



**AN ASSESSMENT OF THE GROWTH-ENHANCING SIZE OF GOVERNMENT
IN THE CARIBBEAN**

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ABSTRACT

Between 1990 and 1994, the average size of the public sector in the Caribbean was just 16 percent of GDP, in the five years hence, the ratio has climbed and currently stands at 22 percent of GDP. While an expansion in the size of government usually results in the greater provision of services, it can also lead to slower rates of growth because of greater bureaucracy and the crowding-out of private sector driven initiatives. Using a simple production function approach, this study provides an assessment of the growth-enhancing size of government in the Caribbean using annual observations for the period 1975 to 2002. The econometric results in the paper suggest that government services do positively influence growth, but only if the size of government is, on average, between 10 percent and 16 percent of total real value-added.

KEYWORDS: Government size, growth, Caribbean.

JEL CLASSIFICATION: H1, C23, O54

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I. INTRODUCTION

Governments are necessary for the provision of public goods such as defence, public health, police protection and the legal system, as the market would normally under-provide these types of goods and services. In some instances, the public sector also produces goods and services normally obtained through the private sector due to market imperfections. Barro (1990) presents a theoretical assessment of the impact of government activities on economic growth by incorporating the public sector into a constant-returns model of endogenous growth. The author shows that differing sizes of governments can have two effects on growth. When the government is small, an increase in its size can lead to a rise in the rate of growth. As the public sector grows larger, its positive contribution to growth becomes smaller and eventually has a negative impact on economic growth. This would suggest a government size-growth relationship similar to that shown in Figure 1, where there exists a g/y^* value after which an expansion in this ratio would negatively influence growth.

Most of the early empirical studies which attempted to assess the impact of government size on growth (Kormendi and Meguire, 1985; Grier and Tullock, 1989; Landau, 1983, and; Barro, 1991) observe an inverse or insignificant relationship between the two variables, especially in high-income countries (OECD). In contrast, Karras (1993) using an approach based on Barro (1990) and observations on 37 countries over the period 1950 to 1987 find that permanent changes in government spending have positive effects on growth, but declines as government size increases. Based on the econometric results, Karras estimates the optimal size of government (the size of government after which government consumption has a negative impact on growth) at 20 percent of GDP.

This approach was subsequently refined and expanded in Karras (1996) and Karras (1997). Karras (1996) investigated whether government services were productive and optimally provided for 118 countries. The author concluded that government services are productive and optimally provided in most regions with the exception of Africa (over-provided) and Asia (under-provided). The average optimal government size is estimated at 23 percent for all countries, varying from as low as 16 percent for North America to as high as 33 percent for South America.

Within recent years, the size of the public sector in the Caribbean has expanded appreciably. Between 1990 and 1994, the average size of the public sector in the region was just 16 percent of GDP, in the five years hence, the ratio has climbed and currently stands at just over 22 percent of GDP (see Figure 2). It is generally accepted that government size and the level of development are linked, as developing countries usually require greater government intervention to achieve certain basic outcomes (Grier and Tullock, 1989).

Using a similar approach to Karras (1997), this study attempts to address three questions. First, are government services productive in the region? Second, are they optimally provided? And finally, is the recent expansion in government services, witnessed over the last eight years, likely to negatively influence economic growth. The analysis is conducted over the period 1975 to 2002 for 14 Caribbean countries and provides the first such assessment for the region. Section II provides a description of trends in the size of Caribbean governments. Section III gives the methodology and data used in the study, while Section IV and V presents the results and conclusion, respectively.

II. GOVERNMENT SIZE IN THE CARIBBEAN

As government size tends to be inversely related to a country's level of development, one would expect that, on average, the public sector in the Caribbean should be larger than in more developed economies. Table 1 shows that for the period 1975 to 2002 the average size of Caribbean governments (defined as government consumption as a percentage of GDP) has been about 19.7 percent¹, ranging from 15 percent to 26 percent, well above the average for most developed countries. Available information on the major developed countries show an average size of government of around 19.3 percent², with most countries falling below this ratio. The magnitude of the difference between the averages for this group of advanced countries and the developing countries of the region seemingly supports the hypothesis of an inverse relationship between the level of development and the size of government.

