Determining Optimal Public Debt and Debt-Growth Dynamics in the Caribbean

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1. The Study & Findings

- This study:
  - (i) Investigates the debt-growth nexus and the non-linearity issue using estimations and threshold dynamics in 13 Caribbean countries.
  - (ii) Calibrates an optimal debt/GDP ratio for each country using a modified Blanchard (1983) exercise.
  - (iii) Tests the crowding out hypothesis by examining the debt-investment link.

- The empirical results support the view that there is a non-linear relationship between debt and growth.
  - The findings suggest that there is a global tipping point for the debt/GDP ratio of 61 percent beyond which debt adversely impacts growth and investment.
  - At the country level, the results show marked divergence between actual debt/GDP ratios and the calibrated optimal ratios.
  - The empirical findings have policy relevance for Caribbean countries that are challenged by persistent high debt and low growth in the context where development is financed largely by debt accumulation.

2. Motivation

- Caribbean countries are ideal for examining this nexus, since some of then are among the most indebted in the world in terms of debt/GDP ratio, but there have been only a handful of studies examining the debt-growth link in the Caribbean.
  - They were primarily descriptive.
  - They followed a linear approach in investigating the relationship between debt and economic growth without examining optimality with respect to the debt/GDP ratio.

- There is no consensus regarding the optimal debt/ gross domestic product (GDP) ratio a country can maintain.
  - An optimal debt/GDP ratio is one that maximizes social welfare and economic growth without reducing private investments or increasing sovereign credit risks or raising overall development costs.

- Reinhart and Rogoff (2010) found that debt is drag on growth when the ratio exceeds a 90 percent threshold.
  - Reinhart and Rogoff's study came under attack when Herndon et al (2013) errors in Reinhart and Rogoff's dataset in trying to replicate their results.
    - Although neither study answered the causality question, the empirical findings of both imply a negative association between debt and growth when debt exceeds a certain threshold.
    - This concern is particularly acute in the Caribbean context, where countries are challenged by heavy debt burdens, low economic growth and unacceptably high poverty.

Structure of Study

- Section provides a brief examination of public debt and growth performances in selected Caribbean countries.
- Section discusses the model and the data.
- Section provides the estimation results.
- Section addresses policy implications and section ***seven*** concludes.

3. GROWTH AND PUBLIC DEBT PERFORMANCES IN THE CARIBBEAN: SNAPSHOT

- Economic growth within and across countries has been uneven and decelerating, but public debt has been accelerating on average.
- The weighted average growth rate during the 2000s was 2.7 percent, compared with 2.5 percent during the 1990s and 1.0 percent during the 1980s.
  - The low weighted average growth rate during the 1980s is mainly a result of the economic contractions in Trinidad and Tobago.
- Trinidad and Tobago, along with Guyana and Suriname benefitted from fortuitous economic circumstances and structural reforms, causing a turnaround in the mid 1990s and growth in the mid 2000s, up until the global 2009 crisis.
- Growth was interrupted in all of the sample countries in 2009 with the exception of Guyana and Suriname, but most are recovering.
- Given the openness and external dependence of all Caribbean economies, fluctuations in output growth tend to be frequent
  - The volatility of output growth as measured by the standard deviation of real GDP growth 2.3 percent during 2000-12.

GROWTH AND PUBLIC DEBT PERFORMANCES IN THE CARIBBEAN: SNAPSHOT

- The weighted average real GDP per capita growth rate has been gradually accelerating, with a weighted average growth rate of 4.6 percent in the 1990s, and 5.6 percent in the 2000s.

Table 1

	Real GDP Growth (%)									Real Per capita GDP Growth (%)								
	1980-89			1990-99			2000-12			1980-89			1990-99			2000-12		
	Av.	St.Dev	# of years of growth	Av.	St.Dev	# of years of growth	Av.	St.Dev	# of years of growth	Av	St.Dev	# of years of growth	Av.	St.Dev	# of years of growth	Av.	St.Dev	# of years of growth
Antigua and Barbuda	6.4	3.2	9	3.4	3.4	9	1.6	6.5	9	14.7	4.1	10	3.8	1.0	9	2.2	7.0	8
The Bahamas	3.5	2.9	9	2.7	4.9	8	1.2	2.5	10	6.6	3.3	10	5.7	4.7	6	1.2	3.8	8
Barbados	1.8	3.1	8	0.5	3.6	7	1.2	2.6	10	7.9	2.5	10	1.8	5.5	8	3.0	4.4	10
Belize	6.9	8.6	8	5.9	4.7	10	4.4	3.4	12	6.4	6.8	8	1.8	3.6	9	3.0	3.1	12
Dominica	5.4	4.8	9	2.6	1.4	10	1.7	3.0	10	N/a	N/a	N/a	5.2	4.0	10	3.6	4.0	10
Grenada	4.1	4.1	9	4.4	4.0	9	2.3	5.2	9	10.0	4.3	10	7.5	3.2	9	4.3	5.5	12
Guyana	-3.1	4.6	3	4.8	4.1	8	2.4	2.6	10	1.5	13.3	4	2.9	4.2	7	7.5	5.3	13
Jamaica	2.3	4.2	7	1.3	1.9	7	0.8	1.7	10	4.2	16.0	7	7.7	9.1	7	3.8	6.1	11
St. Kitts and Nevis	5.8	4.0	9	4.1	1.9	10	2.0	4.4	9	14.2	6.2	9	9.1	11.5	9	2.9	6.1	10
St. Lucia	6.7	5.5	9	3.5	3.5	9	1.6	3.6	9	11.0	9.1	10	7.3	4.6	9	3.5	5.4	11
St. Vincent and the Grenadin	5.6	3.7	10	3.6	3.4	9	2.3	3.1	9	12.0	5.9	9	6.3	4.5	10	11.0	14.8	12
Suriname	-1.8	5.7	2	0.6	3.5	6	4.4	1.8	12	N/a	N/a	N/a	N/a	N/a	N/a	10.6	9.9	12
Trinidad and Tobago	-1.4	6.0	3	3.9	3.7	8	5.1	5.3	10	-2.8	14.8	4	2.1	12.2	8	11.0	14.8	12
Weighed average	1.0	2.4	7	2.5	1.6	9	2.7	2.6	12	3.3	5.4	3	4.6	12.2	9	5.6	14.8	12
Average	3.2	1.9	10	3.2	0.9	10	2.4	2.2	11	7.1	2.1	10	3.3	2.8	10	4.4	5.7	12

