Medium-Term Economic Growth In The Caribbean

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Medium-Term Economic Growth in the Caribbean

Frederic L. Pryor*

ABSTRACT

This study compares the GDP growth rates of twenty-two Caribbean countries and territories between 1980 and 2007. It shows that a simple model with one economic, two environmental, and two political variables provides relatively good predictions of per capita GDP growth for the period. Other historical factors, that some have used to explain differential growth rates in the Caribbean, do not seem to play an important role.

Key words: economic growth, Caribbean
JEL codes: O11, O47, O54,

This study examines the economic, political, and environmental determinants of economic growth in twenty-two Caribbean nations and territories for the twenty-seven-year period from 1980 through 2007. It first examines some previous studies and reviews the hypotheses to be explored. Then it briefly explains the data, some key features of the sample selection, and the statistical techniques employed. Finally it presents the statistical tests of the various hypotheses. An appendix presents the major sources of data.

For the quantitative analysis I combine the data for each year for each country and calculate both pooled and fixed effect regressions. For each nation I also calculate aggregated growth data and use these in a cross-section analysis (which I call “aggregate regressions”); but only the qualitative results of this latter statistical experiment are reported. Using the first two regression techniques, I find significant influences on growth rates of per capita GDP of such variables as growth of tourism, per capita land availability,

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natural disasters, effectiveness of government economic policies, and political independence.

PERSPECTIVES ON CARIBBEAN GROWTH
Several previous studies point toward the impact of the type of colonial rule on subsequent economic growth of nations, but from quite different perspectives. For instance, Engerman and Sokoloff (1997) examine the impact of a colony's factor endowment and the land suitable for growing crops in large-scale plantations using slave labour, all of which led to long-lasting inequalities and the development of institutions unfavourable to commerce and long-term economic growth. By way of contrast, Acemoglu, Johnson, and Robinson (2001) highlight the disease environment which, in turn, adversely influenced the adoption of secure property rights that were favourable for subsequent economic development. Others, such as LaPorta, Lopez-de-Silanes, Shleifer, and Vishny (e.g., 2008) focus in a series of papers on the importance of the adoption of civil or common law systems as a factor crucial to economic growth. Finally, Feyrer and Sacerdote (2007) use a worldwide sample of islands to argue that the length of colonial rule, rather than the identity of the colonizer or the type of rule, is the key variable in explaining the relative level of per capita GDP.

The Caribbean would seem ideal for testing many hypotheses about the determinants of economic growth because, in many respects the countries have had similar backgrounds, but they differ in some important respects. Among their similarities, most of the Caribbean islands have featured a relatively small population of colonialists and an agricultural sector usually focusing on a single export crop. Moreover, this crop was usually grown on plantations and, after the severe reduction or elimination of indigenous peoples, was carried out by slaves until the 19th century. However, the islands also varied considerably in certain crucial factors, such as the extent of slavery, their legal system, the length of their colonization, and whether they were colonized by Britain, France, Spain, the Netherlands, or Denmark. The impact of these historical differences can be easily tested.

1 Nunn (2009) provides a useful survey of this research.
Such an approach, however, has its critics, especially for explaining short- or middle-run economic growth. Some economists try to show that rather than such general influences, it is really the specific policies and politics, or particular economic circumstances that are critical influences on differences in economic growth. For instance, over the years the IMF, the World Bank, and various economists have produced a variety of comparative studies of economic growth in the various Caribbean islands in the short and long runs that introduce particular policy variables into the analysis. The most sophisticated econometric study is by Nicholls (2001), who uses panel data regression techniques to conclude that per capita GDP growth is mostly explained by export growth, followed in importance by changes in the level of per capita expenditures on education and appropriate management of the environment (measured by land availability per person). Other studies that examine the economic performance of pairs of Caribbean countries (e.g., Da Costa 2007 and Henry and Miller 2008) show that governmental economic policies, rather than institutions, seem critical for understanding economic growth.

SPECIFIC HYPOTHESES TESTED

In the regression experiments reported below, I examine the impact of historical, economic, political, and environmental variables.

