An Analysis of Public Expenditure in Barbados: Trends and Relationship with Economic Growth

by

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Overview (1)

- Aims - examine the effect of the composition of public expenditure on economic growth in Barbados, updating and extending previous study by Belgrave and Craigwell (1997) by:
  - including trend analysis of Central Government spending
  - incorporating additional variables into the model
  - applying more recent econometric techniques (ARDL) method

Overview (2)

- Results:
  - Capital expenditure is statistically significant and positively related to economic growth in both the short- and long-run.Conversely, the relationship between current expenditure and real per capita growth is negative in both scenarios.
  - Most expenditure components significant and positively related with growth in the short-run but show a negative relationship in the long-run.
  - These results have important fiscal policy implications, particularly given current pressures on public finances.

Background (1)

- Extensive research investigating relationship between public expenditure and economic growth:
  - Mixed and conflicting results, but consensus that aggregate expenditure levels are insignificant
  - However, individual expenditure components shown to be significant

Background (2)

- Thus, components may be:
  - 'productive', i.e. growth-enhancing, and others
  - 'unproductive' or growth-retarding
- Therefore, paper motivation = identify 'productive' and 'unproductive' in order to:
  - Boost 'productive' expenditures
  - Cut 'unproductive' ones

Literature

- Devarajan, Swaroop and Zou (1996)
- Kweka and Morrissey (1999)
- Bose, Haque and Osborn (2003)
- Belgrave, Craigwell, Douglas and Williams (1996)
- Belgrave and Craigwell (1997)

Empirical Model (1)

- Based on Belgrave and Craigwell (1997):
  - No *a priori* assumptions about expenditure component categorization
  - growth in real per capita GDP expressed as a function of several expenditure ratios, variables capturing external shocks to the economy, a domestic control variable and an error term

Empirical Model (2)

$$\Delta GDP_t = B'_X X_t + \mu_t \quad (1)$$

Where ΔGDP_t is the growth rate of real GDP per capita and B_x is a vector of β-coefficients corresponding to the various variables in , which is given by:

$$X = \begin{bmatrix} ARGTEXP_t, HOMEXP_t, HLTHEXP_t, ROADEXP_t, EDUCEXP_t, CHRGEXP_t, WELFEXP_t, \\ TEXPGDP_t, DOM_t, OIL_t, LIBOR_t, WGDP_t \end{bmatrix}$$

Empirical Model (2)

- To examine the effects of more aggregated expenditure categories, Equation 1 is re-estimated, with the ratio of capital expenditure to total expenditure (*CAPTEXP*) replacing the individual expenditure categories in *X*, and again with *CAPTEXP* replaced by the ratio of current expenditure (less debt service payments) to total expenditure (*CURREXP*).

Data

- Annual frequency, 1966 – 2004, in logs
- Expenditure statistics for Central Govt. only
- Sources:
  - Barbados Abstract of Statistics
  - CBB Annual Statistical Digest
  - CBB Economic and Financial Statistics
  - IMF International Financial Statistics CD-ROM

Methodology (1)

- Econometric Software – Eviews
- All variables ADF-tested for unit roots
- Auto-Regressive Distributed Lag (ARDL) method [Pesaran et al (2001)] employed:
  - Mixed orders of integration
  - Small sample size

Methodology (2)

- ARDL Representation of Model:

$$GDP_t = B'_X X_t + \sum_{s=-1}^{1} \lambda'_s \Delta X^i_{t+s} + \xi_t \qquad (2)$$

- 'General to Specific' (GETS) procedure [Hendry et al (1978)] applied to arrive at more parsimonious representation

Methodology (3)

- To investigate short-run effects, the following General Error Correction Model (GECM) is estimated:

$$\Delta GDP_t = \Delta GDP_{t-1} + \sum_{s=-1}^{0} \lambda_s' \Delta X_{t+s}^i + \phi_s' X_{t+s}^j + ECM_{t-1} + \varepsilon_t \qquad (3)$$

- The GETS procedure is again employed in estimating Equation (3)

Long-Run Results (1)