An examination of government size averages within the Caribbean reinforces this hypothesis. Among the more developed countries of the region, namely Jamaica, Barbados and Trinidad and Tobago, the average size of government is comparatively smaller (17.1 percent) than for the less developed countries, mostly OECS (20 percent). The OECS region is itself highly diverse with respect to the level of development of its members. Among the more developed of these economies, like St Lucia the average is 17.8 percent, while the comparatively less developed Dominica has an average of 22.2 percent. Not surprisingly, while Guyana is regarded as one of the larger economies, it is considerably less developed than some of the OECS countries and has on average a relatively large public sector (24.5 percent). Additionally, the Dominican Republic has the lowest ratio of government expenditure to GDP.

Another important question that arises in any discussion of government expenditure in the region is the issues of the nature of the government services offered. Given the differences in economic structure across the region, governments in some countries have to play a greater role in stimulating and engendering economic growth in the face of market imperfections. For example, while the average Caribbean country spends 16 percent of its budget on education, countries such as Barbados, Belize, Jamaica and Suriname, due to their high dependence on services, all have ratios in excess of 20 percent. Admittedly, this emphasis on education predates the dependence on services and reflects a post-independence vision and commitment to national development but the resulting reliance on services and an acceptance of the limited scope for manufacturing have necessitated the maintenance of continued high levels of educational investment. In contrast, Guyana, which is largely dependent on agriculture and natural resource extraction, spends less than 10 percent of its budget on education. Antigua and Barbuda, Guyana and St. Vincent, on the other hand, spend a greater proportion of their budget on general public services (see Figure 5).

The pattern of government spending may well explain why some countries have developed at a faster rate than others. Investment in human capital, according to growth theory, is likely to bring the greatest rewards. Indeed, a study by Lewis-Bynoe and Craigwell (1998) on the determinants of growth in Barbados pointed to accelerated economic growth in this country arising from human capital investment. It is therefore not surprising that those countries in the region with expenditure heavily skewed towards education, health, and social security and welfare have experienced better economic growth performance.

Private sector inertia and lack of dynamism have also compelled governments in developing countries, including the Caribbean, to take the lead in advancing the growth of certain key sectors. As a result, expenditure on economic affairs and services are relatively high as well. As mentioned earlier, Caribbean economies are highly diverse with varying levels of development and the evidence of this is reflected in the distribution of expenditure. A preliminary examination of the data, points to a greater role

¹ This average was calculated excluding the Dominican Republic.

² Excluding France the average is 16.5 percent. The average for France is considerably higher than most developed countries, averaging around 23.3 percent.

for government among the smaller, more underdeveloped OECs countries. With the more acute market failures, these countries expenditures are most heavily skewed towards economic affairs and services, such as tourism, agriculture and other productive sector development. Moreover for the Caribbean the narrow and limited resource base means that the issue of optimal use of resources is central and a crucial determinant of these countries growth and development prospects. The subsequent section presents the methodology employed to derive the optimal size of government.

III. METHODOLOGY AND DATA ISSUES

A. Econometric Model and Estimation Approach

Assuming there exists an economy-wide production function, growth (\dot{y}/y) in real economic activity is given by:

$$\dot{y}/y = \dot{\tau}/\tau + \beta(\dot{n}/n) + \delta(\dot{k}/y). \quad (1)$$

where n and k are the amount of labour and capital resources employed in the production process and τ are the methods used to transform inputs into outputs (technology). In Equation (1), higher rates of labour and capital utilisation or technological improvements are accompanied by increased economic growth.

The public sector can be incorporated into the above specification by considering government services as inputs into the production process (see Barro, 1990). Following Karras (1993) Equation (1) therefore becomes:

$$\dot{y}/y = \dot{\tau}/\tau + \beta(\dot{n}/n) + \delta(\dot{k}/y) + \phi(\dot{g}/g)(G/Y) \quad (2)$$

where g is the value of government services (G) as a ratio of employed individuals, G/Y is the size of government and ϕ gives the effect that one dollar of government spending has on economic activity (also referred to as the marginal product of government services). The coefficient on the public sector variable, ϕ , is expected to be positive, provided government services enhance economic growth, and zero otherwise.