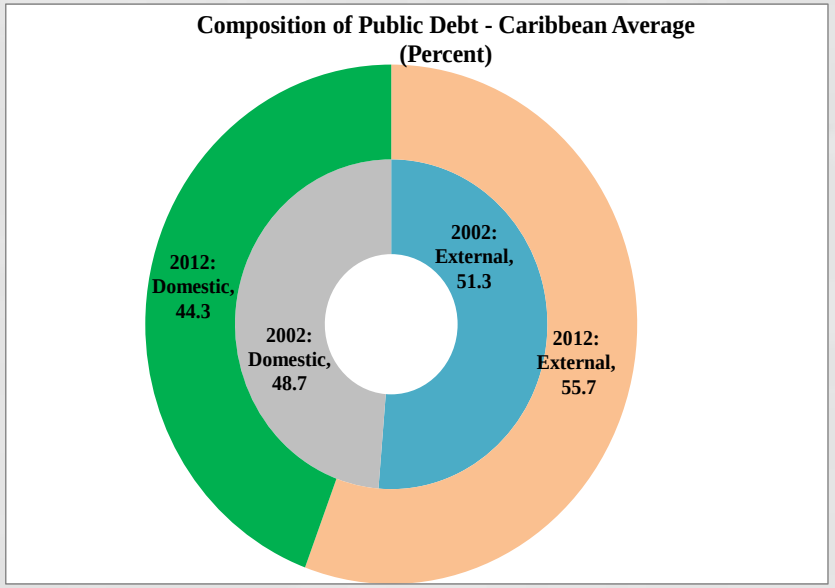
GROWTH AND PUBLIC DEBT PERFORMANCES IN THE CARIBBEAN: SNAPSHOT

- In 2012, the combined nominal stock of the selected Caribbean countries increased 61 percent relative to the stock at 2002.
  - The elevation in the debt stock has been pronounced in The Bahamas and Barbados, occasioned by rapid build up in expenditures.
  - Since 2008 and over the recessionary period up to 2010, sustained increases in debt levels have been observed in the majority of countries.
- Reliance on external debt has increased: in 2012, external debt accounted for the larger share of total debt in seven of the 12 sample countries relative to 2002, associated with increased reliance on bilateral debt and multilateral financing

Table 2: Nominal Public Debt (US$ billion)

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Antigua and Barbuda	1.0	1.1	1.1	0.9	1.0	1.0	1.0	1.2	1.0	1.0	1.1
The Bahamas	1.7	1.9	2.0	2.2	2.3	2.5	2.7	3.0	3.5	3.9	4.2
Barbados	2.0	2.0	2.1	2.5	2.5	2.8	3.2	3.7	4.1	4.4	4.7
Belize	0.8	1.0	1.1	1.2	1.1	1.1	1.1	1.1	1.2	1.2	1.2
Dominica	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.4
Grenada	0.4	0.5	0.6	0.6	0.7	0.7	0.7	0.8	0.8	0.8	0.9
Guyana	1.5	1.4	1.5	1.5	1.4	1.0	1.1	1.2	1.3	1.5	1.6
Jamaica	10.3	10.4	11.3	12.2	12.9	13.3	13.8	13.7	16.4	18.2	19.0
St. Kitts and Nevis	0.4	0.4	0.2	0.3	0.4	0.7	0.7	0.8	0.9	0.8	0.7
St. Lucia	0.3	0.4	0.1	0.1	0.2	0.6	0.6	0.6	0.6	0.7	0.7
St. Vincent and the Grenadines	0.2	0.3	0.3	0.3	0.4	0.4	0.4	0.4	0.4	0.5	0.5
Suriname	0.6	0.5	0.6	0.6	0.6	0.5	0.6	0.6	0.8	1.0	1.1
Trinidad and Tobago	4.6	4.9	4.6	3.8	2.7	2.2	1.4	2.2	2.3	1.6	2.9
Caribbean	**24.2**	**25.2**	**25.9**	**26.6**	**26.5**	**27.2**	**27.5**	**29.6**	**33.8**	**36.0**	**39.1**

Figure 1



GROWTH AND PUBLIC DEBT PERFORMANCES IN THE CARIBBEAN: SNAPSHOT

- From 2002-07, the debt/GDP ratios declined from an average 78.5 percent in 2002 to 63 percent in 2007.
  - Reductions in the debt/GDP ratios were recorded in five countries with cumulative percentage points declines as follows: Guyana (71.4); Antigua and Barbuda (48.7); Trinidad and Tobago (33.5); Dominica (27.3); and Suriname (22.6).
- However, it has been on a steady increase on average at the aggregate level since 2008.
- As Figure 3 shows, the debt/GDP ratios expanded persistently in The Bahamas, Barbados, St. Kitts and Nevis and St. Lucia, and Grenada.
- Debt decomposition analysis shows that the main contributors to the increases have been modest GDP growth, deteriorating primary deficits and rising interest rates.

