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ECONOMIC GROWTH IN THE CARIBBEAN

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ECONOMIC GROWTH IN THE CARIBBEAN

I. INTRODUCTION

One of the main features of developing countries is their low level of per capita gross domestic product (GDP) relative to the per capita GDP observed in developed nations. Indeed, by 2007 per capita GDP in the United States was 39.5 times higher than in Haiti, and 17.7 times higher than in Nicaragua.¹ Per capita GDP is one of the main components of the Human Development Index (HDI), and perhaps the measure most used throughout the world to evaluate and compare progress in development. Very few economists and development specialists would dispute the fact that economic growth is a necessary, although not a sufficient, condition for overall development: general and significant increases in human development are not possible without sustained expansions in output.

Different theoretical approaches have been used to account for the factors behind the growth process. Broadly speaking, growth models can be divided into two categories, exogenous and endogenous. Exogenous models are best represented by the neoclassical growth model pioneered by Solow (1956), which proposes that the growth rate is explained by an accumulation of factors of production – namely, physical capital and labour – and a remainder, known as the “Solow residual” or total factor productivity (TFP). The Solow residual is everything that accounts for growth other than the accumulation of factors; it is taken as exogenous by the neoclassical growth model, and is the only factor that can explain sustained, steady-state, long-run growth within the model. The endogenous growth theory tries to explain what the Solow model leaves as exogenous, that is, whatever can make sustained long-run growth possible. There are large numbers of models that attempt to do so (see Barro and Sala-i-Martin, 2004).

Various theoretical approaches have given rise to a myriad of empirical studies aimed at assessing the wide differences in GDP per capita and growth rates between countries. Growth accounting based on the Solow model is one of the main empirical exercises carried out, in which GDP growth is broken down into the contributions of factor accumulation (including human capital in some instances) and TFP. Barro (1991) initiated a stream of literature based on regressions of the economic growth rate on variables such as the accumulation of human and physical capital, macroeconomic stability, financial deepening, foreign capital inflows, trade openness, terms of trade changes, institutional quality, and so on.

Although a number of these studies cover different regions of the world (and the world itself), there is no study that deals specifically with the Caribbean subregion.² This paper tries to fill this gap by making a contribution to the understanding of economic growth in the Caribbean. Section II discusses growth performance in the Caribbean during the last five decades from different perspectives, including growth crises and growth episodes. Section III explores the extent to which the convergence hypothesis implied by the Solow model is valid for the Caribbean, whilst Section IV undertakes a growth- accounting exercise, with and without the inclusion of human capital. Section V then explores the determinants of economic growth, including a large set of variables usually found in the literature. Section VI concludes.

¹ Measured in purchasing power parity (PPP) United States dollars at constant 2005 prices according to World Bank, *World Development Indicators*, electronic version.

² In the case of Latin America see, for instance, Solimano (2006); Agosin, Machado and Nazal (2004); Fernández-Arias, Manuelli and Blyde (2005) and Loayza, Fajnzylber and Calderón (2005).

II. GROWTH PERFORMANCE IN THE CARIBBEAN

During the last five decades, growth performance in the Caribbean has been heterogeneous. Table 1 shows GDP per capita growth rates for the period 1961-2007 for 13 Caribbean countries, and for three comparator countries, the Dominican Republic,³ Fiji and Mauritius. These countries are all categorized as small island developing States (SIDS).⁴ Considering the countries for which there is information for the whole period, and setting 2% as the trend value of annual GDP per capita growth (see below), four countries exhibit above-trend, and three countries below-trend growth. The Dominican Republic falls within the former category and Fiji within the latter. In those countries where data are only available from the 1970s onwards, the record is far better, the lowest figure being shown by Saint Lucia with 3.2% per capita growth per year in the period 1971-2007.

Table 1

GDP per capita growth, 1961-2007 (Percentage)

	1961-1970	1971-1980	1981-1990	1991-2000	2001-2007	1981-2007	1961-2007
Bahamas	3.6	0.6	0.9	0.1	-0.3	0.3	1.0
Barbados	6.2	2.4	0.3	1.0	1.2	0.9	2.3
Belize	2.3	5.2	2.3	3.0	1.4	2.5	3.0
Guyana	1.3	0.6	-3.0	4.8	1.3	1.1	1.0
Jamaica	5.2	-2.1	1.5	1.1	0.9	1.3	1.4
Suriname	..	..	-2.3	-0.1	3.5	0.4	..
Trinidad and Tobago	3.3	4.1	-3.4	2.5	5.8	1.7	2.6
Antigua and Barbuda	..	4.2	7.7	1.1	2.2	4.1	4.1 ^a
Dominica	..	4.0	5.5	1.9	2.3	3.6	3.7 ^a
Grenada	..	6.1	5.1	2.9	0.7	3.2	4.0 ^a
Saint Kitts and Nevis	..	6.4	5.9	3.6	1.4	4.1	4.7 ^a
Saint Lucia	..	3.5	5.5	1.6	1.2	3.0	3.2 ^a
Saint Vincent and the Grenadines	0.4	1.6	5.1	2.5	2.6	3.8	2.6
The Dominican Republic	2.5	4.4	0.3	4.1	2.5	2.5	2.9
Fiji	2.2	2.9	-0.3	1.6	0.7	1.5	0.7
Mauritius	..	..	4.9	4.0	2.2	4.1	..

Source: World Bank, *World Development Indicators*, electronic version; United Nations Statistical Division; CARICOM and ECLAC data base.

.. = not available.

^a Corresponds to 1971-2007.

In most countries, output per capita grew faster in the decade of the 1960s and/or 1970s than in the decade of the 1990s and 2000s. The Bahamas, Barbados, Belize and Jamaica are examples of this, within the category of most developed countries (MDCs).⁵ The 1960s and the 1970s are decades when import substitution industrialization (ISI) strategies were in place, while the 1990s and 2000s are periods characterized by liberalizing reforms. In Guyana, higher growth was recorded in the 1990s, partly due to massive aid flows that fostered economic expansion. In Trinidad and Tobago, growth was higher in the 2000s, a process led by the surge in energy prices. In all the Eastern

³ As the focus of this paper is the English-speaking Caribbean and Suriname, the Dominican Republic has been omitted.

⁴ For a characterization of small island developing States (SIDS), see Read (2008).

⁵ The Bahamas, Barbados, Belize, Guyana, Jamaica, Suriname, and Trinidad and Tobago

Caribbean Currency Union (ECCU) countries considered,⁶ the period of more rapid growth is the 1980s. This may seem surprising, given that this period is precisely the “lost decade” prompted by the debt crisis. However, the figures appear to make more sense when the date of independence – late 1970s or early 1980s, except for Grenada (1974) – is taken into account, as public debt stocks would not have been excessive in 1982. The same is true for Mauritius, perhaps the most successful of the SIDS in the last five decades. These results are summarized in table 2.

Table 2

Decades of higher per capita output growth, 1961-2007

1960s or 1970s	1980s	1990s	2000s
Bahamas (the) Barbados Belize Jamaica	Antigua and Barbuda Dominica Grenada Saint Kitts and Nevis Saint Lucia Saint Vincent and the Grenadines	Guyana	Trinidad and Tobago

Source: ECLAC, based on table 1.

As noted by Solimano and Soto (2006), the literature recognizes three levels of economic growth:

- (i). Long-term or steady state growth, involving periods of 50 years or more
- (ii). Medium-term growth, comprising periods of 10 to 30 years
- (iii). Short-term growth over periods from 4 to 6 years.

Despite the obvious overlap of the different terms, it is useful for analytical purposes to consider them separately. Given that the deficiency in data does not allow for steady-state analysis, the analysis below is conducted for short- and medium-term levels of growth only.

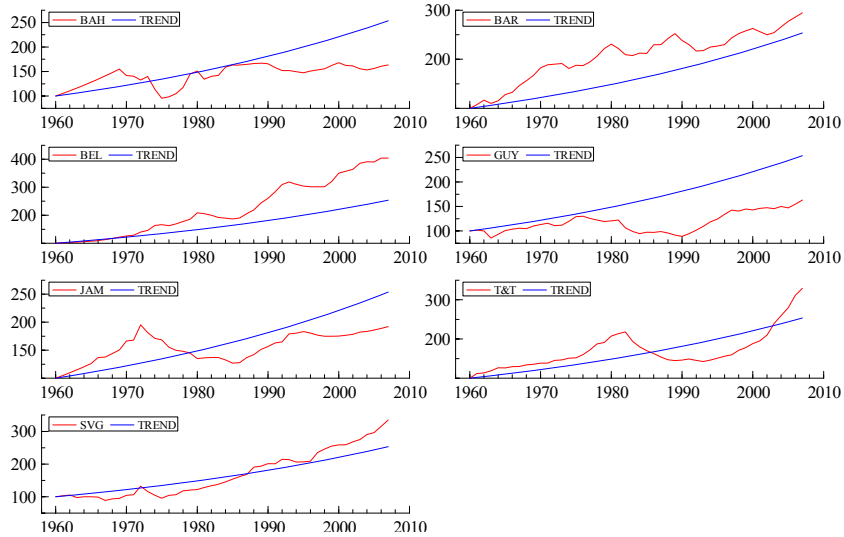
In undertaking an analysis of medium-term growth, a benchmark trend of GDP per capita growth should be established. Some authors like Solow (1956) and Kehoe and Prescott (2002) assume that the trend of GDP per capita is driven by the exogenous evolution of knowledge useful to production. This, in turn, is assumed to be equal to the rate of growth of GDP per capita in the United States of America, which averaged 2% per annum last century. This is the value adopted by Solimano and Soto (2006), and Aravena, Hofman and Solimano (2006). Following Solimano and Soto, a period of prosperity or boom is defined as one where GDP per capita growth is above trend for a decade or more, whereas a period of slowdown or stagnation is defined as one where GDP per capita growth is below trend for at least a decade.