Barro (1990) shows that in an endogenous model of economic growth, government services are optimally provided when one additional dollar of government spending yields exactly one additional dollar in real economic output ($\phi = 1$). Hence, Equation (2) also provides a means to evaluate whether government services are being over or under supplied: values of ϕ above (below) 1 would suggest that government services are underprovided (overprovided). Exploiting the relationship between ϕ and government size also allows one to estimate the optimal size of government. First, note that $\phi = \gamma/(G/Y)$, where γ is the percentage point change in output brought about by a given change in government services (referred to as the output elasticity of government services). Secondly, when government services are optimally provided $\phi = 1$. The relationship between ϕ and government size therefore simplifies to $\gamma = G/Y$, or that the optimal size of government is equal to the output elasticity of government services. One way to obtain an estimate of γ is to divide the last term in Equation (2) by G/Y , which gives:

$$\dot{y}/y = \dot{\tau}/\tau + \beta(\dot{n}/n) + \delta(\dot{k}/y) + \gamma(\dot{g}/g). \quad (3)$$

Equations (2) and (3) are estimated using panel data and time series techniques. In instances when panel data methodologies are employed, the models are estimated using generalised least squares and time specific effects. Time specific effects (dummy variables for each year in the time period) are included in the specification to allow the technological growth rate to vary over time. One caveat that

should be noted is that the direction of causality between growth and some of the explanatory variables may not always be one way. For example, it is plausible that as a result of falling consumption in export markets domestic firms may reduce employment and investment, and as a result output. Similarly, to counter economic shocks policy makers may attempt to stimulate economic activity by using expansionary fiscal policies. To account for these endogeneity issues two-stage least square techniques are employed in all estimated equations (see Cable and Wilson, 1989).

B. Data Issues

The study uses annual observations over the twenty-eight year period from 1975 to 2002. The series are compiled from the International Monetary Fund's International Financial Statistics (IFS) CD-Rom, the various statistical and national accounts publications of the regional central banks, the CARICOM Secretariat's National Accounts Digest 1990 to 1999, the United Nation's National Accounts Statistics: Main Aggregates and Detailed Tables (various issues), and the International Labour Office's (ILO) Statistical Yearbook (1982 and 1997). Some statistics are also obtained from the websites of the Central Bank of the Dominican Republic, the Planning Institute of Jamaica and the ILO Sub-Regional Office of the Caribbean.

Real government consumption and gross capital formation statistics were only available for St. Lucia and Belize. To obtain real estimates of government consumption and gross capital formation for the other countries, the nominal values are deflated by the consumer price index at 1995 prices. Complete series on employment are only obtainable for Barbados, Jamaica and Trinidad and Tobago. For the remaining countries, observations are only available in intermittent years. Therefore, changes in total population are used to fill in the missing points, with the implicit assumption that the rate of employment is stationary.

IV. ECONOMETRIC RESULTS

A. Cross-Country Results

Table 3 gives the cross-country and three individual country results for Equation (2). The 'Caribbean' regression successfully explains one half of the variation in growth for the region as a whole and all the signs of the regression coefficients are in accordance with a priori expectations and most are significant at classical levels of testing. While the marginal product of labour is somewhat higher than that obtained by Karras (1996) for the "World", it reflects the importance of labour in the principally service driven economies of the Caribbean.

The marginal product of government services is positive and significant at the 1 percent level of testing in all the Caribbean growth equations, suggesting that the growth of government services, on average, enhances economic growth. The size of the coefficient, however, indicates that these services seem to be over-provided (it is less than one). The null hypothesis of $\phi = 1$ is also rejected using a Wald test.

Given that government services are on average over-provided in the Caribbean, an estimate optimal of government size can be obtained by econometrically estimating Equation (3), and these results are presented in Table 4. The majority of the variables are statistically significant and have expected signs. Additionally, the coefficient estimates for the output elasticity of labour and the marginal product of capital are quite similar to those in Table 3, indicating the coefficient estimates are relatively robust to specification changes.

The estimated output elasticity of government services indicates that the optimal government size, on average, between 10 percent and 16 percent. This level is somewhat smaller than Karras (1996) in the author's "World" regression, but similar to the estimates obtained for the OECD countries. Given

that the average size of government in the Caribbean currently stands at 22 percent, this would suggest that the recent expansion in the public sector could have inhibited growth. Policy-makers in the region may therefore need to re-examine their expenditure policies to see if some services could not be shifted towards the private sector.

B. Individual Country Estimates

Growth regressions are also estimated for three individual countries. These countries were chosen since they had good employment statistics and they represented the gamut of Caribbean countries: Barbados having a high degree of government intervention, Trinidad and Tobago one of the lowest levels of intervention and Belize somewhat in between. Estimating individual country regressions also permits heterogeneity in the optimal size of government and as a result allows one to compare the results between countries.