Figure 2

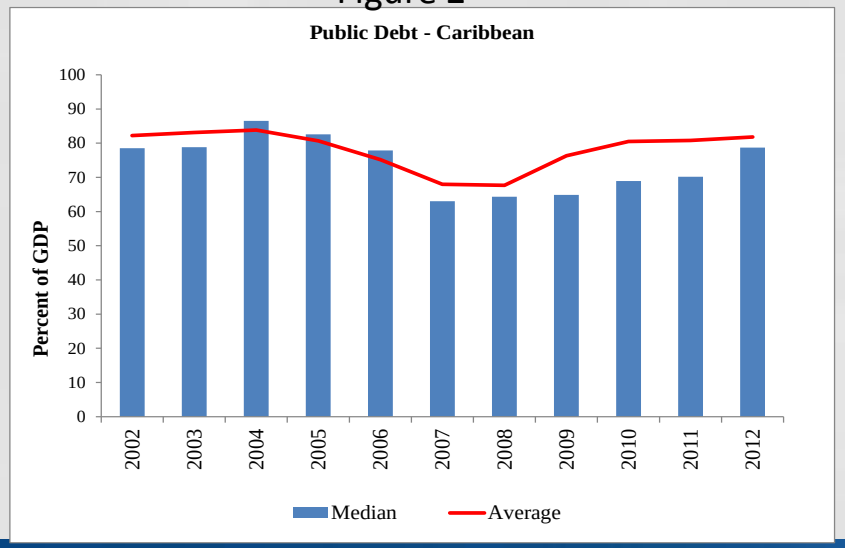
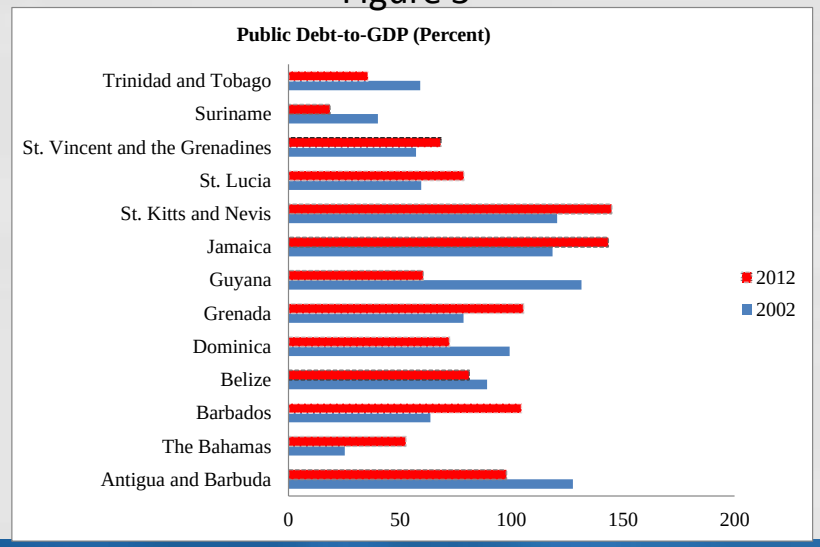


Figure 3



GROWTH AND PUBLIC DEBT PERFORMANCES IN THE CARIBBEAN: SNAPSHOT

- The ratio of total external debt to total exports of goods and services has generally been on a downward trajectory in the commodity exporting countries in the past decade. In the tourism-dependant countries, the ratio was on a steady uptrend throughout the decade until 2011.
- There is a negative relationship between GDP per capita growth and the ratio of public debt/GDP on average, across the selected Caribbean countries. The majority of countries cluster in the low-growth (2-3 percent) and high-debt (70-100 percent of GDP) ranges.

Figure 3

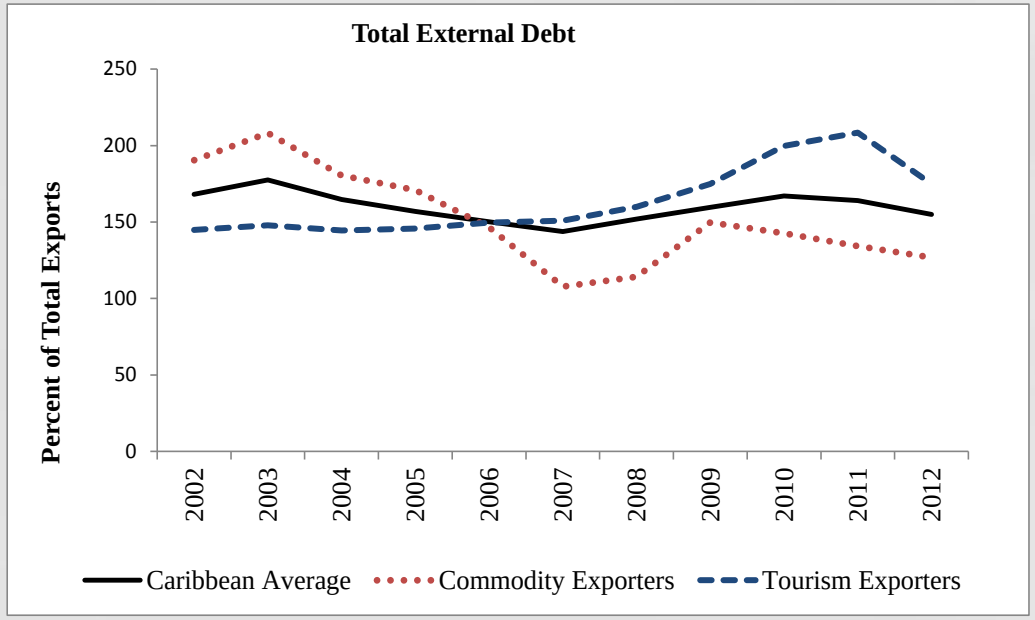
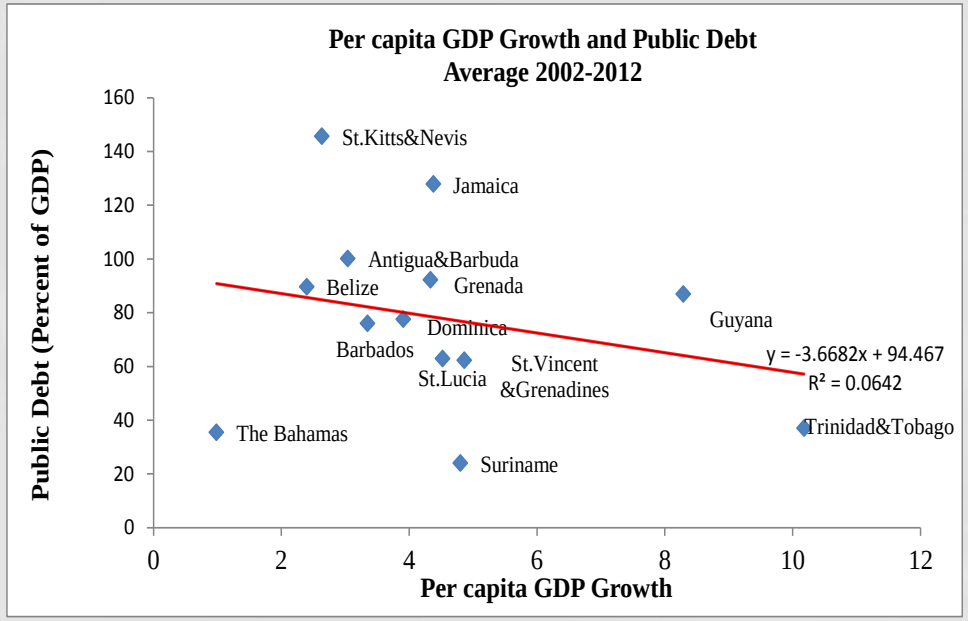