Historical Institutions

Many of the hypotheses reviewed above can be quickly eliminated from consideration. Preliminary results showed that the particular type of colonial regime (British, French, Spanish, Dutch, or Danish) did not have any significant impact on differences in per capita GDP growth of the various Caribbean nations in the period under study. This suggests that the legal structure of an island, which for

2 Obtaining comparable data for the various Caribbean nations and territories has been a difficult problem for carrying empirical studies of comparative growth. For instance, objections can be raised to Nicholl's education variable since it was based on government expenditures on education (taken from Bulmer-Thomas 2001), converted into dollars by the exchange rate; it shows sharp discontinuities when the exchange rate changes. His variable for changes in per capita land availability is really a measure of population growth since neither total land nor arable land greatly changed in the short time period he studied. One might also ask whether his variable for per capita export growth is a cause or an effect of GDP growth.
the most part stems from its colonial past, also does not play a significant role in recent economic growth. More specifically, the pooled and fixed effects regressions show no significant impact of the colonial origin of the nation. In contrast, the “aggregate regression” suggests that former French colonies (Haiti excepted) has a significantly higher growth rate, even when political independence is held constant, while the other colonial backgrounds have no significant effects on growth.

Previous studies of the influence of historical institutions on per capita GDP also suggest that slavery and high sugar production in the past might also be linked to current economic growth rates because they affect the cultural values associated with economic development. I measured slavery as the ratio of slaves to total population in 1834 and in the “aggregate regression” analysis, such variables had no significant influence on current economic growth. I measured per capita sugar production between 1895 and 1905 and in like manner found that this variable is weakly but significantly correlated with economic growth, but with the wrong sign. Since I could not find the mechanism to explain this correlation, this correlation seemed random and, therefore, I dropped it from further consideration.

Economic Factors

A good many cross-section regressions attempting to explain the differences in per capita GDP growth rates between nations show that per capita GDP in the initial year is inversely related to growth in the subsequent period. This means that the per capita GDP in the sample nations are gradually converging. The underlying argument is that nations with higher per capita GDPs also have higher ratios of capital to labour, and such a convergence implies a declining marginal productivity of capital, other things being equal. As the limitations of the Caribbean data do not permit us to hold other key factors constant, I nevertheless dutifully included a per capita GDP variable in the regression experiments. For the “aggregate regressions” I found confirmation of a convergence per the levels of economic development; but for the disaggregated combined and panel regressions, no significant relationship could be found and, therefore, the results are not reported.
Since all of the countries in the sample provide sun and sand, tourism plays an important economic role in most of them. I use as a variable the total number of tourist days (the number of tourists staying overnight times the average number of days that they stay); this promising hypothesis is explored below. In a separate regression I also find that the growth of tourism was significantly and inversely proportional to the tourist density (total tourists divided by the population in the initial year). This suggests that increasing tourism is likely to play a less important role in the growth of per capita GDP in the future.

I also tested and rejected several other credible economic determinants. One was population growth. A fast population growth can encourage investment and, hence, overall GDP growth. If population growth is slow because of emigration — particularly of skilled labour — economic growth can be retarded. The impact of population growth on per capita GDP is more difficult to predict and measurement of this influence is complicated by a problem of endogenous causation. More specifically, emigration can be a result of slow economic growth, as well as a cause. Unfortunately, the sample does not permit an easy selection of an instrument for migration that would take account of this two-way causation, so the variable for population growth had to be dropped from the regression.

The size of the nation, as measured by the logarithm of the population, can have two possible influences on the growth of per capita GDP. Since smaller nations are more open to foreign trade (higher ratios of trade to GDP), shocks from this sector are more likely to retard growth than in large nations. On the other hand, the implementation of economic policy could be easier in a smaller country, where the government has closer contact with the population. Given the offsetting influences, it should not be surprising that land area did not turn out to be a statistically significant determinant of per capita growth.