An examination of the regression results reveals: all the signs of the coefficient estimates are in accordance with expectations and are statistically significant. There are two things of note about the individual country and panel results. First, the coefficient on the capital-output variable is more than twice the size of that obtained in the panel growth regressions. The basic problem is that the panel regression assumes that all countries have the same production technology. While this assumption may hold in the long run as production technologies converge, over relatively short periods it is likely to bias the contribution of capital to output in individual countries. The second key difference between the panel and individual country growth regressions is the explanatory power of the models. The individual country growth regressions are better able to explain growth, with the exception of Belize, as individual country shocks are better accommodated in a time series framework.

Despite these two key differences, the results for the coefficient on the government services variable, the regression estimates are quite similar. In the case of Barbados and Trinidad and Tobago, the provision of government services has a positive and significant influence on output growth. Additionally, the coefficient estimates are insignificantly different from 1, suggesting that government services are on average optimally provided in both countries. In contrast, the coefficient on the government services variable in Belize is positive, but insignificantly differently from zero, indicating that the provision of government services has an insignificant effect on output growth. This result seems to partially reflect the relatively small amounts spent by the Government in this country, especially on health and social security (see analysis in Section II).

The estimates of the optimal size of government differ significantly between the three countries (see Table 4). In Barbados, the estimate of the optimal size of government is 26 percent of real output while in Trinidad and Tobago it is only 12 percent. The difference in the estimates of the optimal size of government reflects the difference in focus of the two countries. Barbados leans closer to social democracy while Trinidad and Tobago can be classified as a liberal democracy. For example, in Barbados almost 50 percent of government's expenditure goes towards education and health care, while in Trinidad the ratio is only 37 percent. The difference in the optimal size of government also reflects the divergence in economic structure of the two countries. Barbados is very much a service driven economy, with 74 percent of economic output being generated by services in contrast to only 56 percent in Trinidad and Tobago; Industries such as tourism and international financial services requires much more careful husbandry than petroleum and manufacturing.

C. Robustness of Results

This section of the study discusses the robustness of the results obtained in the previous sub-sections. As shown in Section II, Guyana and the Dominican Republic are somewhat different from the rest of the Caribbean. Guyana, because of the size of its external debt, spends a large proportion of its budget on debt service. On the other hand, the Dominican Republic has one of the smallest public sectors, as a ratio to GDP, in the region. Given these differences, it is possible that the inclusion of these two countries could distort the estimates of the optimal size of the government in the region.

The second column in Table 5 therefore gives the regression estimates excluding Guyana. There are two things to notice here. First, the estimated marginal product of labour is slightly smaller than that reported in Table 3. This implies that the contribution of labour to output is much higher in Guyana than it is in the rest of the region. This finding partially reflects the importance of agriculture in this country relative to the rest of the region. Second, the impact of the exclusion of Guyana on the estimated optimal size of government is not significantly different from the 13 percent obtained earlier.

The third column of Table 5 also provides the regression estimates for Equation (3), this time excluding the Dominican Republic. Unlike the case of Guyana, there is no appreciable difference in any of the coefficient estimates, although the explanatory power of the model improves slightly.

A lagged dependent variable is also added to Equation (3) to allow for persistence in the rate of economic activity. The inclusion of a lagged dependent variable requires that the generalised method of moments (GMM) estimator developed by Arrelano and Bond (1991) be used rather than the instrumental variable techniques that were employed earlier. These results are also presented in Table 5. The coefficient on the lagged dependent variable proved to be positive, but was insignificant at the 10 percent level of testing and the estimate of the optimal size was not significantly different from those obtained earlier.

V. CONCLUSIONS

The public sector is a significant part of most countries in the Caribbean. While in more developed nations the contribution of government services is usually less than 16 percent, in the Caribbean the average size of the public sector is approximately 19 percent; reaching as high as 24 percent in Guyana. However, the greater provision of government services does not necessarily imply a faster rate of economic expansion.

This study presents cross- and country-specific regressions for the Caribbean to evaluate three key questions: (1) do government services make a positive contribution to growth in the region; (2) are government services over-, under- or optimally provided, and; (3) what is the optimal size of government in the Caribbean as a whole. The econometric results in the paper suggest that government services do positively influence growth but only if the size of government is, on average, approximately between 10 percent and 16 percent of total real value-added. For individual countries, the results vary somewhat: in Barbados' social democratic model, government services are optimally provided when government size is 26 percent of output while in Trinidad and Tobago it is only 12 percent.