Table 2(a): ARDL Estimation Results – Diagnostic Statistics

Test Statistic	Expenditure Components	Capital Expenditure	Current Expenditure
R-Squared	0.915	0.890	0.876
Durbin-Watson	1.947	1.093	1.686
Jarque-Bera	1.310 (0.519)	0.645 (0.724)	1.408 (0.356)
Breusch-Godfrey LM	0.025 (0.876)	5.643 (0.027)	0.890 (0.356)
ARCH LM	0.217 (0.644)	0.003 (0.955)	0.112 (0.739)
White Heteroskedasticity	2.587 (0.146)	1.285 (0.406)	0.857 (0.645)
Ramsey RESET	1.562 (0.235)	1.159 (0.335)	0.004 (0.996)
CUSUM	Yes	No	No
CUSUMSQ	Yes	Yes	Yes

Long-Run Results (2)

Table 2(b): ARDL Estimation Results – Expenditure Components

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	6.695	0.388	17.260	0.000
LARGTEXP	-0.096	0.046	-2.102	0.048
LEDUCEXP	-0.456	0.167	-2.738	0.012
LHOMEXP	0.226	0.027	8.247	0.000
LWELFEXP	-0.450	0.099	-4.541	0.000
D(LWGDP)	4.449	1.862	2.390	0.026
D(LWGDP(-1))	-3.319	1.321	-2.512	0.020
D(LWGDP(1))	-3.958	1.472	-2.689	0.014
D(LCHRGEXP(-1))	-0.238	0.080	-2.980	0.007
D(LTEXPGDP)	-0.620	0.183	-3.389	0.003
D(LLIBOR)	-0.163	0.078	-2.101	0.048
D(LLIBOR(-1))	0.164	0.074	2.224	0.037
D(LLIBOR(1))	0.130	0.068	1.913	0.070
D(LROADEXP(-1))	-0.183	0.083	-2.194	0.040
D(LROADEXP(1))	-0.279	0.081	-3.436	0.003
D(LDOM)	0.248	0.096	2.577	0.018
D(LDOM(1))	0.199	0.106	1.876	0.075

Dependent Variable: LGDP   38 observations

Long-Run Results (3)

Table 2(c): ARDL Estimation Results – Capital Expenditure

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	8.703	0.106	82.005	0.000
LCAPTEXP	0.129	0.050	2.555	0.019
D(LWGDP(-1))	-4.434	1.041	-4.259	0.000
D(LWGDP(1))	-7.147	1.589	-4.497	0.000
D(LWGDP(2))	-2.821	1.268	-2.225	0.037
D(LTEXPGDP(1))	0.617	0.206	2.993	0.007
D(LTEXPGDP(-2))	-0.324	0.174	-1.866	0.076
D(LLIBOR(1))	-0.136	0.066	-2.071	0.051
D(LLIBOR(-2))	0.193	0.075	2.569	0.018
D(LOIL)	-0.093	0.042	-2.204	0.039
D(LOIL(-1))	-0.233	0.048	-4.839	0.000
D(LOIL(1))	0.092	0.050	1.862	0.077
D(LOIL(-2))	-0.266	0.049	-5.432	0.000
D(LOIL(2))	0.180	0.049	3.680	0.001
D(LDOM(1))	0.332	0.107	3.096	0.006
D(LDOM(-2))	0.289	0.122	2.370	0.027

Dependent Variable: LGDP   37 Observations

Long-Run Results (4)

Table 2(d): ARDL Estimation Results – Current Expenditure

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	7.914	0.133	59.499	0.000
LCURREXP	-1.244	0.276	-4.514	0.000
D(LWGDP(-1))	-3.234	1.227	-2.637	0.015
D(LWGDP(1))	-6.420	1.374	-4.674	0.000
D(LTEXPGDP(1))	0.804	0.186	4.331	0.000
D(LTEXPGDP(-2))	-0.413	0.179	-2.300	0.031
D(LLIBOR)	-0.146	0.062	-2.347	0.028
D(LOIL(-1))	-0.152	0.042	-3.606	0.002
D(LOIL(1))	0.149	0.046	3.258	0.004
D(LOIL(-2))	-0.237	0.045	-5.215	0.000
D(LOIL(2))	0.092	0.044	2.080	0.049
D(LDOM(-2))	0.310	0.120	2.592	0.016
D(LDOM(2))	-0.217	0.121	-1.795	0.086
D(LLIBOR(1))	-0.120	0.069	-1.745	0.094