Figures 1a to 1c depict actual GDP per capita and trends. In accordance with the availability of data, this information has been normalized such that 1960=100, 1970=100 or 1980=100. Figure 1a clearly shows three patterns. Firstly, some countries, such as Barbados and Belize, exhibit prosperity during the whole, or almost the whole, period. Secondly, some countries like Guyana record a period of stagnation during the entire, or almost the entire, period. Finally, some countries combine periods of prosperity with periods of stagnation. As expected, this is the case for most countries, including the Bahamas, exhibiting prosperity in the 1960s and early 1970s and stagnation thereafter: Jamaica,

⁶ Saint Vincent and the Grenadines, Antigua and Barbuda, Dominica, Grenada, Saint Kitts and Nevis, and Saint Lucia. The other two members of the ECCU are Anguilla and Montserrat.

booming during the 1960s and 1970s and slowing down in the 1980s, Trinidad and Tobago, with a period of prosperity up to mid-1980s, stagnant up to the early 2000s, and booming again until 2007, and Saint Vincent and the Grenadines, with stagnation until the 1990s followed by a period of prosperity.

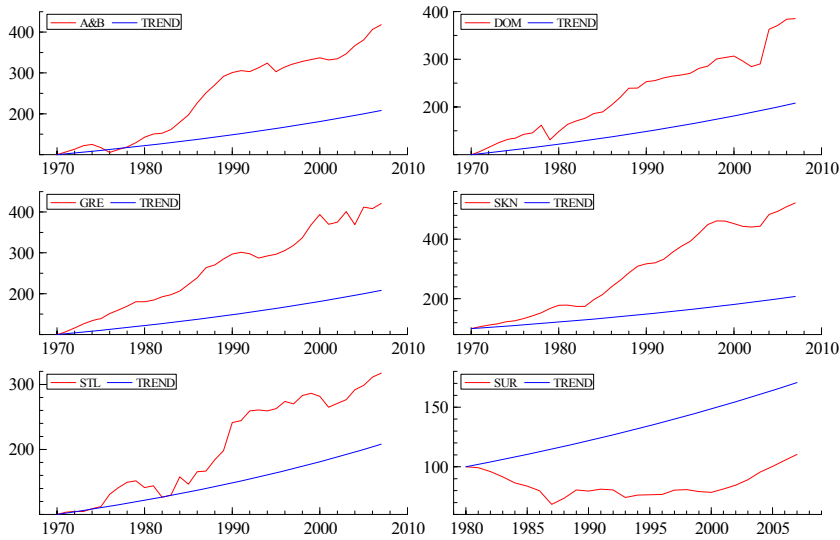
Figure 1a
GDP per capita, 1960-2007
(Index 1960 = 100)



Source: ECLAC on the basis of data from World Bank, *World Development Indicators*, electronic version.

Figure 1b shows GDP per capita behaviour in countries where data for the 1960s were not available. It is clear that all five ECCU countries display a similar pattern of boom throughout the five decades. Suriname exhibits the reverse behaviour, stagnation from the first observation available in 1980, as shown in the lower right panel of Figure 1b.

Figure 1b
GDP per capita, 1970-2007
(Index 1970 = 100)

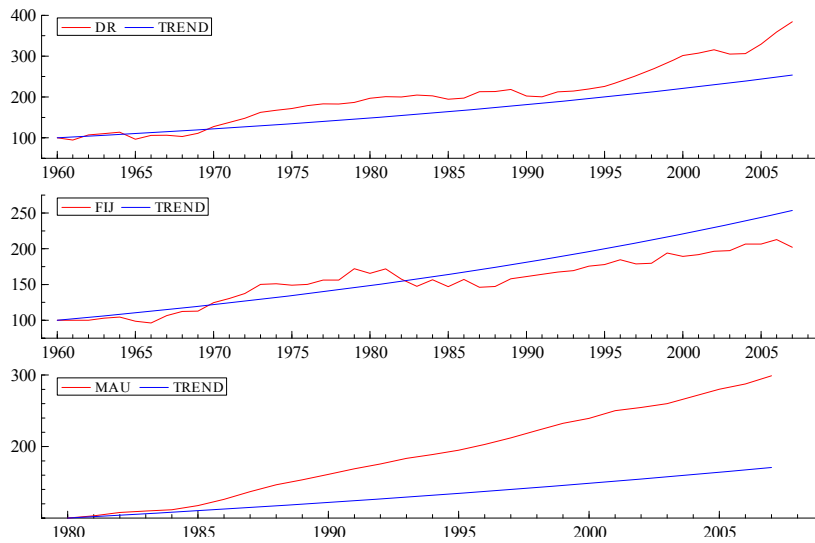


Source: Author's calculations on the basis of data from World Bank, *World Development Indicators*, electronic version, and United Nations Statistics Division.

In order to compare how Caribbean countries fared against the reference countries, figure 1c shows GDP per capita evolution in the Dominican Republic, Fiji and Mauritius. Data for the Dominican Republic and Fiji were available from 1960 onwards. Like Barbados and Belize, the Dominican Republic exhibits prosperity over almost the whole half-century. Fiji shows behaviour similar to most countries in figure 1a, combining periods of stagnation (the 1960s and early 1980s onwards) with periods of prosperity (1970s and early 1980s).

Like Suriname, data for Mauritius were available only since 1980. As expected, Mauritius being one of the most successful economic stories in SIDS, the three decades represent a period of uninterrupted prosperity. Moreover, not only was the rate of growth of GDP per capita consistently above trend, it was also fairly stable, as the quasi-linear trajectory of GDP per capita shows in the last panel of figure 1c. Stable growth is a significant factor, as growth volatility is detrimental to the growth rate itself, given the higher levels of uncertainty it engenders.

Figure 1c
GDP per capita, 1980-2007
(Index 1980 = 100)



Source: Author's calculations on the basis of data from World Bank, *World Development Indicators*, electronic version.

Solimano and Soto (2006) define an episode of growth as at least six consecutive years of GDP per capita growth of more than 2%, and a growth crisis as any year with negative GDP per capita growth. Table 3 presents the number of growth crises occurring in Caribbean countries by decade between 1961 and 2007.

As expected, the 1980s is the decade with the highest average number of growth crises, with a decline of 3.2 years of per capita GDP, followed by the 1990s (2.6 years). In contrast, the 1960s was the decade where growth crises were less frequent (1.3).

At the country level, Guyana and Bahamas were clearly the countries that experienced more GDP per capita drops in 1961-2007 (18 and 17, respectively). Suriname posted 13 growth crises in 27 years (1981-2007), demonstrating the worst growth performance.

Among the best performers are Trinidad and Tobago and Saint Vincent and the Grenadines, with 10 growth crises in 1961-2007, and Dominica, with only 3 drops in GDP per capita in 1971-2007. In the comparator countries, the Dominican Republic and Fiji show performances similar to the best performers in 1961-2007, while Mauritius did not post any growth crises in 1981-2007.

Table 3
Growth crises, 1961-2007

	1960s	1970s	1980s	1990s	2000s	Total
Bahamas (the)	0	5	2	6	4	17
Barbados	1	2	4	3	2	12
Belize	0	1	5	4	1	11
Guyana	3	4	6	2	3	18
Jamaica	0	7	3	3	0	13
Suriname	..	..	8	4	1	13
Trinidad and Tobago	1	0	7	2	0	10
Antigua and Barbuda	..	2	0	2	1	5
Dominica	..	1	0	0	2	3
Grenada	..	0	1	2	3	6
Saint Kitts and Nevis	..	0	2	1	3	6
Saint Lucia	..	1	3	2	2	8
Saint Vincent and the Grenadines	4	3	0	3	0	10
The Dominican Republic	3	1	3	2	1	10
Fiji	2	1	5	1	2	11
Mauritius	..	..	0	0	0	0
Total^a	9	26	41	34	23	133
Average^a	1.3	2.2	3.2	2.6	1.8	2.2

Source: Author's calculations on the basis of information from World Bank, *World Development Indicators*, electronic version, United Nations Statistics Division, CARICOM and ECLAC.

^a Excludes the Dominican Republic, Fiji and Mauritius.

.. = not available.