The optimal size of government derived in this study is not meant to be a rule, which should be followed rigidly. In countries with low levels of public debt, real government consumption above what is recommended in this paper are acceptable. However, persistent spending above the optimal level could lead to debt repayment problems, and in the long run slower rates of growth.

One of the principal policy implications of this study is that the expansion in the size of government experienced over the past three years (1999-2002) could lead to slower economic growth as the public sector crowds out private enterprise. It is important that policy makers in the region effectively balance the demand for more services by some parts of society and the overall welfare of the nation.

VI. ACKNOWLEDGEMENTS

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denominator and all amounts are measured in Trinidad and Tobago dollars.⁷ Table 2 presents summary statistics.

Figure 1.

The Tax-ratio in Trinidad and Tobago, 1960-2000



Table 2.
Summary Statistics

Variables(s)	Maximum	Minimum	Mean	Standard Deviation
T/Y	0.234	0.075	0.150	0.047
I/Y	0.005	0.002	0.004	0.001
i	21.93	0.820	8.089	5.303
d	0.386	0.021	0.154	0.098
r	1.343	0.609	0.894	0.192

4. Estimation Results

4.1 Unit Root Tests

The initial objective is to achieve a stationary representation of the VAR shown in eq. (11). The Augmented Dickey-Fuller (ADF) test was carried out. The null hypothesis is that the times-series are non-stationary (i.e. the series have a unit root or are integrated of order one, $I(1)$). Table 3 presents the results of the ADF and Phillips-Perron (PP) tests without and with trend. From Table 3 it is clear that the null of a unit root on the levels of the variables cannot be rejected. However, the evidence on

⁷ GDP includes income accruing to foreign factors of production and excludes income received from abroad by residents.

TABLE 1
Government Size in the Selected Caribbean Countries

Variable	Means	Std. Dev.	Minimum	Maximum
Anguilla	15.942	2.433	13.200	20.600
Antigua and Barbuda	20.662	6.384	16.600	50.800
Barbados	18.646	2.513	12.600	23.500
Belize	17.762	1.934	14.500	20.600
Dominica	22.189	3.105	19.3	33.900
Dominican Republic	6.207	2.279	2.500	9.700
Grenada	18.673	2.305	14.300	23.500
Guyana	24.521	8.237	11.800	46.500
Jamaica	16.293	3.542	9.300	22.00
St. Kitts	20.242	2.256	16.700	26.00
St. Lucia	17.832	3.281	14.100	27.700
St. Vincent & the Grenadines	20.692	1.854	17.500	23.900
Suriname	26.308	9.607	11.100	56.000
Trinidad & Tobago	16.336	3.577	12.00	23.400
<i>Memo</i>				
Developed Countries*	19.300	-	-	-

*Austria, Belgium, Canada, France, Germany, Italy, Japan, Spain, Switzerland, the United Kingdom and the United States of America

TABLE 2
Descriptive Statistics of Variables used in Regressions

Variable	Means	Std. Dev.	Minimum	Maximum
Growth in real GDP	0.030	0.042	-0.116	0.144
Growth in employment	0.015	0.028	-0.083	0.092
Growth in government consumption	0.021	0.150	-0.638	0.549
Government Size	0.187	0.064	0.025	0.560
Investment-Output Ratio	0.286	0.093	0.066	0.582

TABLE 3
The Marginal Product of Government Services

<i>Dependent Variable: Real Output Growth</i>				
	Caribbean	Barbados	Belize	Trinidad
\dot{n} / n	0.714 (0.117)**	0.516 (0.204)*	0.267 (0.978)	0.658 (0.270)*
\dot{k} / y	0.049 (0.029)*	0.159 (0.153)	0.456 (0.175)*	0.492 (0.150)**
$(\dot{g} / g) \times (g / y)$	0.567 (0.154)**	1.261 (0.563)*	0.913 (1.198)	0.637 (0.328)*
R ²	0.522	0.811	0.424	0.606
Std. Error of Regression	0.030	0.019	0.033	0.035
Observations	311	24	19	27
Wald (null: MPG = 1)	6.829	0.215	0.005	1.227

Notes: White robust standard errors are reported in parentheses.
**, * indicates significance at the 1 and 10 percent levels.
Panel equations estimated by GLS with time effects.
Country specific equations are estimated by OLS.