3 Tourism growth = 0.077* - .0124* (log tourism density in 1980) n = 22; R² = .5487

(0.007) (0.0025)

Standard errors are placed in parentheses; * = statistically significant at the 0.05 level. Haiti and Montserrat are not included in this regression, while Cuba and the British Virgin Islands are.
Environmental Impacts

It is well known that on average the Caribbean islands are hit by more hurricanes, cyclones, and other natural disasters than most other nations. Recent examples include the eruption of the Soufriere Hills volcano in Montserrat in 1995, which buried the capital city and forced over half the population to abandon the island; and hurricane Ivan in Grenada in 2004 that destroyed property amounting to more than twice its GDP. Natural disasters can be measured in terms either of average property damage as a share of GDP or people killed or injured as a share of the population. I have chosen the former measure and investigate below two hypotheses: In the year of the natural disaster, economic growth is lower than average; and in the following year it is higher since reconstruction activities lead to a higher level of per capita production.

Finally, since agricultural production plays an important part in the economy of most Caribbean nations, it would seem likely that higher per capita arable land (which is the inverse of land density) would have a positive impact on economic growth. Results of tests of this hypothesis are also reported below.

Political Variables

In the period under examination it seems likely that a nation still under a colonial regime in the present era or closely tied to an industrialized nation would have faster growth than its neighbours. Those nations that are currently colonies (mostly British) or an integral part of the motherland (Guadeloupe and Martinique) can obtain capital, technology, and skilled labour (such as technicians or teachers) much more easily and quickly than can nations that have achieved formal political independence. Guadeloupe and Martinique have an extra advantage since they receive greater subsidies and economic aid than do colonies. Such a hypothesis thus suggests that close connection to a Western country has a positive impact on economic growth, in contrast to the situation in past centuries, where this colonial relationship was exploitative and detrimental to the colony.4

4 Curiously, the common notion that colonies also draw more tourists from the home country so that their tourism density (foreign tourists per population) is higher finds little support from my regression analysis.
The effectiveness of the government also seems important, but measuring the impact and quality of governmental economic policies is difficult. For this purpose I tried the World Bank measures of the quality of governance (Kaufmann, Kraay, and Mastruzzi 2009), which combines a number of different surveys of expert opinion into several indices. These governance measures, unfortunately, are available only for the later years of the time period under investigation and, therefore, cannot be used in the regression analysis. Moreover, as it turns out, the "aggregate regression" shows no significant relationship between these measures of governmental effectiveness with growth of per capita GDP, other things being equal.

Nevertheless, a useful proxy for the ineffectiveness of government economic policy is the inflation rate of consumer prices. It seems likely that economic growth is inversely related to inflation and ineffective governmental macro-economic policies since a high inflation rate can discourage investment by increasing uncertainties both about future profits and about the competence of governmental policy-making. This hypothesis is tested below.

DATA PROBLEMS

For the period to be investigated, I selected the twenty-seven years from 1980 through 2007. The initial year followed the last major oil shock in the 1970s. Furthermore, of the colonial nations in the Caribbean that are now independent, all but Antigua/Barbuda and St. Kitts/Nevis had achieved political independence by 1980, and these two nations had done so by the end of 1983. It seems useful, therefore, to use 1980 as the initial year of the analysis. I select 2007 as the end period, since it was the last year before the worldwide recession.

Four of the twenty-four island nations and territories had to be eliminated from my regression calculations. Two were dropped because of problems in obtaining reliable GDP data, namely, Cuba and the British Virgin Islands.\(^5\) Two other nations, Haiti and

\(^5\) The only complete series of GDP for the British Virgin Islands that I could find were UN estimates at <http://millenniumindicators.un.org/unsd/snaama/selectionbasicFast.asp>. This data yielded an extremely high average annual growth rate of per capita GDP which, in light of other countries around the world, did not seem credible. For Cuba, it is hard to obtain a consistent series for the period under investigation.
Montserrat represent atypical extreme points because of their very low growth rates; therefore, they are also excluded from the regression calculations. I have, however, used the regression model to predict the growth of these two nations.

It would have also been desirable to include as a possible explanatory variable, a series reflecting the human capital of these nations. Unfortunately, comparable data on literacy, percentage of the children attending school, or education expenditures were not available for all countries. Similarly, I would have liked to include data on investment but, unfortunately, I could not locate data that was sufficiently comparable to include in the regressions. The sources of data that I do use are reported in the Appendix.