Figure 4



4. Estimation Models, Econometric Method, and Data

4.1.1 The Debt-Growth Model

- The debt-growth model for this study is specified as:

$$\Delta(\vartheta) = \prod \vartheta_{t-1} + \sum \alpha \Delta \vartheta_{t-1} + \sigma \gamma_t + e$$

- ϑ = labour input, capital stock, human capital, government consumption, openness, debt service and the debt/GDP ratio is a data vector explaining the real output relationship with all independent variables.
- γ_t is a vector of deterministic variables and the random term
- e_t is expected to be white noise.

4.1.2 Threshold Debt Model

$$\vartheta_{it} = \vartheta_1(1-\eta_{it}^{D^*})(D_{it} - D^*) + \vartheta_2 \eta_{it}^{D^*}(D_{it} - D^*) + \varphi \vartheta_{it} + e_{it}$$

-D* is the threshold debt/GDP ratio

- η is a variable that takes the value of 1 if the debt/GDP ratio exceeds D* and zero otherwise.
- ϑ is the vector of variables that explain the real output relationship and are estimated when the debt is above and below the estimated threshold.

-The lowest or minimal sequence of residual sum of squares is computed and Bootstrapping techniques are used to determine the statistical significant levels of the asymptotic distribution of the t-statistic.

4.1.3 The Crowding-Out Effect Model

$$\Delta(\omega) = \prod \omega_{t-1} + \sum \alpha \Delta \omega_{t-1} + \sigma \gamma_t + e_t$$

- ω is a data vector of variables that explain the crowding-out relationship. Include labour input, real output growth, human capital, fiscal balances, openness, debt service levels and the debt/GDP ratio.

-The elasticities of capital stock with respect to these variables are determined by the factor γ_t (1- $\alpha - \beta$) , where γ_t is a vector of deterministic variables,

- e_t is expected to be white noise.

4. Estimation Models, Econometric Method, and Data

4.1.4 The Modified Blanchard Model – Determining Optimal Debt/GDP Ratio

- Blanchard (1983) developed a calibration exercise to solve for optimal debt/GDP ratio given the expected path for capital and net output. In Blanchard's model, the stock of future debt is derived from the existing debt stock and the current account deficit.
  - Capital accumulation is first derived following the net output paths, then solutions are derived for total consumption and the external current account deficit, after defining the utility, production, capital accumulation, and adjustment cost functions to be employed (Blanchard 1983).
  - Our model builds on Blanchard's by considering changes in the cost of capital as debt accumulates.

: $\omega = \int_o^\infty \omega(C_t).e^{pt}.e^{\varphi t}dt$ utility function where

- C_t = consumption at time t
- φ = rate of time preference
- e^{pt} = population size at time t
- $\varphi = r$ is the changing and exogenous interest rate
- $Y = F(\eta, \phi e^{vt})$ is the production function
  - η = capital stock
  - v = technology growth
  - ϕe^{vt} = effective amount of labor input.

$1 + \varsigma(\frac{1}{\eta})$ adjustment cost function

assuming that $\varsigma(\frac{i}{\eta}) = \frac{1i}{2\iota\eta}$, where the change in capital stock is given by $\frac{d\eta_t}{d_t} = \kappa_t - \tau\eta_t$.

4. Estimation Models, Econometric Method, and Data

4.1.4 The Modified Blanchard Model – Determining Optimal Debt/GDP Ratio

- We solve for capital accumulation, and then solve for consumption and the current account, by computing the first order conditions that characterize investment and capital accumulation respectively as:

$$\frac{d\eta_t}{dt} = [\iota(q_t - 1) - (\upsilon + \rho + \tau)]\eta_t$$

$$\frac{d\sigma_t}{dt} = (r + \tau)\sigma_t - \eta f^1(\eta_t) - \frac{1}{2}\iota(\sigma_t - 1)^2$$

in the steady state: $\frac{d\eta_t}{dt} = \frac{d\sigma_t}{dt} = 0$

- To analyze the investment and capital dynamics, we linearize (4) and (5) around the steady state to derive output $\omega_t = \eta f(\eta_t)$
- Next, consumption is solved for with exogenously determined government spending with: $c_t = rb_0 + r\int_0^\infty (\omega_t - \eta_t - \theta - \zeta(\eta_t, \eta_t))e^{-rt}dt$
- The trade balance is derived by subtracting consumption, exogenously determined government spending, investment and its residual cost from output:

$$tbd_t = c_t + \theta_t + k(i_t, \eta_t) - \omega_t$$

- The current account deficit is given by $cad_t = tbd_t + (r - \nu - \rho)b_t$ and the debt/GDP ratio by $b_{t+1} = b_t + cad_t$

4. Estimation Models, Econometric Method, and Data

4.2 The Econometric Method: Debt-Growth Dynamics (Using PDOLS)

- This study uses PDOLS to derive the long and short-run estimates in the debt-growth investigation in the sample of Caribbean countries.
- Recognizing that the growth model is normally non-linear in nature (Greenidge et al 2012), simple tests of non-linearity are carried out using the Wald statistic (Harvey and Leybourne 2007):

$$W_t = \frac{RSS_1 - RSS_0}{RSS_0 / T}$$

where RSS_0 and RSS_1 are the residuals sum of squares from the unrestricted and restricted OLS regressions, respectively.