TABLE 4
Optimal Size of Government

<i>Dependent Variable: Real Output Growth</i>				
	Caribbean	Barbados	Belize	Trinidad
\dot{n} / n	0.756 (0.122)**	0.557 (0.212)*	0.191 (0.856)	0.676 (0.268)*
\dot{k} / y	0.044 (0.031)	0.143 (0.157)	0.499 (0.153)**	0.492 (0.151)**
\dot{g} / g	0.130 (0.030)**	0.264 (0.129)*	0.280 (0.252)	0.119 (0.063)*
R ²	0.513	0.804	0.598	0.603
Std. Error of Regression	0.030	0.019	0.028	0.035
Observations	311	24	19	27
Optimal Size of Government	13.0%	26.4%	28.0%	11.9%

estimates. Notes: White robust standard errors are reported in parentheses below the coefficient

**, * indicates significance at the 1 and 10 percent levels.
Panel equations estimated by GLS with time effects.
Country specific equations are estimated by OLS.

TABLE 5
Robustness of Results

<i>Dependent Variable: Real Output Growth</i>			
	Caribbean – Excluding Guyana	Caribbean – Excluding the Dominican Republic	Caribbean – Lagged Dependent Variable
\hat{n}/n	0.684 (0.117)**	0.776 (0.129)**	0.602 (0.154)**
\hat{k}/y	0.036 (0.031)	0.058 (0.035)*	0.037 (0.026)
\hat{g}/g	0.115 (0.030)**	0.119 (0.034)**	0.113 (0.026)**
\hat{y}_{t-1}/y_{t-1}	-	-	0.084 (0.052)
R ²	0.506	0.534	0.524
Std. Error of Regression	0.030	0.030	0.031
Observations	290	288	311
Optimal Size of Government	11.5%	11.9%	11.3%

Notes: White robust standard errors are reported in parentheses below the coefficient estimates.

**, * indicates significance at the 1 and 10 percent levels.

Panel equations are estimated by GLS with time effects, except for model with the lagged dependent variable. In this scenario the model is estimated using GMM techniques (see Arellano and Bond, 1991).

Country specific equations are estimated by OLS.

FIGURE 1
Growth and the Size of the Public Sector

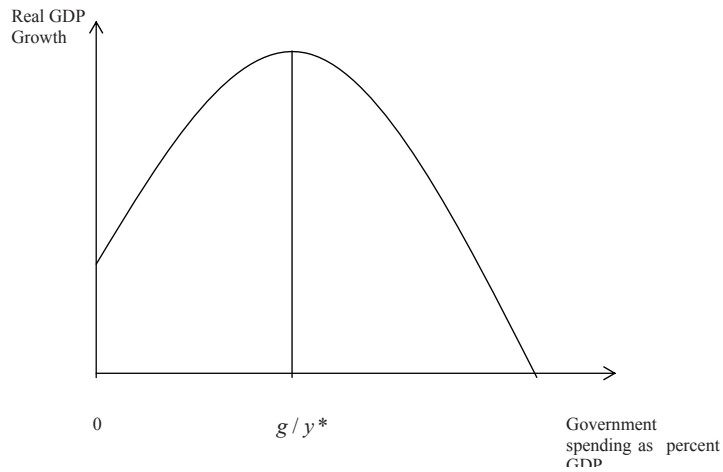
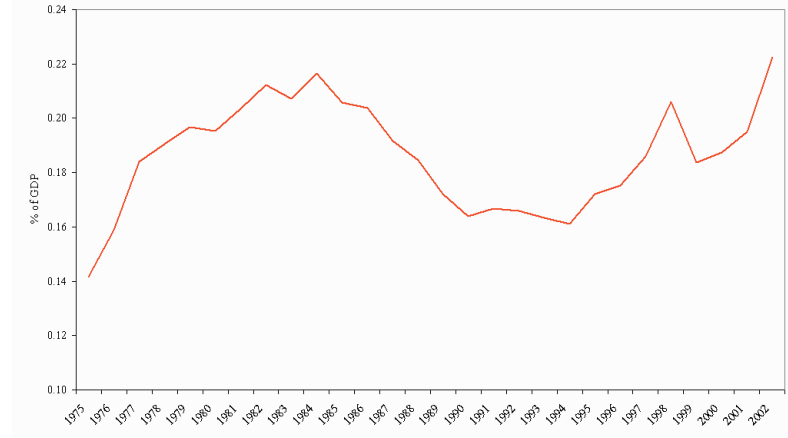
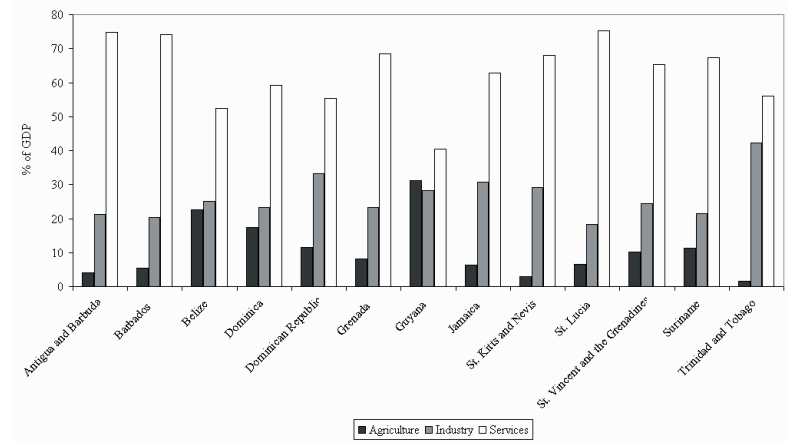