ECONOMETRIC RESULTS AND THEIR INTERPRETATION

Table 1: Determinants of Annual Real Per Capita GDP Growth, 1980-2007

<table>
<thead>
<tr>
<th></th>
<th>Coefficient</th>
<th>St. error</th>
<th>Impact of one std. deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>0.0364*</td>
<td>0.0038</td>
<td></td>
</tr>
<tr>
<td>Annual growth of tourism</td>
<td>0.0629*</td>
<td>0.0133</td>
<td>0.90%</td>
</tr>
<tr>
<td>Arable land per capita</td>
<td>0.1075*</td>
<td>0.0253</td>
<td>0.88%</td>
</tr>
<tr>
<td>Impact of disasters</td>
<td>-0.0019</td>
<td>0.0087</td>
<td>-0.04%</td>
</tr>
<tr>
<td>Impact of disasters, 1 year lag</td>
<td>0.0167*</td>
<td>0.0086</td>
<td>0.36%</td>
</tr>
<tr>
<td>Annual growth of consumer prices</td>
<td>-0.0828*</td>
<td>0.0278</td>
<td>-0.60%</td>
</tr>
<tr>
<td>Political independence</td>
<td>-0.0165*</td>
<td>0.0042</td>
<td>-0.82%</td>
</tr>
<tr>
<td>Adjusted R²</td>
<td>0.0997</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: Twenty countries are used in this pooled OLS regression. The third column of numbers reflects the impact on the growth rate of per capita GDP when the independent variable is increased by one standard deviation. Statistical significance at the 0.05 level is designated with an asterisk. The impacts of the disasters were measured as a share of GDP. Sources of the data used in these regressions are discussed in the appendix.

Table 1 presents pooled regressions to explain the annual growth of per capita real GDP by the six most promising explanatory variables, along with an estimate of the impact of the

6 Haiti's low economic growth can be traced to historical factors, particularly its extreme neglect by past governments of the economy and of policies encouraging economic growth. As noted above, because of its large population outflow in 1995-6, Montserrat also represents a unique case.
growth rate of an increase of one standard deviation of these variables. I also calculated random-effect (generalized least squares) and fixed effect regressions, but these results appeared little different than those obtained by the OLS regression (a conclusion validated by a Hausman test). In brief, unobserved heterogeneity does not greatly influence the OLS regression results.

As predicted one economic variable, namely the annual growth of tourism, is significantly and positively related to the annual growth of per capita GDP. The two political variables (the annual growth of the CPI, which is a proxy for the ineffectiveness of governmental economic policy, and political independence), are also significantly and negatively correlated to per capita GDP growth, as predicted. Finally, as also foreseen, arable land per capita is significantly and positively related to per capita GDP growth (in other words, land density is inversely related to per capita GDP growth). The "aggregate regression" shows the same results for all these variables.

The only surprise is that the two regressions do not provide completely convincing evidence that natural catastrophes lower growth in the year they occur and raise growth in the succeeding year (although the variable for the lagged natural catastrophe variable has the predicted sign and is significant at the 0.06 level). Part of the problem may be the timing of the catastrophe: if it occurs early in the year, then reconstruction efforts later in the year may offset the negative impact of the event. The "aggregate regression" (using average disaster damage as a share of GDP for the entire period) does show a significantly negative impact of these events.

Table 2 shows the actual growth of per capita GDP, the predicted growth rates using the previously derived regression equation, and the differences between the two. As expected, Montserrat and Haiti have the largest shortfalls between actual and predicted growth of GDP per capita. The Netherlands Antilles and Dominica also under-performed according to this criterion. On the other hand, Turks and Caicos performed very much better than predicted. The sources of this small country's relative economic success is difficult to determine, but the very high gross capital formation, which averaged 31 percent between 1980 and 2007, undoubtedly played an important role (United Nations 2009). The prediction errors for other countries in the sample are relatively small.
### Table 2: Per Capita Average Real Annual GDP Growth Rates 1980-2007: Actual and Predicted

