

# **ECONOMIC GROWTH IN A SMALL DEVELOPING COUNTRY: THE CASE OF BARBADOS\***

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# **Economic Growth in a Small Developing Country: The Case of Barbados**

## **1 Introduction**

In recent years, there has been a burgeoning of empirical research into the factors affecting economic growth in both developed and developing countries. This research interest was initiated by developments in ‘endogenous growth theory’ which emphasizes the role of technological progress and innovation and human resource development (education and training) in the growth process. Several recent assessments have been made of the empirical literature on economic growth [see, for example, Temple, 1999; Kenny and Williams, 2001]. Several other factors have been identified in the empirical studies of several countries: financial development, political stability/democracy, openness, social capital, government investment, among others [see also Barro, 1997].

The resurged interest in economic growth has given a fillip to development economics as economists seek to understand the factors which influence the development process [see, for example, Barros, 1993; Pio, 1994 and Ruttan, 1998]. For example, several economists in developing countries and international institutions have been examining the impact of global change on the economies of small states [see, for example, Commonwealth Secretariat/World Bank, 2000]. Early work on small countries focused on issues of independence and viability and later on sustainability, and more recently, on vulnerability and volatility [see Demas, 1965, Jalan, 1982 and Kennes, 2000]. As the number of small states increases over time, there will be a pressing need to study the impact which country size has on the growth process [see, Alesina et al, 2000].

Some research work has sought to examine the economic growth process in small states in order to determine if the growth process in these states differs from that in large states [see Banerjee, 1982; Looney, 1989; Milner and Westaway, 1993; Armstrong and Read, 1998; Easterly and Kraay, 2000]. Milner and Westaway (1993) concluded that “there is no obvious link between medium-term growth performance and a range of attributes of country size and performance” (p. 211). Armstrong and Read (1998) noted the “lack of

empirical support for the *a priori* expectation of a significant negative correlation between small size and growth” (p. 22). Easterly and Kraay (2000) have found that there is “no significant difference in growth performance between large and small states” (p. 204). These studies in effect conclude that small size does not *per se* inhibit the growth performance of a country. The important issue therefore becomes one of identifying the main factors which have contributed to the high growth performance of selected small countries.

Empirical research undertaken in the 1980s on the growth process in small developing countries indicates that there are certain key variables which positively affect the process, namely, exports, investment in physical and human capital and capital inflows [see Banerjee, 1982; Manning, 1982; Gould and Ruffin, 1995; Kim and Kim, 1994 and Looney, 1989]. In addition to these variables, other factors must be taken into account when assessing the economic growth of a country: previous policy decisions relating to key variables, the social and political environment and the quality of the institutions which effect major policy decisions.

One small developing country which has performed well over the past four decades (1960-2000) is Barbados. Since the introduction of the UNDP’s Human Development Index in 1990, Barbados, with a population of 269,100 persons in 2000, has been the highest ranked country in the Latin American and Caribbean region. Over the period 1960 to 2000, the real GDP at factor cost increased from Bds \$316.1m (US\$ 158.1m) to Bds \$982.5m (US \$491.3m), that is, an average annual growth rate of 2.9 percent (using the official exchange rate of Bds \$2 to US \$1). Real GDP per capita tripled over the period, from Bds \$1356.25 (US \$678.13) in 1960 to an estimated Bds \$3651.05 (US \$1825.53) in 2000. This represents an average annual growth rate of 2.5 percent. Over the period, Barbados recorded a very low population growth rate of 0.35 percent per annum.

There has been a general upward trend in the real GDP over the study period with three major periods of decline in the economy: 1974-75 (associated with commodity and oil price increases), 1981-82 and 1990-92 (both associated with recessions in the international

economy). Changes in real GDP and real GDP per capita over the past four decades can be attributed to several short and long-term economic and non-economic factors.

The growth of real GDP and real GDP per capita in Barbados compared favorably with that of other Caribbean countries, especially during the 1960s. While Barbados' growth performance was above the average for Latin America and the Caribbean during the 1960s, there was some slippage during subsequent decades [see Table 1]. Throughout Latin America and the Caribbean, there was a general slowdown in the rate of growth over the four decades. Barbados exhibits such a pattern in its growth performance.