- Panel dynamic method is used to determine the short and long-run factors influencing economic growth and capital stock accumulation.

4. Estimation Models, Econometric Method, and Data

4.2 The Econometric Method: Debt-Growth Dynamics (Using PDOLS)

- The estimation of the long-run relationship for Equation (1) is based on the following regression:

$$Y_t = \alpha_0 + \beta X_t + \sum_{i=-k}^{k} \phi X^1_{t-1} + e_t$$

-X is a vector of all explanatory variables
-X^1 is a subset of I(1) variables of X
- β is a vector of long-run coefficients
-e_t is a well-behaved error term.
-The leads and lags of the first differenced I(1) regressors are included to adress the problems of endogeneity and autocorrelation.

- To investigate the short-run dynamics, the estimates from Equation (6) are used to derive a general error correction model of the form:

$$\Delta Y_t = \beta_o + \sum_{1=1}^{m} \beta_{1_t} \Delta Y_{t-1} + \sum_{1=0}^{m} \beta_2 \Delta X^1_{t-1} + \sum_{1=0}^{m} \beta_3 Z_{t-1} + \sum_{i=1}^{m} \varphi(Y_{t-1} - \beta X_{t-1}) + \mu$$

- Changes in per capita GDP growth are a function of its past, lagged first difference non-stationary variables (X^1), lagged stationary variables (Z) and the lagged error correction term.
- $\beta_1, \beta_2 and \beta_3$ capture the short run effects.
-φ rate at which per capita GDP readjusts to steady state.

4. Estimation Models, Econometric Method, and Data

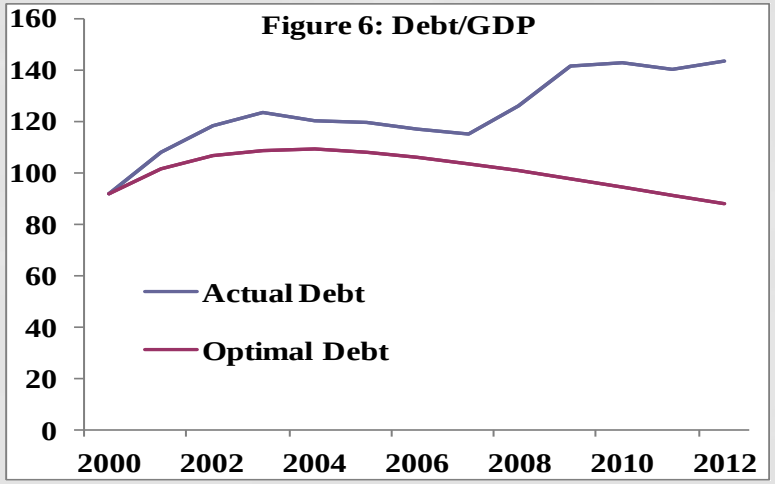
4.3 Data

- The data used in this paper cover the period 1990 to 2012, obtained from the World Development Indicators, 2012 and IMF's World Economic Outlook Database, October 2012.
- In testing the debt-growth relationship:
  - The dependent variable is per capita GDP growth.
  - The independent variables are: debt/GDP ratio, estimates of capital stock using the perpetual inventory method, secondary school enrolment as a proxy for human capital, labour force participation rate, government consumption as a percentage of GDP, openness indicator, and debt service ratio.
- When testing for the crowding out effects on investment, the independent variables become the debt variable indicators.

5. Estimation Results

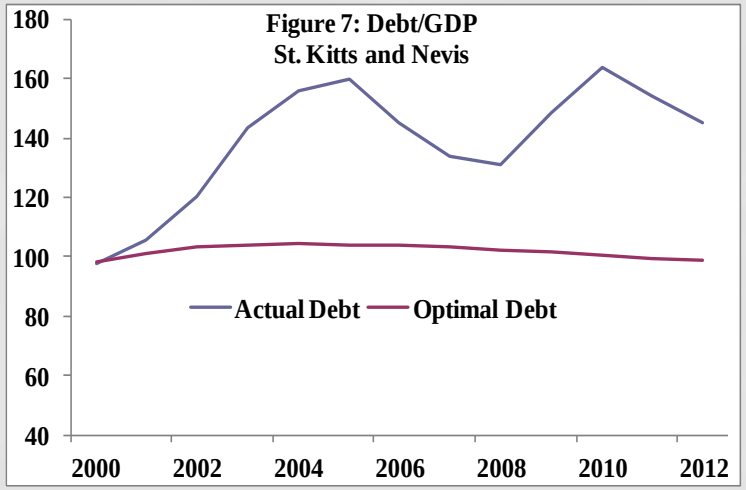
JAMAICA

- 2001-2003: Jamaica's actual debt/GDP ratio deviated from the optimal due to the lower tourism receipts following 9/11 event & post finsac activity.
- 2004-2007: Jamaica's actual debt/GDP ratio decreased but remained above the optimal .
- After 2008, Jamaica experienced a huge decline in tourism receipts and remittances, which would have influenced the deviation between actual and optimal debt/GDP ratios.