As regards growth episodes, table 4 presents the periods, duration, cumulative growth of per capita GDP and average annual growth rate. The most frequent duration of growth episodes is 7 years, and Trinidad and Tobago recorded the longest growth episode of 14 years between 1994 and 2007, representing the highest cumulative growth in GDP per capita (131.2%). Considering that Trinidad and Tobago experienced another growth episode between 1976 and 1982, it is the country with the longest period of boom (21 years), only surpassed by Saint Kitts and Nevis, which registered 24 years of boom, with growth episodes between 1971 and 1980, 1984 and 1990, and 1992 and 1998.

The highest annual average growth rate during growth episodes was 8.9% recorded by the Bahamas in 1961-1969, Antigua and Barbuda in 1983-1990, and Saint Kitts and Nevis in 1984-1990. Thus, the Bahamas and Antigua and Barbuda almost doubled their per capita GDP in only 8 years. The reverse is true of Saint Lucia, which did not experience any growth episodes in the period 1971-2007. Neither did one of the reference countries, Fiji.

Table 4
Growth episodes, 1961-2007

	Period	Length of the cycle (years)	Cumulative growth in GDP per capita (%)	Average annual GDP per capita growth rate (%)
Bahamas (the)	1961-1969	8	97.2	8.9
Barbados	1964-1971	8	71.2	7.0
Belize	1966-1974	9	51.9	4.8
	1987-1994	7	67.6	7.7
Guyana	1991-1997	7	59.9	6.9
Jamaica	1961-1966	6	36.8	5.4
Suriname	2001-2007	7	40.7	5.0
Trinidad and Tobago	1976-1982	7	43.4	5.3
	1994-2007	14	131.2	6.2
Antigua and Barbuda	1983-1990	8	97.2	8.9
Dominica	1971-1978	8	61.9	6.2
Grenada	1971-1979	9	80.3	6.8
	1981-1990	10	64.9	5.1
Saint Kitts and Nevis	1971-1980	10	78.3	6.0
	1984-1990	7	82.0	8.9
	1992-1998	7	43.9	5.3
Saint Lucia	--	--	--	--
Saint Vincent and the Grenadines	1981-1988	8	55.9	5.7
	2002-2007	6	29.3	4.4
The Dominican Republic	1969-1977	9	77.3	6.6
	1994-2000	7	40.4	5.0
Fiji	--	--	--	--
Mauritius	1985-2001	17	123.8	4.9
Average^a	--	7 ^b	--	6.4 ^c

Source: Author's calculations on the basis of information from World Bank, *World Development Indicators*, electronic version; United Nations Statistics Division; CARICOM and ECLAC.

^a Excludes the Dominican Republic, Fiji and Mauritius.

^b Corresponds to the mode.

^c Simple average.

-- = none or nor relevant.

While the Dominican Republic experienced growth episodes between 1969 and 1977, and 1994 and 2000, Mauritius recorded the longest period of boom of all the countries (17 years) between 1985 and 2001, although at a relatively moderate average annual growth rate (4.9%). This allowed this country to post a cumulative per capita output growth of 123.8%.

Overall, considering the different criteria discussed above, the countries recording best growth performances over the last five decades are Belize, Trinidad and Tobago, Antigua and Barbuda, and Saint Kitts and Nevis. In contrast, those countries exhibiting the poorest evolution are the Bahamas, Guyana and Suriname.

III. CONVERGENCE

Perhaps the most interesting and keenly studied implication of the neoclassical growth model (Solow, 1956) is that of convergence. It states that poor countries should grow faster than rich ones because poor countries have lower capital per capita and there are diminishing returns to capital. This can be

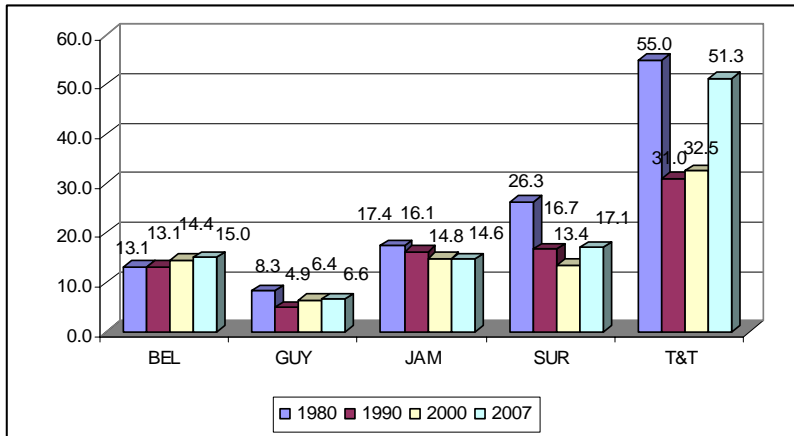
extended to other factors such as human capital and institutional capacity. Thus, in the long run, poor countries would catch up with rich countries in income or output per capita levels.

Given the growth performance of Caribbean countries discussed above, the following examines whether these economies have reduced the gap between their GDP per capita and that of the United States of America during the last five decades. Following Agosin, Machado and Nazal (2004), and Agosin and Machado (2006), figures 2a to 2c present per capita GDP in purchasing power parity (PPP) United States dollars at 2005 prices, as a percentage of United States per capita GDP.

Figure 2a

MDCs: GDP per capita in PPP 2005 US\$, 1980-2007

(Percentage of United States GDP per capita)

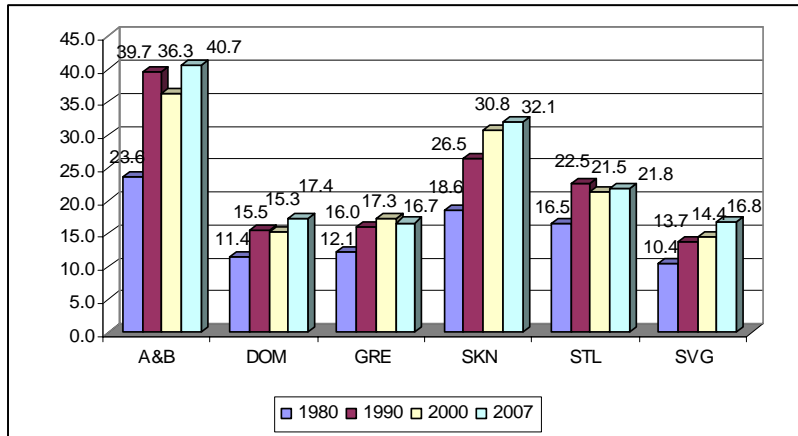


Source: World Bank, *World Development Indicators*, electronic version.

Within the five MDCs considered in figure 1a, only Belize showed some slight trend towards convergence: Belize GDP per capita went from 13.1% of United States GDP per capita in 1980 to 14.4% in 2000 and from 13.1% in 1990 to 15% in 2007. However, in the other four countries, GDP per capita in 2007 represented a lower percentage of United States per capita output than in 1980. The most extreme case was Suriname, in which GDP per capita represented 26.3% of United States per capita output in 1980, dropping to 17.1% in 2007.

The ECCU countries fared much better than the MDCs in terms of convergence. Indeed, in the six countries considered in figure 1b, GDP per capita in 2007 represented a higher percentage of United States GDP per capita than in 1980. The pattern was similar in Saint Kitts and Nevis and in Saint Vincent and the Grenadines.

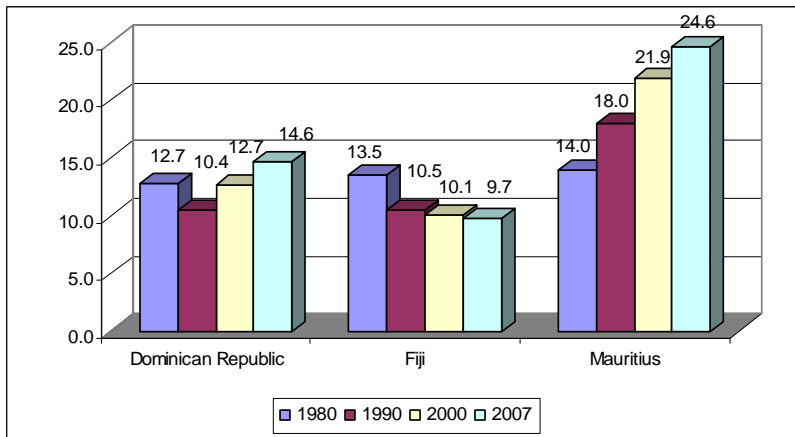
Figure 2b
ECCU: GDP per capita at constant prices in PPP 2005 US\$, 1980-2007
(Percentage of United States GDP per capita)



Source: World Bank, *World Development Indicators*, electronic version.

Finally, the comparator countries exhibited mixed patterns, with Mauritius showing strong convergence as its GDP per capita went from 14% of United States GDP per capita in 1980, to 18% in 1990, 21.9% in 2000 and 24.9% in 2007. In contrast, Fiji showed divergence. Meanwhile, the Dominican Republic showed ups and downs but with a tendency towards closing the GDP per capita gap with the United States; Antigua and Barbuda and Saint Lucia showed similar tendencies, as seen in figure 2b.