FIGURE 2
Average Government Size in the Caribbean (1975-2002)



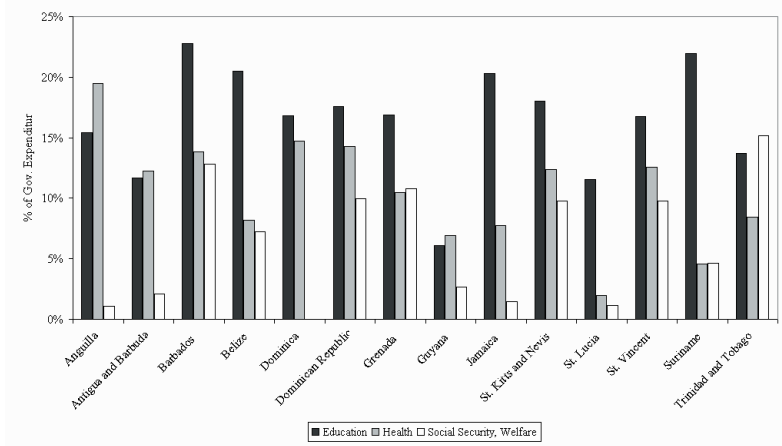
Source: Authors' Calculations.

FIGURE 3
Distribution of GDP in Selected Caribbean Countries



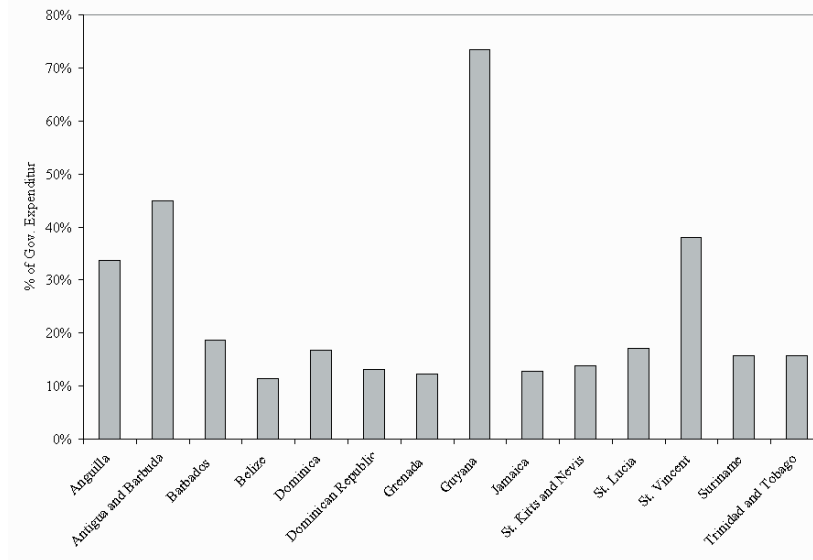
Source: World Development Indicators, 2001 (World Bank)

FIGURE 4
Public Expenditure on Education, Health and Social Security
(percent of Public Sector Expenditure)



Source: Authors' Calculations.

FIGURE 5
General Public Services
(percent of Public Sector Expenditure)



Source: Authors' Calculations.