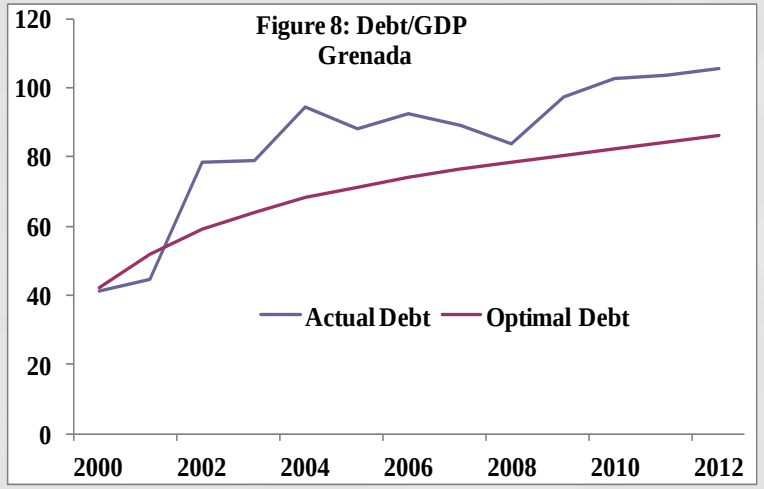
ST. KITTS AND NEVIS

- St. Kitts and Nevis' optimal debt path suggested a relatively stable path.
- Instead, the country's actual debt/GDP ratio has reached more than 160 percent.
- Fiscal deficits for much of the 2000s would have also contributed to the wedge between the actual and optimal ratios.

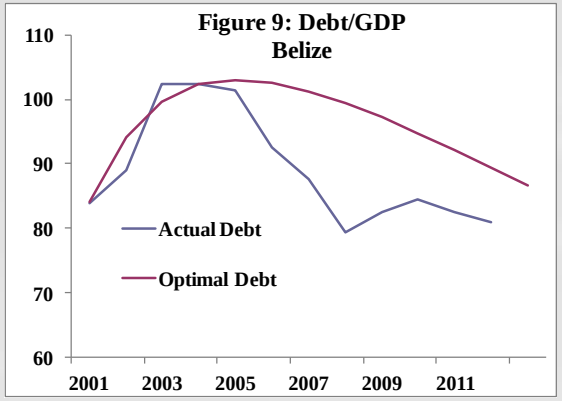


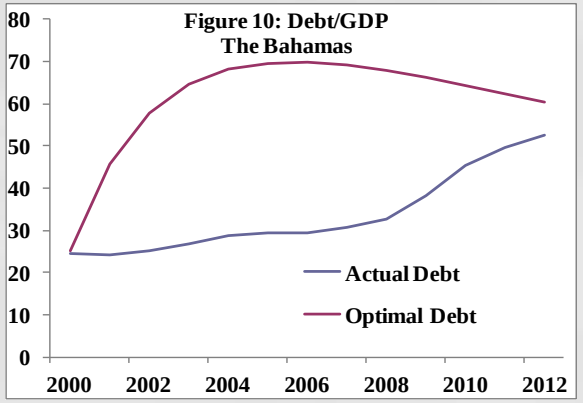
GRENADA

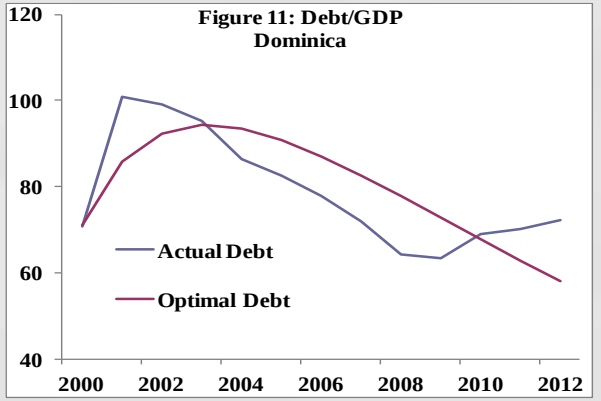
- Grenada's debt/GDP ratio has increased above the suggested optimum throughout the years, due to reconstruction spending from hurricanes Ivan in 2004 and Emily in 2005 and the effects of the economic crisis in 2010.