Figure 2c
Reference countries: GDP per capita in PPP 2005 US\$, 1980-2007
(Percentage of United States GDP per capita)



Source: World Bank, *World Development Indicators*, electronic version.

IV. GROWTH ACCOUNTING

The starting point of traditional growth accounting is the Cobb-Douglas production function with constant returns to scale:

$$Y = A K^\alpha L^{1-\alpha} \quad (1)$$

where Y is GDP, K is the physical capital stock, L is the labour force, A is a technological parameter known as total factor productivity (TFP) and α is the capital-output elasticity.

Taking logarithms and differentiating with respect to time:

$$y = \alpha k + (1 - \alpha) l + a \quad (2)$$

where the lower case letters stand for the percentage rate of change of the corresponding upper case letter variables in (1). Assuming competitive factor markets, α represents the share of capital in national income. In the literature, the value of this parameter is usually taken as 1/3, but some sensitivity analysis is usually conducted using alternative values such as 1/2 or 2/3.

Equation (2) states that GDP growth is a weighted average of physical capital and labour force accumulation. The remainder is assigned to TFP growth. Thus, having GDP and labour force growth rates from official sources, the task is to build a physical capital stock series. This is done using the perpetual inventory approach, which requires data on gross fixed capital formation (GFKF) from the national accounts (see Agosin, Machado and Nazal, 2004; and Solimano, 2006). In countries that do not differentiate between GFKF and changes in inventories, the capital stock series is constructed using gross capital formation (GKF).

The perpetual inventory approach starts with the equation of motion of the capital stock:

$$K_{t+1} = (1 - \delta) K_t + I_{t+1} \quad (3)$$

where δ is the depreciation rate, I is gross investment and the subscripts indicate the period. To estimate the capital stock in the initial period, equation (3) is divided by Y in $t+1$:

$$\frac{K_{t+1}}{Y_{t+1}} = \frac{(1 - \delta) K_t}{(1 + g) Y_t} + \frac{I_{t+1}}{Y_{t+1}} \quad (4)$$

where g is the GDP growth rate. Should the investment rate remain constant for a long period of time, then:

$$\frac{K}{Y} \cong \left(\frac{1}{g + \delta} \right) \frac{I}{Y} \quad (5)$$

The initial capital stock K_0 then is calculated as:

$$K_0 = Y_0 \left(\frac{1}{g + \delta} \right) \left(\frac{\bar{I}}{\bar{Y}} \right) \quad (6)$$

where Y_0 is the initial GDP and $\frac{\bar{I}}{Y}$ is the investment rate in the decade that starts in period 0.⁷

A number of studies since the 1990s have expanded the traditional growth-accounting framework to include human capital. In this case, the Cobb-Douglas production function with constant returns to scale is:

$$Y = AK^\alpha (HL)^{1-\alpha} \quad (7)$$

where H is an index of the quality of the labour force. Loayza, Fajnzylber and Calderón (2005) construct this parameter as:

$$H = \sum_j W_j S_j \quad (8)$$

where H for each country is the weighted average of the share of the population with educational level j , with the weights given by the social returns of incomplete and complete primary, secondary and tertiary education. The W s are taken from Psacharopoulos (2004), whereas the S s are taken from Barro and Lee (2000).

Taking logarithms of (7) and differentiating with respect to time:

$$y = \alpha k + (1 - \alpha)(l + h) + a \quad (9)$$

where h is the rate of growth of the quality of the labour force.

Within the neoclassical Solow growth model framework used for growth accounting calculations, human capital accumulation contributes to output growth, whereas the level of human capital has no effect on the growth rate, but does have an effect on the level of income per capita. However, within the more recent literature on endogenous growth, the level of human capital does have a crucial role in long-term growth, as it precludes physical capital from exhibiting diminishing returns, thus making continuous output expansion possible.⁸

Tables 5a and 5b present the main results of the growth accounting baseline exercise based on equation (2), considering a capital-output elasticity (α) equal to 1/3. The contributions of labour and physical capital accumulation and of TFP evolution are considered both in percentage points and in percentages. Note that TFP is a residual – also known as the Solow residual – and comprises everything else that affects growth except labour and physical capital accumulation. As such, in the words of Denison (1967), it is a “measure of our ignorance.” Therefore, negative contributions of TFP to growth should not be surprising, as they may reflect disruptions to economic activity due to external shocks such as political unrest, adverse evolution of the terms of trade, or reversals in foreign capital inflows. During the most recent period (2001-2007), the contribution of TFP to the growth rate was particularly high in Dominica and Trinidad and Tobago, where this factor accounted for 90.5% and 80.6% of annual GDP growth, respectively. In contrast, the contribution of TFP was lowest in Grenada and Saint Lucia, where it was below 6%. The annex presents growth accounting results assuming alternative values for the capital-output elasticity, namely 1/2 and 2/3.

⁷ See, for instance, Klenow and Rodríguez-Clare (1997), Rodríguez-Clare, Sáenz and Trejos (2004), and Guzmán (2004).

⁸ See Lucas (1988), and Barro and Sala-i-Martin (2004).

Table 5a

MDCs: Growth accounting with $\alpha = 1/3$, 1971-2007

	Contribution to GDP growth in percentage points				Contribution to GDP growth in percentage		
	GDP growth ^a	Physical capital	Labour	TFP	Physical capital	Labour	TFP
Bahamas (the)							
1971-1980	3.5	0.7	1.4	1.4	19.9	40.2	39.8
1981-1990	3.1	2.5	2.1	-1.5	80.6	68.7	-49.3
1991-2000	1.9	2.2	1.3	-1.6	113.0	70.0	-83.0
2001-2007	1.4	1.9	1.0	-1.5	135.8	73.6	-109.3
Barbados							
1971-1980	2.9	0.9	0.2	1.7	31.7	8.5	59.8
1981-1990	1.3	0.5	1.7	-0.9	35.9	134.1	-70.0
1991-2000	1.6	0.3	0.9	0.4	19.2	54.4	26.3
2001-2007	2.0	0.4	0.5	1.1	18.7	23.1	58.2
Belize							
1971-1980	7.4	2.5	1.3	3.6	34.0	17.1	48.9
1981-1990	5.1	1.4	2.3	1.3	28.5	45.1	26.4
1991-2000	6.0	2.1	2.8	1.1	34.1	46.4	19.5
2001-2007	5.0	1.2	3.2	0.6	24.4	63.9	11.7
Guyana							
1971-1980	1.4	0.8	0.5	0.0	59.1	37.2	3.7
1981-1990	-3.2	-0.6	0.3	-2.9	19.3	-8.8	89.6
1991-2000	5.0	0.2	0.9	3.9	3.6	18.5	77.9
2001-2007	2.0	0.4	0.4	1.3	17.4	19.9	62.7
Jamaica							
1971-1980	-0.6	-0.2	1.1	-1.4	37.1	-203.8	266.7
1981-1990	2.7	0.1	1.1	1.6	2.8	39.0	58.3
1991-2000	2.0	0.9	0.3	0.9	43.1	13.5	43.3
2001-2007	1.8	0.9	0.0	0.9	47.8	0.7	51.5
Suriname							
1971-1980	..	..	..	..	..	..	..
1981-1990	-0.9	-0.3	2.0	-2.5	34.1	-229.6	295.5
1991-2000	0.7	0.9	0.5	-0.7	126.2	68.7	-94.9
2001-2007	5.7	3.1	0.9	1.7	54.4	15.3	30.3
Trinidad and Tobago							
1971-1980	5.3	3.1	0.8	1.4	58.2	15.4	26.4
1981-1990	-2.2	0.7	0.6	-3.5	-33.2	-28.3	161.5
1991-2000	3.2	0.8	1.6	0.9	23.7	49.5	26.8
2001-2007	8.8	0.8	0.9	7.1	8.8	10.5	80.6

Source: Author's calculations.

^a Average annual growth rate.