<table>
<thead>
<tr>
<th>Country</th>
<th>Actual average annual growth</th>
<th>OLS pooled regression</th>
<th>Prediction Error</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Actual</td>
<td>Predicted</td>
<td></td>
</tr>
<tr>
<td>Anguilla</td>
<td>6.08%</td>
<td>6.75%</td>
<td>-0.67%</td>
</tr>
<tr>
<td>Antigua</td>
<td>4.34</td>
<td>3.49</td>
<td>0.85</td>
</tr>
<tr>
<td>Aruba</td>
<td>6.05</td>
<td>4.12</td>
<td>1.93</td>
</tr>
<tr>
<td>Bahamas</td>
<td>2.09</td>
<td>2.50</td>
<td>-0.41</td>
</tr>
<tr>
<td>Barbados</td>
<td>1.34</td>
<td>2.64</td>
<td>-1.30</td>
</tr>
<tr>
<td>British Virgin Islands</td>
<td>n.a.</td>
<td>7.87</td>
<td>n.a.</td>
</tr>
<tr>
<td>Cayman</td>
<td>5.37</td>
<td>4.51</td>
<td>0.86</td>
</tr>
<tr>
<td>Cuba</td>
<td>n.a.</td>
<td>6.40</td>
<td>n.a.</td>
</tr>
<tr>
<td>Dominica</td>
<td>2.49</td>
<td>5.19</td>
<td>-2.70</td>
</tr>
<tr>
<td>Dominican Republic</td>
<td>4.33</td>
<td>4.45</td>
<td>-0.12</td>
</tr>
<tr>
<td>Grenada</td>
<td>4.09</td>
<td>3.58</td>
<td>0.51</td>
</tr>
<tr>
<td>Guadeloupe</td>
<td>2.99</td>
<td>4.48</td>
<td>-1.49</td>
</tr>
<tr>
<td>Haiti</td>
<td>-0.45</td>
<td>3.19</td>
<td>-3.64</td>
</tr>
<tr>
<td>Jamaica</td>
<td>1.98</td>
<td>2.39</td>
<td>-0.41</td>
</tr>
<tr>
<td>Martinique</td>
<td>2.93</td>
<td>4.44</td>
<td>-1.51</td>
</tr>
<tr>
<td>Montserrat</td>
<td>-2.95</td>
<td>4.98</td>
<td>-7.93</td>
</tr>
<tr>
<td>Netherlands Antilles</td>
<td>-1.01</td>
<td>4.15</td>
<td>-5.16</td>
</tr>
<tr>
<td>Puerto Rico</td>
<td>3.75</td>
<td>3.81</td>
<td>-0.06</td>
</tr>
<tr>
<td>St Kitts</td>
<td>4.60</td>
<td>4.00</td>
<td>0.60</td>
</tr>
<tr>
<td>St Lucia</td>
<td>3.94</td>
<td>3.98</td>
<td>-0.04</td>
</tr>
<tr>
<td>St Vincent</td>
<td>4.14</td>
<td>3.56</td>
<td>0.58</td>
</tr>
<tr>
<td>Turks/Caicos</td>
<td>9.18</td>
<td>5.74</td>
<td>3.44</td>
</tr>
<tr>
<td>Trinidad/Tobago</td>
<td>2.62</td>
<td>2.74</td>
<td>-0.12</td>
</tr>
<tr>
<td>US Virgin Islands</td>
<td>2.87</td>
<td>3.92</td>
<td>-1.05</td>
</tr>
</tbody>
</table>

Note: The actual growth rates are calculated using an ordinary-least-squares regression for the reported per capita GDP over the period. The estimates for Guadeloupe and Martinique are for 1980-2005. The predicted values use the regression formulae from Table 1 and, because of rounding, the differences between actual and predicted growth rates may not exactly equal the differences reported in the table. n.a. = not available. Data sources are discussed in the appendix.