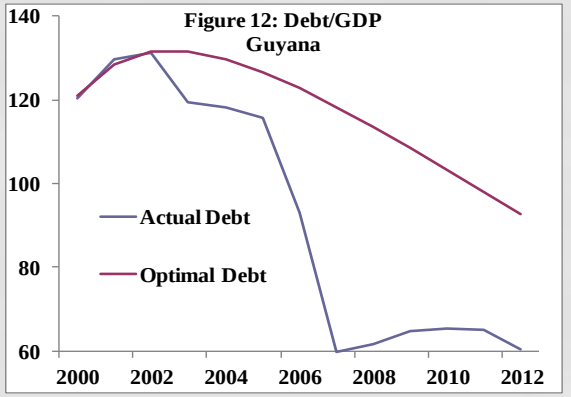


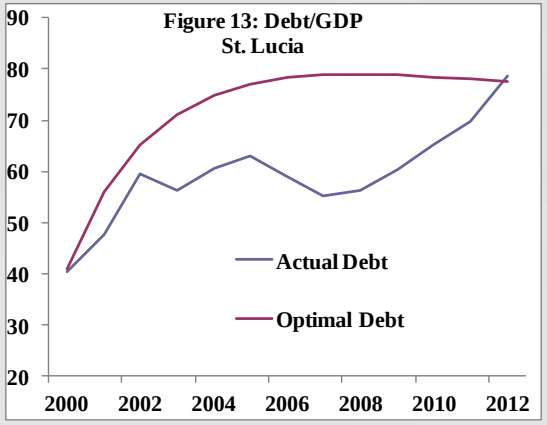
5. Estimation Results

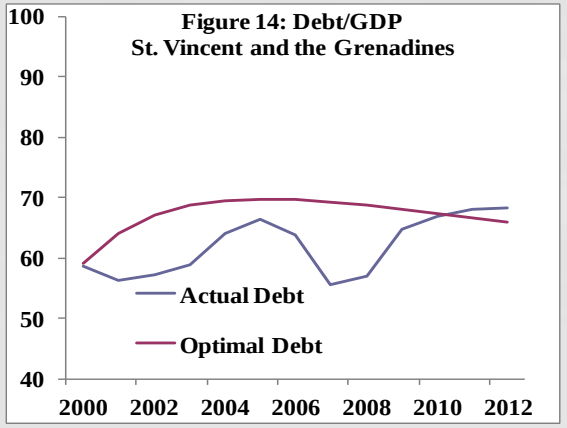


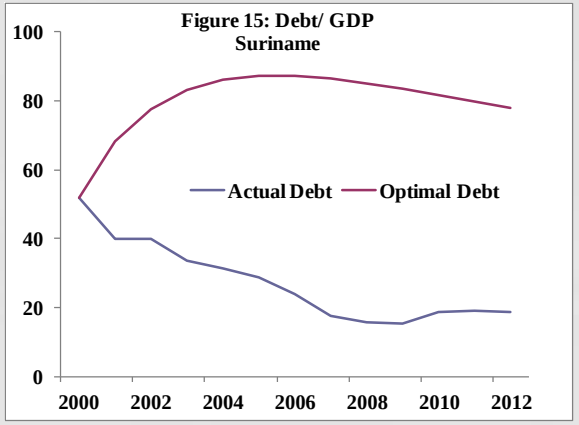


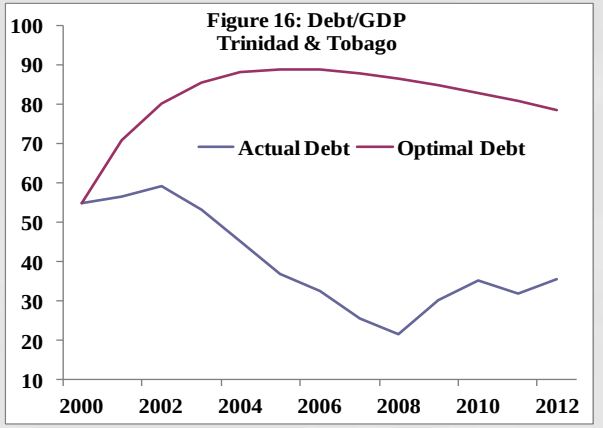








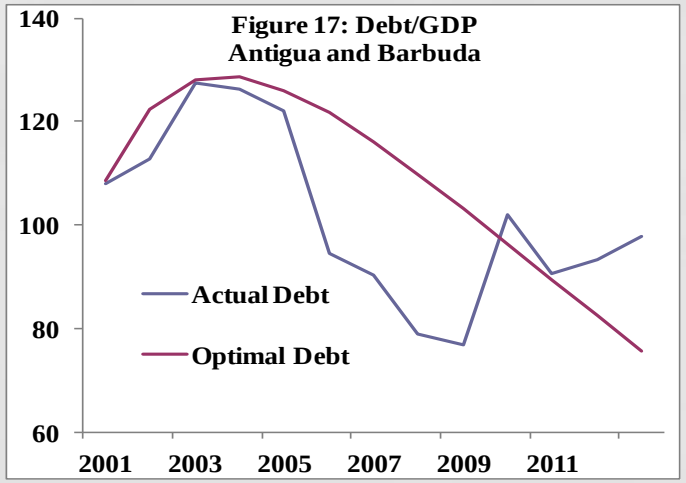




5. Estimation Results

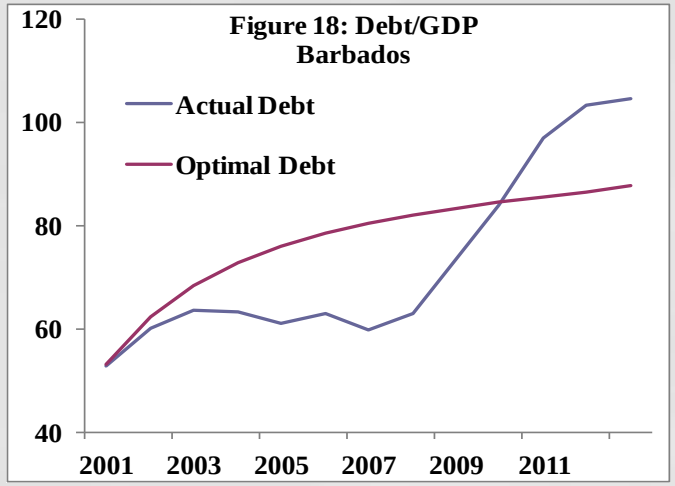
ANTIGUA AND BARBUDA

- The simulated path for the optimal ratio suggested an initial increase in debt of up to 129 percent of GDP in the early years, followed by a subsequent decrease.
- In the period 2000-2008, the country's debt/GDP ratio followed more or less this pattern.
- However, after the economic crisis, the country's actual ratio rose significantly, reflecting the decreasing tourism receipts, remittances, FDI inflows, and fiscal revenues



BARBADOS

- Barbados' actual debt/GDP ratio followed a relatively stable trend, even declining during some years.
- After the economic crisis, Barbados' debt/ GDP ratio increased drastically, and by 2012 the country's actual ratio was 17 percentage points above the optimal, reflecting acute fiscal deficits resulting from falling public revenues



5. Estimation Results

5.2 Debt Growth Nexus Approach – Using PDOLS

- The results of the PDOLS estimations show a negative relationship between economic growth and high indebtedness.
- Economic growth is adversely impacted by debt/GDP ratio (-0.25) and debt servicing (-0.146) and positively by gross capital formation proxied by investment as a percentage of GDP (0.18), and the openness indicator (0.27).

Table 4: Panel Long-Run Coefficients of Real Per Capita Gross Domestic Product

$$Y_t = \underset{(-2.95***)}{-0.25\,DG} \underset{(-2.62***)}{-\ 0.146\,DS} + \underset{(2.63***)}{0.18\,IN} + \underset{(4.561***)}{0.272\,OP}$$

Diagnostic Tests:

$R^2 = 0.28$ $\overline{R^2} = 0.263$ F = 10.51 DW = 1.95 NORM = 4.710
AR = 0.235 ARCH = 0.128 HET = 0.935 RESET = 1.62

- The results of the short-run error correction model (Table 5) suggest that it would take real GDP per capita approximately one period to return to equilibrium after a shock.
- It also shows that debt/GDP and debt service ratios have a negative impact on real output, while investment, government consumption and labour force participation have a positive impact.
- Openess and the human capital were insignificant.