Table 5b

ECCU: Growth accounting with $\alpha = 1/3$, 1971-2007

	GDP growth ^a	Contribution to GDP growth in percentage points			Contribution to GDP growth in percentage		
		Physical capital	Labour	TFP	Physical capital	Labour	TFP
Antigua and Barbuda							
1971-1980	4.0	1.5	-0.1	2.7	36.5	-3.4	67.0
1981-1990	6.1	3.2	0.0	2.9	52.3	1.0	46.7
1991-2000	3.4	1.7	0.8	0.9	49.6	24.9	25.5
2001-2007	4.6	1.5	1.6	1.6	31.7	34.6	33.7
Dominica							
1971-1980	5.0	1.9	0.4	2.7	37.5	7.9	54.6
1981-1990	5.4	2.3	-0.2	3.3	42.1	-4.0	61.9
1991-2000	1.8	1.1	0.0	0.7	60.7	0.1	39.1
2001-2007	4.0	0.6	-0.2	3.6	14.9	-5.3	90.5
Grenada							
1971-1980	5.7	2.2	-0.2	3.8	37.9	-4.1	66.2
1981-1990	5.7	3.7	0.4	1.5	66.1	6.8	27.1
1991-2000	3.7	2.0	0.5	1.3	54.0	12.2	33.8
2001-2007	2.1	1.5	0.5	0.1	70.8	23.2	5.9
Saint Kitts and Nevis							
1971-1980	5.9	2.0	-0.2	4.1	34.2	-4.0	69.8
1981-1990	5.5	2.4	-0.2	3.3	44.1	-3.8	59.7
1991-2000	4.2	1.9	0.4	1.8	46.7	9.8	43.5
2001-2007	3.5	1.9	1.2	0.5	53.2	33.2	13.6
Saint Lucia							
1971-1980	5.1	1.9	1.0	2.3	36.7	18.7	44.6
1981-1990	7.6	2.2	2.1	3.3	29.0	28.0	43.0
1991-2000	3.1	2.7	1.9	-1.5	87.3	60.4	-47.7
2001-2007	2.9	1.2	1.5	0.2	42.8	51.5	5.7
Saint Vincent and the Grenadines							
1971-1980	3.2	1.0	0.8	1.4	30.4	25.9	43.7
1981-1990	6.1	1.5	1.7	2.8	24.3	28.8	46.9
1991-2000	3.2	1.5	1.3	0.5	46.8	39.0	14.2
2001-2007	4.3	1.5	1.2	1.6	35.3	28.2	36.5

Source: Author's calculations.

^a Average annual growth rate.

Table 6 shows growth-accounting results for the median Caribbean country according to the growth rate recorded by decade, assuming different values for capital-output elasticity. The median countries are: Dominica for the 1970s, Belize for the 1980s, Trinidad and Tobago for the 1990s, and Saint Kitts and Nevis for the 2000s. In the first case, the lowest contribution to growth was labour force accumulation that only explained between 4% and 7.9% of output expansion in the 1971-1980 decade. During that decade, the main drivers of growth were physical capital accumulation and TFP evolution. Evidently, the higher the value of α , the higher the contribution of capital accumulation, and the lower the value of TFP behaviour.

Table 6

Median Caribbean country: Growth accounting, 1971-2007^a

	GDP growth ^b	Contribution to GDP growth in percentage points			Contribution to GDP growth in percentages		
		Physical capital	Labour	TFP	Physical capital	Labour	TFP
$\alpha = 1/3$							
1971-1980	5.0	1.9	0.4	2.7	37.5	7.9	54.6
1981-1990	5.1	1.4	2.3	1.3	28.5	45.1	26.4
1991-2000	3.2	0.8	1.6	0.9	23.7	49.5	26.8
2001-2007	3.5	1.9	1.2	0.5	53.2	33.2	13.6
$\alpha = 1/2$							
1971-1980	5.0	2.8	0.3	1.9	56.3	5.9	37.8
1981-1990	5.1	2.2	1.7	1.2	42.7	33.8	23.5
1991-2000	3.2	1.1	1.2	0.9	35.5	37.1	27.4
2001-2007	3.5	2.8	0.9	-0.2	79.8	24.9	-4.7
$\alpha = 2/3$							
1971-1980	5.0	3.6	0.2	1.1	75.0	4.0	21.0
1981-1990	5.1	2.9	1.1	1.0	56.9	22.6	20.5
1991-2000	3.2	1.5	0.8	0.9	47.3	24.8	27.9
2001-2007	3.5	3.8	0.6	-0.8	106.4	16.6	-23.0

Source: Author's calculations.

^a Dominica for the 1970s, Belize for the 1980s, Trinidad and Tobago for the 1990s, and Saint Kitts and Nevis for the 2000s.

^b Average annual growth rate.

The picture changed when the median country in the 1980s and the 1990s were considered. Indeed, given a capital-output elasticity of 1/3, labour accumulation explained roughly half of GDP growth, and physical capital accumulation and TFP evolution contributed with one-fourth each. As the assumed value of α increased to 1/2 and to 2/3, the contribution of labour accumulation declined in favour of the contribution of physical capital increase, leaving TFP evolution participation with no major changes.

Finally, looking at the most recent period, TFP contribution to GDP growth was the lowest of the four decades, as physical capital accumulation increased its contribution. Moreover, as higher values for the capital-output elasticity were assumed, the role of TFP diminished, eventually turning negative. Thus, TFP contribution to output expansion went down from 13.6% to -4.7% and to -23% with values of α of 1/3, 1/2 and 2/3, respectively. In the latter case, labour force accumulation contributed 16.6% to overall growth.

In order to consider the role of human capital accumulation in output expansion, an augmented growth accounting exercise was carried out based on equation (5), using the only available data on school attainment in the Caribbean countries of Barbados, Jamaica, and Trinidad and Tobago (Barro and Lee, 2000).

Tables 7a to 7c present the contribution of the accumulation of the three factors of production – K, L and H – and of the residual (TFP) to GDP growth for different values of capital-output elasticity. This exercise was carried out for the years where data were available, that is, for the 1970s, 1980s and 1990s. In general, the inclusion of human capital accumulation reduced the role of TFP evolution, leaving the contribution (in percentage points) of labour and physical capital accumulation unchanged. Table 7a shows that TFP behaviour in Barbados was more relevant during the 1970s, when it contributed between 1.8 (with $\alpha = 2/3$) and 3.4 (with $\alpha = 1/3$) percentage points to annual GDP growth. Labour force accumulation played the leading role in the 1980s and 1990s, explaining between 0.9 and 1.7 percentage points of output growth. Meanwhile, the contribution of human

capital was below 1 percentage point per year throughout the three decades regardless of the assumed value of α .

Table 7a

Barbados: Growth accounting including human capital, 1971-1999

	GDP growth h ^a	Contribution to GDP growth in percentage points				Contribution to GDP growth in percentage points			
		Physical capital	Human capital	Labour	TFP	Physical capital	Human capital	Labour	TFP
$\alpha = 1/3$									
1971-1980	2.9	0.9	-1.7	0.2	3.4	31.7	-59.8	8.5	119.7
1981-1990	1.3	0.5	0.9	1.7	-1.8	35.9	72.2	134.1	-142.2
1991-1999	1.5	0.3	0.7	0.9	-0.3	17.8	43.7	58.5	-19.2
$\alpha = 1/2$									
1971-1980	2.9	1.4	-1.2	0.2	2.6	47.6	-44.9	6.4	91.0
1981-1990	1.3	0.7	0.7	1.3	-1.4	53.8	54.2	100.6	-108.5
1991-1999	1.5	0.4	0.5	0.7	0.0	26.7	32.8	43.8	-3.3
$\alpha = 2/3$									
1971-1980	2.9	1.8	-0.9	0.1	1.8	63.4	-29.9	4.2	62.3
1981-1990	1.3	0.9	0.5	0.9	-1.0	71.7	36.1	67.1	-74.9
1991-1999	1.5	0.5	0.3	0.4	0.2	35.5	21.9	29.2	13.4

Source: Author's calculations.

^a Average annual growth rate.

In the case of Jamaica, labour force accumulation, TFP evolution and physical capital accumulation, respectively, were the main drivers of GDP growth during the 1970s, 1980s and 1990s. The contribution of the growth of labour in the decade 1971-1980 was between 0.6 and 1.2 percentage points per year, whereas that of TFP behaviour in the decade 1981-1990 ranged between 0.9 and 1.7 percentage points per annum. Obviously, the contribution of physical capital accumulation to output expansion was highest with a capital-output elasticity equal to $2/3$, where capital stock increases explained 1.8 percentage points or 83.2% of the annual GDP growth rate. As with Barbados, the contribution of human capital accumulation to growth was below 1 percentage point, but in this case there was no negative impact, signifying that school attainment indicators improved permanently during the period analysed.

Table 7b

Jamaica: Growth accounting including human capital, 1971-1999

	GDP growth ^a	Contribution to GDP growth in percentage points				Contribution to GDP growth in percentage			
		Physical capital	Human capital	Labour	TFP	Physical capital	Human capital	Labour	TFP
$\alpha = 1/3$									
1971-1980	-0.6	-0.2	1.0	1.2	-2.5	37.1	-179.6	-203.8	446.3
1981-1990	2.7	0.1	0.7	1.1	0.9	2.8	25.4	39.0	32.8
1991-1999	2.1	0.9	0.5	0.3	0.4	41.6	25.3	13.4	19.7
$\alpha = 1/2$									
1971-1980	-0.6	-0.3	0.8	0.9	-1.9	55.6	-134.7	-152.8	331.9
1981-1990	2.7	0.1	0.5	0.8	1.3	4.1	19.1	29.2	47.6
1991-1999	2.1	1.3	0.4	0.2	0.2	62.4	19.0	10.1	8.6
$\alpha = 2/3$									
1971-1980	-0.6	-0.4	0.5	0.6	-1.2	74.1	-89.8	-101.9	217.6
1981-1990	2.7	0.2	0.3	0.5	1.7	5.5	12.7	19.5	62.3
1991-1999	2.1	1.8	0.3	0.1	-0.1	83.2	12.7	6.7	-2.5

Source: Author's calculations.

^a Average annual growth rate.