The key issue is identifying what factors have accounted for the growth and development of the Barbadian economy over the 1960-2000 period, given its small size, little or no natural resources and openness to international trade and investment. Although a few descriptive studies of the economy exist (Worrell, 1982; Howard, 1989), there has been little rigorous empirical analysis of the growth process.

The main purpose of this study is to identify the main factors which would have contributed to the relatively good growth performance of Barbados over the 1960-2000 period. The study draws on the general literature on economic growth to identify factors which are most likely to affect the growth process in a small developing country. These factors are then examined within the context of Barbados.

**Table 1**  
**Average Annual Growth Rates of Real GDP and Real GDP per capita**  
**for Selected Countries in the Caribbean**  
**1960-1997 (%)**

Country	1961-1970		1970-1980		1980-1990		1990-1997	
	Real GDP	Real GDP per capita	Real GDP	Real GDP per capita	Real GDP	Real GDP per capita	Real GDP	Real GDP per capita
Bahamas	6.8	2.4	n.a.	n.a.	2.8	0.7	0.7	-1.0
<b>Barbados</b>	<b>6.1</b>	<b>5.7</b>	<b>2.8</b>	<b>2.4</b>	<b>1.5</b>	<b>1.2</b>	<b>0.5</b>	<b>0.2</b>
Belize	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	4.4	2.0
Guyana	3.6	1.1	1.6	0.8	-3.1	-3.5	6.5	6.4
Jamaica	5.1	3.7	0.1	-1.2	1.5	0.4	1.0	0.4
Suriname	5.6	3.0	3.7	3.9	-1.2	-2.2	-0.8	-2.2
Trinidad and Tobago	4.2	2.1	5.1	3.9	-2.1	-3.4	1.9	0.9
Latin America and the Caribbean	5.4	2.6	6.0	3.3	1.6	-0.4	3.1	1.6

Source: IADB: *Economic and Social Progress in Latin America* (various issues)

The remaining sections of the study are as follows: in section 2, an analytical history of the economic growth process in Barbados over the 1960-2000 period is presented. In section 3, an econometric analysis of the growth process is undertaken in order to determine the relative importance of the quantifiable factors which would have affected economic growth. In section 4, the main policy initiatives that can be adopted to boost the growth process in Barbados are discussed.

## **2 An Analytical History of the Growth Process: 1960-2000**

### **2.1 Historical Background**

The successful introduction of sugar cane cultivation in the 1640s set the tone for the political, social and economic development of Barbados for over three hundred years. The first phase of sugar production (1643-1648) was undertaken primarily with white indentured servant labour mainly from the United Kingdom. From 1650, the demographic structure of the country began to change with black slave labour replacing white indentured labour [see Beckles and Downes, 1987]. It is estimated that in the late 1680s, the sugar industry had absorbed approximately 80 percent of the island's arable land, 90 percent of its labour force and accounted for 90 percent of export revenue. The dominance of the sugar economy in Barbados led commentators to indicate that it was a classic case of an 'export-propelled monocultural economy' [Seers, 1964; Best, 1968]. The basic structure of the economy remained intact until the 1840s when slavery was abolished.

Although ex-slaves left the plantations after the abolition of slavery to establish small-scale operations, the sugar industry still pervaded economic activity in the country. The industry faced severe competition from European beet sugar producers in the late 1890s, but was able to recover and remain a dominant force in the economy up to the late 1960s. During the crisis faced by the sugar industry, persons were able to find alternative employment in other countries. Given the high population density of the country, the level of economic activity was insufficient to absorb the total labour force. Emigration and remittances were important elements in the economic history of Barbados between 1900 and 1965. Major waves of emigration to Panama occurred during the 1904-14 period and to the United Kingdom between 1955 and 1961 [see Conway, 1997].