Table 5: Panel Short-Run Model of Real per capita Gross Domestic Product

$$\Delta Y_t = \underset{(-3.188***)}{-0.349\,\Delta DG} - \underset{(-1.755*)}{0.1688\,\Delta DS} + \underset{(4.034***)}{1.448\,\Delta GC_{t-1}}$$
$$\underset{(2.02**)}{0.1391\,\Delta LF_{t-1}} + \underset{(2.069**)}{0.284\,\Delta IN} \underset{(-4.975***)}{-\ 0.7248\,ECT_{t-1}}$$

Diagnostic Tests:

$R^2 = 0.429$ $\overline{R^2} = 0.411$ F = 113 DW = 2.047 NORM = 3.892
AR = 1.86 ARCH = 0.65 HET = 0.253 RESET = 1.27

5. Estimation Results

5.3 Threshold Debt Dynamics

- Calculating the threshold debt/GDP ratio that optimizes the sequence of RSS for the panel of Caribbean countries, the test results (Table 6) show a threshold debt/GDP ratio of 61 percent that is statistically significant.

Table 6: Estimated Threshold Debt/GDP Ratio: Panel

Panel	Search Range for Thresholds	Optimal Threshold (percent)	Likelihood Raito	Critical Value	Significance Level
Sample Countries	{16, 17, 18, 19,……, 164}	61	12.72	6.94	0.0001

- The second column provides the range over which the threshold search was done: from the lowest debt/ GDP ratio recorded in the data set of 16 percent (Suriname) in 2009 to 164 percent (St. Kitts and Nevis) in 2010, which provided approximately 149 panel regressions.
- The minimization of the RSS vector occurred at the debt/GDP ratio of 61 percent.

5. Estimation Results

5.3 Threshold Debt Dynamics

- The loss in real per capita GDP due to debt are inferred from the coefficients in the long-run sustainable equations for each economy, which estimated losses in real per capita GDP growth once the debt/GDP threshold is reached.
- The results suggest that in Guyana, Suriname, and Trinidad and Tobago real per capita growth has not been adversely given relatively light debt burdens.
- For the remaining countries, the inferred loss in annual real GDP growth range from 0.78 percentage points in The Bahamas to 3.18 percentage points in Grenada.
- The optimal debt/GDP ratio of 61 percent is the estimation for the panel of countries, so this might not always coincide or be close to the estimated optimal for the individual country, which in this case is The Bahamas.

Table 7: Inferred Annual Loss in Real per capita GDP Growth beyond Debt Threshold

Country	Annual Loss in Real GDP per capita Growth (percentage points)
Antigua and Barbuda	1.36
The Bahamas	0.78
Barbados	1.02
Belize	1.47
Dominica	1.14
Grenada	3.18
Guyana	-5.40
Jamaica	2.85
St. Kitts and Nevis	2.93
Saint Lucia	1.78
St. Vincent and the Grenadines	1.05
Suriname	-5.90
Trinidad and Tobago	-0.40

5. Estimation Results

5.4: Crowding Out Effects

- Using PDOLS to check the impact of debt on total investment, the results show that in the long run the variables: debt/GDP ratio; debt service; openness; and real per capita GDP growth are statistically significant.
- The debt/GDP and debt service ratios both have a negative impact on investment beyond the 61percent debt/GDP threshold, supporting the hypothesis of investment being crowded out with increasing indebtedness.
- The impact of openness and real GDP variables are positive and support the theory that expanding levels of income and greater trade openness are positively correlated to investment levels in developing and emerging economies.

Table 8: Panel Long-Run Coefficients of Investment

IN = -0.40DG - 0.075DS + 0.105Y + 0.59 OP (-9.65***) (-2.94***) (4.98***) (4.108***)
Diagnostic Tests: R^2 = 0.345 $\overline{R^2}$ = 0.339 F = 15.92 DW = 2.02 NORM = 6.43 AR = 0.105 ARCH = 0.67 HET = 0.234 RESET = 1.18

6. Policy Implications

- The negative debt-growth relationship reinforces the point that government borrowing must be done not only on terms that are consistent with sustainability, but also on terms that produces long term growth through investment.
- For countries where the actual debt/GDP ratio exceeds or is close to exceeding the calibrated optimal and the estimated threshold, governments must move decisively to address the imperatives of fiscal consolidation and debt reduction.
- For countries where the actual debt/GDP ratio is below the calibrated optimal, the result does not imply that these countries have space to implement expansionary fiscal policies, especially given their vulnerabilities (as is the case with the other countries) to external economic shocks and natural events.
- Additionally, structural/fiscal reforms that target improvements in budget credibility are also imperative.
- Finally, reforms aimed at achieving fiscal and debt sustainability must be complemented by policies to enhance national productivity and competiveness.

7. Conclusions

- The debt/GDP ratio in Jamaica, Grenada and St. Kitts and Nevis were found to be above what the model calibrates as optimal. After the 2009 crisis, the actual debt/GDP ratios of Antigua and Barbuda and Barbados have been above the calibrated optimal.
- Taken together, a global debt/GDP tipping point of 61 percent was estimated for the sample countries.
- The debt variables negatively impacts economic growth, and this relationship is amplified when the openness indicator is controlled for.
- In the long-run model, government consumption and the TFP were not found to be statistically significant.
- The crowding out hypothesis results show that debt/GDP ratios exceeding the 61 percent threshold have an adverse impact on investment.
- The study not only contributes to the discourse on the debt problem in the Caribbean, but also has relevance for policymakers by estimating the growth and investment impacts of high indebtedness.
- The findings can help inform the policy agenda to address the imperatives of fiscal consolidation, debt reduction and growth acceleration.