Finally, Table 7c reveals that physical capital accumulation has had a prominent role in explaining growth during the 1970s and 1980s in Trinidad and Tobago. During the 1970s, investment in physical capital contributed between 3.1 and 6.2 percentage points per year to output expansion. This factor explained between 0.7 and 1.1 percentage points of annual GDP growth during the 1980s. The situation changed in the 1990s, when labour force accumulation achieved the main role, except when assuming a capital-output elasticity equal to 2/3. Finally, the role of human capital accumulation in Trinidad and Tobago was relatively high during the 1970s, when this factor contributed between 0.7 and 1.5 percentage points per year to the GDP growth rate.

Table 7c

Trinidad and Tobago: Growth accounting including human capital, 1971-1999

	GDP growth ^a	Contribution to GDP growth in percentage points				Contribution to GDP growth in percentage			
		Physical capital	Human capital	Labour	TFP	Physical capital	Human capital	Labour	TFP
$\alpha = 1/3$									
1971-1980	5.3	3.1	1.5	0.8	-0.1	58.2	27.8	15.4	-1.5
1981-1990	-2.2	0.7	0.0	0.6	-3.5	-33.2	-0.8	-28.3	162.4
1991-1999	2.9	0.8	0.5	1.6	0.0	26.4	16.4	56.8	0.5
$\alpha = 1/2$									
1971-1980	5.3	4.7	1.1	0.6	-1.1	87.3	20.9	11.6	-19.7
1981-1990	-2.2	1.1	0.0	0.5	-3.7	-49.8	-0.6	-21.3	171.7
1991-1999	2.9	1.1	0.4	1.2	0.2	39.6	12.3	42.6	5.6
$\alpha = 2/3$									
1971-1980	5.3	6.2	0.7	0.4	-2.0	116.4	13.9	7.7	-38.0
1981-1990	-2.2	1.4	0.0	0.3	-3.9	-66.4	-0.4	-14.2	181.0
1991-1999	2.9	1.5	0.2	0.8	0.3	52.8	8.2	28.4	10.7

Source: Author's calculations.

^a Average annual growth rate.

Considering the median Caribbean country in general, basic growth accounting reveals that the role of total factor productivity (TFP) in growth was at its highest during the 1970s, declining to its lowest level in the 2000s. Physical capital accumulation was prominent in the explanation of output growth both in the 1970s and in the 2000s. Meanwhile, labour force accumulation was the most important factor accounting for GDP growth in the 1980s and 1990s.

When the role of human capital accumulation is added to the analysis, it partially crowds out the impact of TFP evolution on growth. Considering the three countries where data was available, improved labour force quality made a greater contribution in Trinidad and Tobago during the 1970s, in Barbados during the 1980s, and in Jamaica during the 1990s. However, it is only during the 1970s that the contribution of improvement in the quality of the labour force to output growth was above 1 percentage point per annum. Thus, despite the undoubted relevance of human capital accumulation to economic growth, its contribution appears to have been of little significance to Caribbean countries during the period from 1971 to 1999.

V. DETERMINANTS OF ECONOMIC GROWTH

This section undertakes an econometric modelling, estimation and testing exercise intended to identify the determinants of economic growth in the Caribbean. As was mentioned in the introduction, Barro (1991) prompted a proliferation of literature on the issue both at the national and regional levels, including Latin America.⁹

The modelling strategy follows that of Hendry's Reduction Theory (Hendry, 1987): starting with an over-parameterized, inefficient but consistent model, and reducing some of the explanatory variables one by one, according to statistical significance and economic interpretation, so as to converge to a still-consistent, but more efficient, model. The initial regression of GDP per capita growth (y/n) is:

$$\frac{y}{n} = f\left(\frac{Y_0}{N_0}, GAP_0, INV, SCH, LEXP, INF, DCPS, M2, RIR, OPEN, FLOW, GC, POP\right) \quad (6)$$

The basic source is World Bank, *World Development Indicators*, electronic version.

The following variables are included in the growth regression:

A. CONDITIONAL CONVERGENCE AND CYCLICAL REVERSION VARIABLES

Y_0/N_0 is initial real GDP per capita (in logarithms).

GAP_0 is the initial GDP gap, calculated as the difference between potential and actual GDP (in logarithms). The former, in turn, is the trend output calculated using the Hodrick-Prescott filter.

B. PHYSICAL AND HUMAN CAPITAL VARIABLES

INV is investment as a share of GDP at constant prices (in logarithms).

SCH is the gross rate of schooling either in primary ($SCHP$) or in secondary ($SCHS$) education (in logarithms).

$LEXP$ is life expectancy at birth divided by 100 (in logarithms).

C. FINANCIAL VARIABLES

$DCPS$ is domestic credit to the private sector as a share of GDP (in logarithms).

$M2$ is M2 as a share of GDP (in logarithms).

RIR is the real interest rate (in logarithms).

⁹ For example, Solimano and Soto (2006) contain growth studies on Andean Community, MERCOSUR and Central American countries. Similarly, Fernández-Arias, Manuelli and Blyde (2005) compile growth papers on Argentina, Brazil, Chile, Paraguay, Peru and Uruguay. Agosin, Machado and Nazal (2004) include studies on Costa Rica, El Salvador and the Dominican Republic.

D. MACROECONOMIC STABILITY VARIABLE

INF is the inflation rate (in logarithms of $1 +$ inflation rate).

E. STRUCTURAL VARIABLE

OPEN is trade openness, calculated as exports plus imports of goods and services as a share of GDP (in logarithms).

F. EXTERNAL CONDITIONS VARIABLE

FLOW is foreign capital inflows, approximated by the current account deficit as a share of GDP (in logarithms).

G. FISCAL VARIABLE

GC is government consumption as a share of GDP (in logarithms).

H. DEMOGRAPHIC VARIABLE

POP is population in thousands of people (in logarithms). Source: CARICOM.

The inclusion and omission of some variables deserves some explanation.

Firstly, the inclusion of GAP_0 is to preclude the overestimation of the conditional convergence parameter associated to initial GDP per capita, as recovery from a cyclical recession can be confused with rapid convergence (see Loayza, Fajnzylber and Calderón, 2005). Secondly, the omission of the terms of trade change, as included in several studies such as Agosin and Machado (2006), is due to lack of information. The same is true of institutional-quality variables included in a number of studies, such as Blyde and Fernández-Arias (2006).

In long-run growth studies, the use of annual data is not recommended: the high levels of noise exhibited by this frequency series tend to reflect fluctuations below the production frontier, or transitory shocks, rather than expansions in potential output. Following Agosin and Machado (2006), a three-year moving-average annual growth rate has been used. This reduces the variance by 45% compared to the annual observed growth rate. The sample includes the 13 Caribbean countries considered above, from 1981 to 2007.

The growth regression equation (6) is dynamic in nature. Some explanatory variables such as investment can be endogenous to economic growth. Loayza, Fajnzylber and Calderón (2005) have noted that this brings about estimation problems, such as accounting for country-specific effects and biases derived from simultaneous or reverse causality. Therefore, the Generalised Method of Moments (GMM) estimation developed by Arellano and Bond (1991) has been used. The Sargan chi-squared test for the validity of the instruments is reported, together with the AR(1) and AR (2) $N(0,1)$ tests to evaluate the behaviour of the residuals.

As the transformation used is first differences, if the disturbances of the original regression (6) are serially uncorrelated, the differenced residual must show significant first-order negative autocorrelation, and no significant second-order serial autocorrelation. In addition, as noted by Arellano and others (2001), the estimated standard errors of the estimated parameters using GMM are

downward biased. To deal with this problem, the Windmeijer (2000) small-sample correction is applied. The software used is PcGive 10.1.

Table 8 presents the econometric results of two alternative specifications: including and excluding the cyclical reversion variable. As shown, specification (1) reveals that the initial output gap has a negative and significant impact on GDP per capita growth rate (at the 10% level). The estimated coefficient of -0.134 is comparable to that of -0.122 found by Blyde and Fernández-Arias (2006) for the MERCOSUR countries and Chile, as these values are less than two standard deviations apart. However, the coefficient estimated by Loayza, Fajnzylber and Calderón (2005) for a panel of 78 countries around the world barely doubles these values (-0.253). Surprisingly, the estimated transitional convergence parameter, though negative, is not statistically different from zero at standard significance levels, which contradicts the findings of a number of studies.

Table 8

GDP per capita growth equations estimation by GMM using panel data ^a
(Sample period: 1981-2005; countries: 13; frequency: annual)

Dependent variable	(1)	(2)
Conditional convergence and cyclical reversion		
Y_0/N_0	-0.002 (-0.06)	-0.033 (-1.32)
GAP_0	-0.134 (-1.88)*	
Physical and human capital		
INV	0.023 (1.41)	0.021 (1.42)
$SCHS$	0.001 (3.93)***	0.001 (3.83)***
Financial		
RIR	-0.057 (-2.01)**	-0.073 (-2.40)**
Macroeconomic stability		
INF	-0.086 (-2.65)***	-0.103 (-2.88)***
Structural		
$OPEN$	0.083 (2.08)**	0.082 (2.19)**
Fiscal		
GC	-0.073 (-6.22)***	-0.076 (-6.83)***
Number of observations	203	208
Wald (joint) Chi-squared test	881.5***	382.8***
Sargan Chi-squared test	364.4	395.0**
AR(1) N(0,1) test	-1.795*	-1.667*
AR(2) N(0,1) test	1.078	0.670

Source: Author's calculations.