The events of the 1930s provided an important watershed in the political, social and economic history of Barbados. The Great Depression of 1929-32 caused a drop in sugar prices and a slump in the value of exports. Since government revenue depended largely on sugar exports, there was a consequential fall in government revenue and hence government expenditure. Social services (housing, education, health, etc) suffered. Unemployment increased during the depression years, and the populace reacted with a series of riots which prompted the colonial administrators to establish a commission of enquiry. The recommendations of the commission led to the formation of political parties, the introduction of elections and the formation of trade unions.

During the 1940s, the British colonial government was preoccupied with Second World War (1939-45) efforts and hence little was done to improve the Barbadian economy. Most of the attempts to deal with the socio-economic conditions in Barbados came after the end of the war with the introduction of ministerial government, development planning and attempts to deal with the high dependence on the sugar industry.

The period 1946 to 1960 can be regarded as one of economic and political transition. Elections were held in 1946 under a wider franchise than before. The black-dominated political party, the Barbados Labour Party (BLP) won the elections and set about political and institutional change as a means of attaining economic change. The economy was largely controlled by a white agro-commercial elite who dominated the sugar industry and the distribution sector. Elections held in 1951 under adult suffrage were again won by the BLP. During the period 1946 to 1961, while the BLP administered the affairs of the government, several institutions were established to diversify the economic structure of the country.

Formal development planning was introduced in 1946, with the preparation of the “*Ten Year Development Plan For Barbados: Sketch Plan of Development 1946 to 1956*”. This long-term plan was followed by two medium-term plans: 1952 to 1957 and 1955 to 1960. The focus of these plans was on the development of the social infrastructure, namely, health, education, water and housing. These public sector projects were seen as vital to the

economic transformation of the country. The two medium-term plans however showed signs of government's intention to deal with the dominance of the sugar industry. The plans contained statements which signaled the government's intention to promote the manufacturing and tourism sectors by encouraging direct investment. This approach was in keeping with the suggestions made by Lewis (1950) in his articulation of an alternative path of development for Caribbean countries [see also Downes, 1985].

The passing of the Barbados Development Act 1955 and the establishment of the Barbados Development Board in 1957 provided the main institutional mechanism for driving the diversification program. The Board was charged with promoting industrial development and financing small-scale enterprises and with the expansion of hotels. Fiscal incentives (duty-free imports for inputs, tax holidays, accelerated depreciation charges, reduced rent, etc) were offered to promote local and especially foreign investment into Barbados. A Tourist Board was established in 1958 to promote and develop the tourism sector. The incentives granted to investors were designed to encourage foreign investment since domestic savings and investment were perceived by the Government as being inadequate to meet the development effort which was needed. Furthermore, the largely risk-averse agro-commercial elite were not inclined to enter the manufacturing and tourism sectors.

Government's approach to development planning was (and has remained) largely indicative, that is, offering fiscal and other incentives to the private sector, in order to promote investment and growth. The government saw its role as providing the institutional, physical and policy framework within which economic activity would take place.

During the 1950s, a serious effort was made to collect data on various aspects of the economy with the establishment of the Barbados Statistical Service in 1956. Data collection was critical to the monitoring of economic progress and the evaluation of development plans.

The building blocks for the ‘economic modernization’ of Barbados therefore began in the late 1950s. It was generally thought that the economy could not continue to be highly dependent on the export-oriented sugar industry for growth, employment and foreign exchange. A new administration of government [the Democratic Labour party (DLP), formed by former members of the BLP] took office in 1961 and sought to hasten the process of economic diversification and growth. Development planning became an important aspect of economic policy along with short-term budgeting to ensure macroeconomic stability in the economy [see Downes, 1989].

An assessment of development planning since the 1960s shows a number of development policy goals that were pursued by the government:

- i. the diversification of the productive structure of the economy to reduce the heavy reliance on the sugar industry for employment, foreign exchange and government revenue. From the 1640s to the 1960s, the sugar industry dominated the economy and prospered under a protective imperial preferential arrangement;
- ii. the creation of new employment opportunities through the diversification process, hence reducing the high levels of un- and under-employment;
- iii. the provision of social services – health, sanitation, education, housing, transport and social security – in order to eradicate poverty and deprivation in the country;
- iv. the achievement of balanced and sustainable economic growth and development;
- v. the development of the human resource base of the country through training and education in order to boost productivity and competitiveness.