### FINAL WORDS

Many aspects of economic growth in the Caribbean are not well understood. For example, why do some of the nations and territories have much greater GDP fluctuations than others? Regarding the actual growth rates, however, this brief statistical examination shows that one economic factor (the growth of

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7 I experimented with a number of variables and models to explain these fluctuations, but without success.
tourism), two environmental factors (occurrence of natural disasters and the ratio of arable land to the population), and two political factors (colonial status and/or political integration with a much richer entity and political independence) provide the greatest explanation of differential growth rates.

The growth of tourism, which is a significant determinant of economic growth, is not entirely in the hands of the policy-makers in the country. As shown above (footnote 4), the growth of tourism is slower with a higher ratio of tourists to the native population, so it seems likely that tourism will grow more slowly in the future so that its impact on per capita GDP will become less important in the future.

Discussion of other policy implications for future economic growth of these results requires more discussion than space permits. Nevertheless, several general observations, which have been extensively discussed by others, deserve mention: Rather than relying on increasing tourism to drive future economic growth, these Caribbean economies need to diversify their economies. Since these nations have small domestic markets and, to compete in world markets, need also to obtain economies of scale, such diversification will primarily mean the introduction of only a limited number of new industries. To foster such industries, many Caribbean nations must make it easier to start new businesses and to educate a labour force appropriate for working in these new industries. The particular industries each islands chooses will be a crucial factor in its differential growth rate in the future.

APPENDIX: SOURCES OF DATA

GDP

The most complete collection of comparable macroeconomic data for the Caribbean islands and territories is by Victor Bulmer-Thomas (2001), but unfortunately this data extends only up to 1997.

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8 According to the World Bank (2006: 6), only a few of the Caribbean nations ranked in the top fourth of nations in their "ease of doing business." The exceptions were Puerto Rico, St. Lucia, Antigua/Barbuda, and St. Vincent and the Grenadines.

Therefore, I have based my GDP estimates primarily on United Nation estimates\(^\text{10}\) which contains data series for some colonies and dependent territories, unlike the data series of the World Bank. The series for Guadeloupe and Martinique splices data from Bullmer-Thomas (2001) for 1975 through 1994 and from INSEE (Institut national de la statistique et des études économique)\(^\text{11}\) for 1994 through 2005. Unfortunately no data was available for 2006 and 2007. Finally, for the American Virgin Islands I used data from the World Development Indicators <www.worldbank.org> for the period from 1975 through 1988, spliced to a series supplied by M. Samer Budeir of Moody’s Economy. The latter series was based on a current price GDP series deflated by the consumer price index.

**Per Capita GDP in Dollars (Purchasing Power Parity Calculation)**

The ppp estimates of the 1990 per capita GDP of the Caribbean nations and territories made by the World Bank, the UN Human Development group, the UN Millennium Indicators group, the Inter-American Development Bank, the Penn World Tables group, the CIA Factbook, and Angus Maddison (2001) are all rather different. Since few of these sources describe their methodology, it is difficult to decide which is the most accurate. Therefore I used an averaging procedure which for the seven estimates started with the relative per capita GDP of each country using as a base three different countries as the pivot. These three different averages were then themselves averaged for the final estimate for 1990. For 1980 I simply reduced the 1990 results by the growth of per capita GDP of each country between 1980 and 1990.

**Other Data**

CPI data came from a variety of sources, including Bulmer-Thomas (2001), the Eastern Caribbean Central Bank, INSEE (via Gérard Forgeot), and, for several countries, national statistics sources. Data on population, total land, and arable land came from the Food and Agriculture Organization.\(^\text{12}\) The population data covers 1980 through 2006.

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Data on natural disasters for each country came from the OFDA/CRED International Disaster Database at the Université Catholique de Louvain (<www.emdat.be>) and was supplied by Regina Below.

Data on slaves came from Higman (1984) and Engerman and Higman (1997). Data on sugar production in 1900 came primarily from Deerr (1949, 1950), supplemented for several countries by monographs.

Data on tourism comes from Baron (1980) and World Tourism Organization (2007). The growth rates were calculated as the average annual growth in the average number of tourists from 1982 through 1985 and from 2001 through 2005. The number of tourists was calculated from the number of tourists staying in the country multiplied by the average visitor stay plus the number of day tourists.

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