^a Regressions with constant and time dummies; t-values in parenthesis using robust standard errors.

* Significantly different from zero at the 10% level.

** Significantly different from zero at the 5% level.

*** Significantly different from zero at the 1% level.

In order to explore whether this finding is the result of the inclusion of the output gap as an explanatory variable, GAP_0 is excluded in specification (2). Nevertheless, initial GDP per capita keeps exhibiting no statistical significance at conventional levels. Moreover, in specification (2), the null hypothesis of the validity of the instruments is rejected by the Sargan Chi-squared test at the 5% level. In contrast, the null cannot be rejected in specification (1), which also reveals negative first-order

autocorrelation and no second-order autocorrelation of the residuals. Thus, this specification is the preferred one.

The other variables that negative and significantly affect GDP per capita growth are the real interest rate, inflation, and government consumption. In the case of inflation, the estimated coefficient (-0.086) is more than ten times higher than the estimation by Loayza, Fajnzylber and Calderón (2005) (-0.008). Aravena, Hofman and Solimano (2006) found no statistically significant effect of inflation on GDP per capita growth in the Andean countries. As regards government consumption, the estimated parameter (-0.073) is again around 10 times higher than the one estimated by Loayza, Fajnzylber and Calderón (2005) (-0.008). However, it is much lower than the estimations of Aravena, Hofman and Solimano (2006) which are between -1.47 and -1.86, depending on the specification of the model. It is worth noting that Blyde and Fernández-Arias (2006) found no significant impact of inflation on GDP per capita growth for the MERCOSUR countries plus Chile (and the sign of the estimated parameter is positive). Finally, the financial variable that best fitted in the regression equation is *RIR* which is statistically different from zero at the 5% level and shows the expected negative sign. There was no multi-country study within the literature reviewed in which the real interest rate was the explanatory variable.

The variables that showed a significant positive effect on the growth rate were gross enrolment in secondary education, and openness to international trade. In the case of the former variable, this finding contrasts with the findings of other studies such as Loayza, Fajnzylber and Calderón (2005), which do not find that the effect of SCHS on GDP per capita growth is statistically different from zero at standard significance levels. Aravena, Hofman and Solimano do not include it as an explanatory variable. Agosin and Machado do not find human capital (as represented by average years of schooling of the population between 15 and 65 years of age) as a statistically significant explanatory variable of per capita GDP growth in Central America. The same is true of Blyde and Fernández-Arias (2006) who defined this variable as the average years of secondary schooling of the male population over the age of 25.

Results on the significance of openness to trade on growth are consistent with the findings of Aravena, Hofman and Solimano (2006), Blyde and Fernández-Arias (2006), and Loayza, Fajnzylber and Calderón (2005). The estimated coefficient of 0.083 is around seven times higher than the values found in the second and the third studies, for the MERCOSUR countries plus Chile, and for the 78 countries around the world, respectively. In fact, the estimated coefficient is much lower than the values estimated by Aravena, Hofman and Solimano (2006), which range between 0.23 and 0.45, depending on the specification of the model.

VI. CONCLUSION

This paper has undertaken a study on economic growth in 13 Caribbean countries during the last five decades. Considering the evolution of GDP per capita growth rates, as well as growth crises, defined as any year of decline in per capita GDP, and growth episodes, defined as a period of at least six consecutive years of per capita GDP growth of above 2%, it seems that, in general, the ECCU countries have shown a better record than the MDCs. In fact, the countries that have exhibited the worst growth performances in the Caribbean have been the Bahamas, Guyana and Suriname, whilst the countries with the most dynamic growth have been Antigua and Barbuda, Saint Kitts and Nevis, Belize, and Trinidad and Tobago.

Most MDCs have shown higher GDP per capita growth (Bahamas, Barbados, Belize and Jamaica) during the 1960s and 1970s when the ISI strategy was in place, whereas all ECCU countries included in the analysis have exhibited better performances during the 1980s. This might seem

surprising as the debt crisis of developing countries took place during the 1980s. However, given that all ECCU countries with the exception of Grenada became independent either during the 1980s or late 1970s, public debt stocks in 1980 could not have been that significant. The only countries to have experienced more rapid growth in a later decade were Guyana in the 1990s and Trinidad and Tobago in the 2000s. In Guyana, this phenomenon was driven by a surge in foreign aid, and in Trinidad and Tobago by the hike in world energy prices.

The conclusion that, in general, ECCU countries did better in terms of growth than MDCs is confirmed by convergence analysis. Indeed, in the six ECCU countries included in the sample, per capita GDP as a share of United States per capita GDP was higher in 2007 than in 1980. In the MDCs, this was true only in Belize: the other four countries where data were available (Guyana, Jamaica, Suriname, and Trinidad and Tobago) did not close the gap with United States per capita GDP between 1980 and 2007.¹⁰

A growth accounting exercise was carried out assuming different values for the capital-output elasticity for the median Caribbean country per decade, using Dominica for the 1970s, Belize for the 1980s, Trinidad and Tobago for the 1990s, and Saint Kitts and Nevis for the 2000s. In the 1970s, the main drivers of growth were physical capital accumulation and TFP evolution, with little contribution by labour accumulation. The role of labour accumulation increased significantly during the 1980s and the 1990s, when its contribution to the growth rate was between 22.6% and 49.5%, depending on the value assumed for capital-output elasticity (the lower the value, the higher the contribution of labour force accumulation). Finally, in the 2000s, the contribution of TFP to GDP growth was the lowest of the five decades, due to the increase of the role of physical capital accumulation.

Introducing the role of human capital accumulation in the explanation of GDP growth in the three countries where data were available, showed its role to be highest in Trinidad and Tobago during the 1970s, in Barbados during the 1980s and in Jamaica during the 2000s. Nevertheless, only in Trinidad and Tobago was the contribution of human capital accumulation to GDP growth above 1 percentage point per year in the period analysed (1971-1999), with a maximum of 1.5 percentage points per year during the 1970s, and a minimum of zero in the 1980s. This indicates that human capital accumulation does not play a significant role in GDP growth, the accumulation of either physical capital or labour appearing in most cases to be more relevant.

Finally, the econometric panel data estimation of the determinants of GDP per capita growth in 1981-2007 showed results mostly consistent with the expected results and estimates of recent studies carried out on Latin America (Loayza, Fajnzylber and Calderón, 2005), the Andean countries (Aravena, Hofman and Solimano, 2006) MERCOSUR plus Chile (Blyde and Fernández-Arias, 2006) and Central America (Agosin and Machado, 2006). Surprisingly, evidence in favour of the conditional convergence hypothesis was not found.

GDP per capita growth in Caribbean countries appeared to be mainly driven by higher secondary enrolment and more openness to international trade, together with lower real interest rates, inflation and government consumption. The initial output gap also seems to play a significant negative role.

¹⁰ Trinidad and Tobago did partially catch up with the United States per capita GDP during the 2000s, compared to performance in the 1980s and 1990s.

Annex

Table A.1a: MDCs: Growth accounting with $\alpha = 1/2$, 1971-2007

	GDP growth ^a	Contribution to GDP growth in percentage points			Contribution to GDP growth in percentage		
		Physical capital	Labour	TFP	Physical capital	Labour	TFP
Bahamas (the)							
1971-1980	3.5	1.1	1.1	1.4	29.9	30.2	39.9
1981-1990	3.1	3.7	1.6	-2.2	120.9	51.6	-72.4
1991-2000	1.9	3.3	1.0	-2.3	169.6	52.5	-122.0
2001-2007	1.4	2.9	0.8	-2.2	203.6	55.2	-158.8
Barbados							
1971-1980	2.9	1.4	0.2	1.3	47.6	6.4	46.1
1981-1990	1.3	0.7	1.3	-0.7	53.8	100.6	-54.4
1991-2000	1.6	0.5	0.6	0.5	28.9	40.8	30.3
2001-2007	2.0	0.6	0.3	1.1	28.1	17.3	54.6
Belize							
1971-1980	7.4	3.8	0.9	2.7	50.9	12.9	36.2
1981-1990	5.1	2.2	1.7	1.2	42.7	33.8	23.5
1991-2000	6.0	3.1	2.1	0.8	51.2	34.8	14.0
2001-2007	5.0	1.8	2.4	0.8	36.6	47.9	15.5
Guyana							
1971-1980	1.4	1.3	0.4	-0.2	88.6	27.9	-16.5
1981-1990	-3.2	-0.9	0.2	-2.5	28.9	-6.6	77.8
1991-2000	5.0	0.3	0.7	4.0	5.4	13.9	80.7
2001-2007	2.0	0.5	0.3	1.2	26.1	14.9	59.0
Jamaica							
1971-1980	-0.6	-0.3	0.9	-1.1	55.6	-152.8	197.2
1981-1990	2.7	0.1	0.8	1.8	4.1	29.2	66.6
1991-2000	2.0	1.3	0.2	0.5	64.7	10.1	25.2
2001-2007	1.8	1.3	0.0	0.5	71.7	0.5	27.8
Suriname							
1971-1980	..	..	..	..	..	..	..
1981-1990	-0.9	-0.4	1.5	-1.9	51.2	-172.2	221.0
1991-2000	0.7	1.4	0.4	-1.0	189.2	51.5	-140.8
2001-2007	5.7	4.7	0.7	0.4	81.6	11.5	6.9
Trinidad and Tobago							
1971-1980	5.3	4.7	0.6	0.0	87.3	11.6	1.1
1981-1990	-2.2	1.1	0.5	-3.7	-49.8	-21.3	171.0
1991-2000	3.2	1.1	1.2	0.9	35.5	37.1	27.4
2001-2007	8.8	1.2	0.7	6.9	13.2	7.9	78.9

Source: Author's calculations.

