. The sources of the data are the **Central Bank of Barbados,** Annual Statistical Digest and the **World**

Bank, Annual Tables. The government data employed relates to the central government; expenditure of government owned or controlled public sector enterprises are omitted. Details of the data are given in am appendix available from the authors.

Following Engle and Granger (1987) we first attempt to determine whether a long run relationship exists between the variables. If the variables are cointegrated, they cannot move too "far away" from each other. In contrast, a lack of cointegration suggests that the variables have no long run link and can move arbitrarily far away from each other. The cointegration method involves checking to see whether the individual series are stationary (I(0)) or not (I(1)) and then testing the residuals from the regression equations for stationarity. The specific method used to test for stationarity is the well known Augmented Dickey Fuller (ADF) method. All computations are done using the TSP computer programme.

Table 1 suggests that the series are either I(0) or I(1). **Table 2** presents the results of the regression of the ratio of capital and current expenditure to GDP (**equation 2 and 3 above**). These equations are not cointegrated and hence the findings should be

interpreted with some caution. With this in mind, the effect of capital expenditure on economic growth is positive but significant only at the 15% level. This result is in tune with the standard hypothesis that the capital component of public expenditure and per capita growth is positively related. For current expenditure, the level of statistical significance is the same but its sign is negative. Again, this finding is in tune with our a priori belief and gives some credence to the policy advice dished out by various international institutions prescribing a cut in current, rather than capital, expenditure in order to foster long-term economic growth.

Table 2 also implies that cointegration does not exist for equation 1 mentioned in section two. Moreover, a look at this equation indicates that there is serial correlation and that the domestic policy proxies are insignificant. Omitting DOM_t from the equation not only removed the serial correlation but gave a cointegrating relation between the variables . Consequently we focus on the model that exclude the domestic policy variable.

Formal testing of the resultant model for the presence of first and second order serial correlation is rejected using the Lagrange Multiplier Test. The ARCH test results in the

null hypothesis of homoscedasticity while the CUSUM test suggests that the parameters of the system are stable. A misspecification test in the form of the Ramsey (RESET) test implied acceptance of the hypothesis that the model is correctly specified in its linear form. These diagnostic tests are presented in Table 3.

Of note is the positive significant relationship between economic growth and agriculture, housing and community, and health expenditures, respectively; road and other transport is positively signed but not significant. As economic infrastructure expenditure in general have a high proportion of capital expenditure, the finding that it has a positive relation with economic growth is consistent with the correlation between capital expenditure and growth discussed above. This result concurs with that of Easterly and Rebelo (1993) who report that public investment in transport and communication in developing countries seem to be consistently positively correlated with growth with a very high coefficient. On the other hand, Devarajan et al (1994) found a negative relationship between public infrastructure expenditure and per capita growth.

The surprising finding in the study is that education expenditure carries a negative sign though insignificant. This result may imply that a finer disaggregation is required for education as exemplified in Devarajan et al (1994) who found that spending on subsidiary services to education (for example, transportation, food, medical and other services to students) and program units engaged in teaching methods and objectives is positively related with growth.

As for the other variables in the model the shock variable has the correct sign if only significant at the 12% level. Total expenditure to GDP tends to be negative and significant, suggesting that the productivity of government spending does not exceed the deadweight loss associated with the tax used to pay for it.

CONCLUSIONS

This paper develops a simple model to show how the composition of public expenditure affects growth. The cointegration method is employed on data for Barbados over the period 1969-1992. The results indicate that an increase in the share of capital expenditure has a positive relation to growth and so does health, housing, agriculture and road

expenditures. By contrast, the relationship between current expenditure and growth is negative. A similar result holds true for education though this is not a significant one.

Clear directions for further research have emerged from this paper. Of first importance is the need for further disaggregation of the data. Health expenditure for example needs to be disaggregated to explicitly measure the effects of hospital and polytechnic expenditure on growth. Given the small size of the sample it is also necessary to extend the analysis to cover a wide cross-section of Caribbean economies. Moreover, this paper has not address the problem of joint endogeneity of public expenditure and growth, and the possibility of reverse causality.

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TABLE 1: UNIT ROOT BEST RESULTS

VARIABLE	AUGMENTED DICKEY FULLER	McKINNON CRITICAL VALUES 5%
DGDP	-2.35	-3.79
D(DGDP)	-3.98	-3.0
AGRTEXP	-2.25	-3.00
D(AGRTEXP)	-5.48	.01
HOMEXP	-2.19	-3.00
D(HOMEXP)*	-2.92	-3.01
HLTHEXP	-1.89	-3.00
D(HLTHEXP)	-3.89	-3.01
ROADEXP	-2.37	-3.00
D(ROADEXP)	-3.50	-3.01
EDUCEXP	-3.03	-3.00
SHOCK	-2.08	-3.01
D(SHOCK)	-3.44	-3.02
TEXPGDP	-3.97	-3.00
CURTEXP	-1.38	-3.00
D(CURTEXP)	-3.85	-3.01
CAPTEXP	-1.38	-3.00
D(CAPTEXP)	-3.85	-3.01
MONEY	-0.58	-3.04
D(MONEY)*	-2.75	-3.05
NDA	-0.35	-3.04
D(NDA)	-3.37	-3.05

Notes:* denotes significance at rate 10% level and before the variables represents first differences.

TABLE 2: ENGLE-GRANGER COINTEGRATION TEST RESULTS

Equation	1(a)	1(b)	2	3
DGDP	1.000	1.000	1.000	1.000
AGRTEXP	-3.243 (2.405)	-2.837 (2.302)		
HOMEXP	-3.265 (2.201)	-3.025 (2.456)		
HLTHEXP	-6.050 (2.583)	-6,034 (2.907)		
ROADEXP	-0.678 (1.083)	-0.821 (1.438)		
EDUCEXP	1.193 (-0.689)	0.861 (-0.719)		
SHOCK	-0.001 (0.166)	0.001 (0.125)	0.006 (1.045)	-0.001 (1.219)
TEXPGDP	1.724 (-1.985)	2.060 (-2.535)	2.870 (-2.959)	3.130 (-3.284)
CURTEXP				0.895 (-1.685)
CAPTEXP			-1.023 (1.909)	
DMONEY		0.001 (1.600)		0.001 (1.020)
DNDA	0.000 (0.441)		0.000 (0.143)	
DICKEY FULLER T	-4.52	5.41	-2.81	-2.59
McKinnon Crit. Val 5%	-5.75	5.75	-5.29	-5.29
D.W statistic	2.49	2.60	1.447	1.554

TABLE 3: A VARIANT OF EQUATION (1) AND DIAGNOSTIC TESTS

Equation	Coefficient	T-Statistics	F Statistics
CONSTANT	-0.0757	-0.236	
AGRTEXP	3.548	2.787	
HOMEXP	3.313	2.722	
HLTHEXP	3.507	2.424	
ROADEXP	0.473	0.798	
EDUCEXP	-0.807	-0.654	
SHOCK	0.006	1.625	
TEXPGDP	-1.683	-2.372	
LM TEST			0.086
ARCH TEST			0.121
RESET TEST (1)			2.686
R-SQUARED	0.77		
D.W.	2.09		
ADF	6.16		