Dependent Variable: LGDP   37 Observations

Short-Run Results (1)

Table 3(a): GECM Estimation Results – Diagnostic Tests

Test Statistic	Expenditure Components	Capital Expenditure	Current Expenditure
R-Squared	0.915	0.890	0.876
Durbin-Watson	1.947	1.093	1.686
Jarque-Bera	1.310 (0.519)	0.645 (0.724)	1.408 (0.356)
Breusch-Godfrey LM	0.025 (0.876)	5.643 (0.027)	0.890 (0.356)
ARCH LM	0.217 (0.644)	0.003 (0.955)	0.112 (0.739)
White Heteroskedasticity	2.587 (0.146)	1.285 (0.406)	0.857 (0.645)
Ramsey RESET	1.562 (0.235)	1.159 (0.335)	0.004 (0.996)
CUSUM	Yes	No	No
CUSUMSQ	Yes	Yes	Yes

Short-Run Results (2)

Table 3(b): GECM Estimation Results – Expenditure Components

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.479	0.089	5.397	0.000
D(LLIBOR)	0.108	0.011	9.498	0.000
D(LOIL)	-0.091	0.012	-7.360	0.000
D(LOIL(-1))	-0.043	0.009	-4.590	0.000
D(LTEXPGDP)	-0.240	0.044	-5.410	0.000
D(LTEXPGDP(-1))	0.168	0.045	3.783	0.001
D(LHLTHEXP(-1))	0.225	0.050	4.479	0.000
D(LCHRGEXP)	-0.230	0.021	-11.041	0.000
LARGTEXP(-1)	0.052	0.010	5.447	0.000
LWELFEXP(-1)	0.058	0.028	2.053	0.052
LHOMEXP	0.040	0.007	5.659	0.000
ECMGDP(-1)	-0.312	0.074	-4.230	0.000

Dependent Variable: LGDP   38 observations

Short-Run Results (3)

Table 3(c): GECM Estimation Results – Capital Expenditure

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LGDP(-1))	0.324	0.125	2.601	0.015
D(LGDP(-2))	0.488	0.112	4.351	0.000
D(LWGDP2)	1.562	0.367	4.254	0.000
D(LWGDP2(-1))	-1.066	0.488	-2.183	0.037
D(LWGDP2(-2))	1.275	0.539	2.367	0.025
D(LLIBOR(-2))	-0.090	0.026	-3.534	0.001
D(LDOM(-1))	0.091	0.042	2.163	0.039
LCAPTEXP	0.034	0.009	3.768	0.001
ECMTERM(-1)	-0.681	0.112	-6.075	0.000

Dependent Variable: LGDP   38 observations

Short-Run Results (4)

Table 3(d): GECM Estimation Results – Current Expenditure

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.182	0.057	-3.213	0.003
D(LGDP(-1))	0.451	0.127	3.563	0.001
D(LGDP(-2))	0.567	0.113	4.999	0.000
D(LWGDP2)	2.138	0.418	5.109	0.000
D(LWGDP2(-1))	-1.423	0.579	-2.457	0.021
D(LWGDP2(-2))	1.541	0.570	2.700	0.012
D(LLIBOR(-2))	-0.094	0.026	-3.648	0.001
D(LDOM)	-0.093	0.047	-1.968	0.059
LCURREXP(-2)	-0.329	0.130	-2.520	0.018
ECMTERM(-1)	-0.838	0.132	-6.323	0.000

Dependent Variable: LGDP   38 observations

Conclusions (1)

- Findings:
    - A positive and significant relationship between capital expenditure and growth, but a negative and significant link between current expenditure and economic growth
    - in the short-run, agriculture, welfare, housing and health are all significant and positively related with economic growth, while debt service is the only one with a significant negative relationship with growth
    - However, in the long-run, agriculture, education and welfare, and charges of debt all have appear to have significant negative relationships with growth, whereas housing is the only one positively related with growth and health is found to be statistically insignificant.

Conclusions (2)

- Policy Recommendations:
    - Boosting relatively more 'productive' capital expenditures and cutting current expenditure, which is shown to be relatively 'unproductive', are two viable policy options if the fiscal authorities wish to enhance the growth performance of the Barbadian economy