^a Average annual growth rate.

Table A1.b: ECCU: Growth accounting with $\alpha = 1/2$, 1971-2007

	GDP growth ^a	Contribution to GDP growth in percentage points			Contribution to GDP growth in percentage		
		Physical capital	Labour	TFP	Physical capital	Labour	TFP
Antigua and Barbuda							
1971-1980	4.0	2.2	-0.1	1.9	54.7	-2.6	47.9
1981-1990	6.1	4.8	0.0	1.3	78.5	0.7	20.8
1991-2000	3.4	2.5	0.6	0.2	74.4	18.7	6.9
2001-2007	4.6	2.2	1.2	1.2	47.6	25.9	26.5
Dominica							
1971-1980	5.0	2.8	0.3	1.9	56.3	5.9	37.8
1981-1990	5.4	3.4	-0.2	2.1	63.2	-3.0	39.9
1991-2000	1.8	1.7	0.0	0.2	91.1	0.1	8.8
2001-2007	4.0	0.9	-0.2	3.3	22.3	-4.0	81.7
Grenada							
1971-1980	5.7	3.3	-0.2	2.6	56.9	-3.1	46.2
1981-1990	5.7	5.5	0.3	-0.2	99.2	5.1	-4.3
1991-2000	3.7	3.0	0.3	0.4	81.1	9.2	9.8
2001-2007	2.1	2.2	0.4	-0.5	106.2	17.4	-23.7
Saint Kitts and Nevis							
1971-1980	5.9	3.0	-0.2	3.1	51.3	-3.0	51.7
1981-1990	5.5	3.6	-0.2	2.0	66.1	-2.8	36.7
1991-2000	4.2	2.9	0.3	0.9	70.1	7.3	22.6
2001-2007	3.5	2.8	0.9	-0.2	79.8	24.9	-4.7
Saint Lucia							
1971-1980	5.1	2.8	0.7	1.6	55.0	14.1	30.9
1981-1990	7.6	3.3	1.6	2.7	43.5	21.0	35.5
1991-2000	3.1	4.1	1.4	-2.4	130.9	45.3	-76.3
2001-2007	2.9	1.8	1.1	0.0	64.3	38.6	-2.9
Saint Vincent and the Grenadines							
1971-1980	3.2	1.4	0.6	1.1	45.6	19.4	35.0
1981-1990	6.1	2.2	1.3	2.5	36.4	21.6	42.0
1991-2000	3.2	2.3	0.9	0.0	70.2	29.3	0.6
2001-2007	4.3	2.3	0.9	1.1	53.0	21.2	25.9

Source: Author's calculations.

^a Average annual growth rate.

Table A2.a: MDCs: Growth accounting with $\alpha = 2/3$, 1971-2007

	GDP growth ^a	Contribution to GDP growth in percentage points			Contribution to GDP growth in percentage		
		Physical capital	Labour	TFP	Physical capital	Labour	TFP
Bahamas (the)							
1971-1980	3.5	1.4	0.7	1.4	39.8	20.1	40.0
1981-1990	3.1	4.9	1.1	-2.9	161.1	34.4	-95.5
1991-2000	1.9	4.3	0.7	-3.1	226.1	35.0	-161.1
2001-2007	1.4	3.8	0.5	-2.9	271.5	36.8	-208.3
Barbados							
1971-1980	2.9	1.8	0.1	0.9	63.4	4.2	32.4
1981-1990	1.3	0.9	0.9	-0.5	71.7	67.1	-38.8
1991-2000	1.6	0.6	0.4	0.5	38.5	27.2	34.3
2001-2007	2.0	0.7	0.2	1.0	37.5	11.5	51.0
Belize							
1971-1980	7.4	5.0	0.6	1.7	67.9	8.6	23.5
1981-1990	5.1	2.9	1.1	1.0	56.9	22.6	20.5
1991-2000	6.0	4.1	1.4	0.5	68.3	23.2	8.5
2001-2007	5.0	2.4	1.6	1.0	48.8	32.0	19.3
Guyana							
1971-1980	1.4	1.7	0.3	-0.5	118.1	18.6	-36.7
1981-1990	-3.2	-1.3	0.1	-2.2	38.5	-4.4	65.9
1991-2000	5.0	0.4	0.5	4.1	7.2	9.3	83.5
2001-2007	2.0	0.7	0.2	1.1	34.7	10.0	55.3
Jamaica							
1971-1980	-0.6	-0.4	0.6	-0.7	74.1	-101.9	127.7
1981-1990	2.7	0.1	0.5	2.0	5.5	19.5	75.0
1991-2000	2.0	1.7	0.1	0.1	86.3	6.8	7.0
2001-2007	1.8	1.7	0.0	0.1	95.5	0.4	4.1
Suriname							
1971-1980	..	..	..	..	..	..	..
1981-1990	-0.9	-0.6	1.0	-1.3	68.2	-114.8	146.6
1991-2000	0.7	1.8	0.3	-1.4	252.3	34.4	-186.7
2001-2007	5.7	6.2	0.4	-0.9	108.8	7.7	-16.4
Trinidad and Tobago							
1971-1980	5.3	6.2	0.4	-1.3	116.4	7.7	-24.1
1981-1990	-2.2	1.4	0.3	-3.9	-66.4	-14.2	180.6
1991-2000	3.2	1.5	0.8	0.9	47.3	24.8	27.9
2001-2007	8.8	1.5	0.5	6.7	17.7	5.3	77.1

Source: Author's calculations.

^a Average annual growth rate.

Table A2.b: ECCU: Growth accounting with $\alpha = 2/3$, 1971-2007

	GDP growth ^a	Contribution to GDP growth in percentage points			Contribution to GDP growth in percentage		
		Physical capital	Labour	TFP	Physical capital	Labour	TFP
Antigua and Barbuda							
1971-1980	4.0	2.9	0.0	1.2	72.9	-1.7	28.8
1981-1990	6.1	6.4	0.0	-0.3	104.6	0.5	-5.1
1991-2000	3.4	3.4	0.4	-0.4	99.3	12.4	-11.7
2001-2007	4.6	2.9	0.8	0.9	63.4	17.3	19.3
Dominica							
1971-1980	5.0	3.8	0.2	1.1	75.0	4.0	21.0
1981-1990	5.4	4.5	-0.1	1.0	84.2	-2.0	17.8
1991-2000	1.8	2.2	0.0	-0.4	121.5	0.1	-21.5
2001-2007	4.0	1.2	-0.1	2.9	29.7	-2.7	72.9
Grenada							
1971-1980	5.7	4.3	-0.1	1.5	75.9	-2.1	26.2
1981-1990	5.7	7.4	0.2	-2.0	132.2	3.4	-35.6
1991-2000	3.7	4.1	0.2	-0.5	108.1	6.1	-14.2
2001-2007	2.1	2.9	0.2	-1.1	141.7	11.6	-53.3
Saint Kitts and Nevis							
1971-1980	5.9	4.0	-0.1	2.0	68.4	-2.0	33.6
1981-1990	5.5	4.8	-0.1	0.8	88.2	-1.9	13.7
1991-2000	4.2	3.9	0.2	0.1	93.4	4.9	1.7
2001-2007	3.5	3.8	0.6	-0.8	106.4	16.6	-23.0
Saint Lucia							
1971-1980	5.1	3.7	0.5	0.9	73.4	9.4	17.2
1981-1990	7.6	4.4	1.1	2.1	58.0	14.0	28.0
1991-2000	3.1	5.5	0.9	-3.3	174.6	30.2	-104.8
2001-2007	2.9	2.4	0.7	-0.3	85.7	25.8	-11.4
Saint Vincent and the Grenadines							
1971-1980	3.2	1.9	0.4	0.8	60.8	12.9	26.3
1981-1990	6.1	2.9	0.9	2.2	48.6	14.4	37.0
1991-2000	3.2	3.0	0.6	-0.4	93.5	19.5	-13.1
2001-2007	4.3	3.1	0.6	0.7	70.7	14.1	15.2

Source: Author's calculations.

^a Average annual growth rate.

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