During the 1960s (independence was granted in 1966), the development strategy focused on increasing economic growth through the diversification of the economy and the promotion of new exports (tourism and manufacturing). The strategy shifted to non-economic growth objectives between the 1970s and the 1990s with a focus on poverty alleviation, social development and employment creation. In recent years, the concern has been promoting growth and development in a changing global economic environment through productivity growth.

The changes in real GDP and real GDP per capita have been accompanied by other changes in the economy, namely, the distribution of economic activity among various sectors, changes in the population and the labour force and the external environment.

## 2.2 Growth and Structural Change

The macroeconomic performance of Barbados can be examined through two basic aggregates: real domestic product (GDP) and real GDP per capita. Both indicators show that Barbados made significant advances over the period 1960 to 2000 [see Table 2]. The low differential between the growth rates of real GDP and real GDP per capita indicates that the population growth rate was very low over the period (i.e., 0.37 percent per annum).

*Table 2*  
**Levels of Real GDP and Real GDP per capita, 1960-2000**

Year	Real GDP (Bds \$m at 1974 prices)	Real GDP per capita (Bds \$)
1960	316.1	1356.07
1965	441.9	1803.67
1970	627.7	2620.88
1975	628.1	2552.21
1980	802.3	3216.92
1985	786.9	3061.87
1990	879.1	3370.78
1995	844.7	3194.78
2000	982.5	3156.06

Source: Barbados: Economic and Social Reports, various issues.

The low population growth rate reflects the efforts at family planning and mass education which began in the 1950s with the establishment of the Barbados Family Planning Association. The general fertility rate (the number of births per 1000 women aged 15 to 44) declined from 105 in 1970 to 64 in 1990 and to 59 in 2000. This change reflected a decline in the crude birth rate of 21 births per 1000 persons in 1970 to 17 births per 1000 in 1990. In 1960, the birth and infant mortality rates were 34 per 1000 and 60 per 1000 live births, respectively. By the year 2000, the birth rate was estimated at 14 per 1000, while the infant mortality rate was 25.8 per 1000 births. In effect, Barbados has one of the lowest population growth rates in the world.

Although the trends in real GDP and real GDP per capita were generally upwards over the 1960 to 2000 period, an analysis of sub-periods indicate some unevenness in the growth paths [see Table 3] The period 1960 to 1970 was one of relatively high economic growth. Real GDP grew at an average annual rate of 6.8 percent per annum. Although there was an effective devaluation of the Barbadian (Eastern Caribbean) dollar, which was tied to the pound sterling, in 1967, economic growth was high due to favourable export market for sugar especially during the 1965-70 period.

**Table 3**  
**Growth Rates of Real GDP and Real GDP per capita,**  
**1960-2000**

Period	Average Annual Growth Rates (%)	
	Real GDP	Real GDP per capita
1960-1965	2.96	2.60
1965-1970	7.27	7.76
1970-1975	0.01	-0.53
1975-1980	5.02	4.74
1980-1985	-0.39	-0.98
1985-1990	2.28	1.98
1990-1995	-0.80	-1.07
1995-2000	3.07	2.71

Source: Barbados: Economic and Social Reports, various issues.

Economic growth slowed during the decade of the 1970s as real GDP and real GDP per capita grew by 2.5 and 2.1 percent per annum over the 1970-80 period. The sub-period 1970-75 was particularly poor as economic growth stagnated. The poor economic performance could be attributed to the world commodity shortage that brought significant increases in the prices of agricultural products and the 'oil crisis' of 1973-74 that resulted in the quadrupling of oil prices. The short run macroeconomic consequence of the increase in international commodity prices was a reduction in domestic and foreign demand and hence a fall in aggregate domestic production.

The economy recovered from the 'oil shock' in the late 1970s as reflected in the increase in the average annual growth rate of 5 percent over the 1975-80 period. The recovery was mainly due to a reduction in import prices and an increase in tourism activity. The recovery was however short-lived as a rise in oil prices in 1979 sent the international economy into a short recession in the early 1980s. Economic activity declined in the

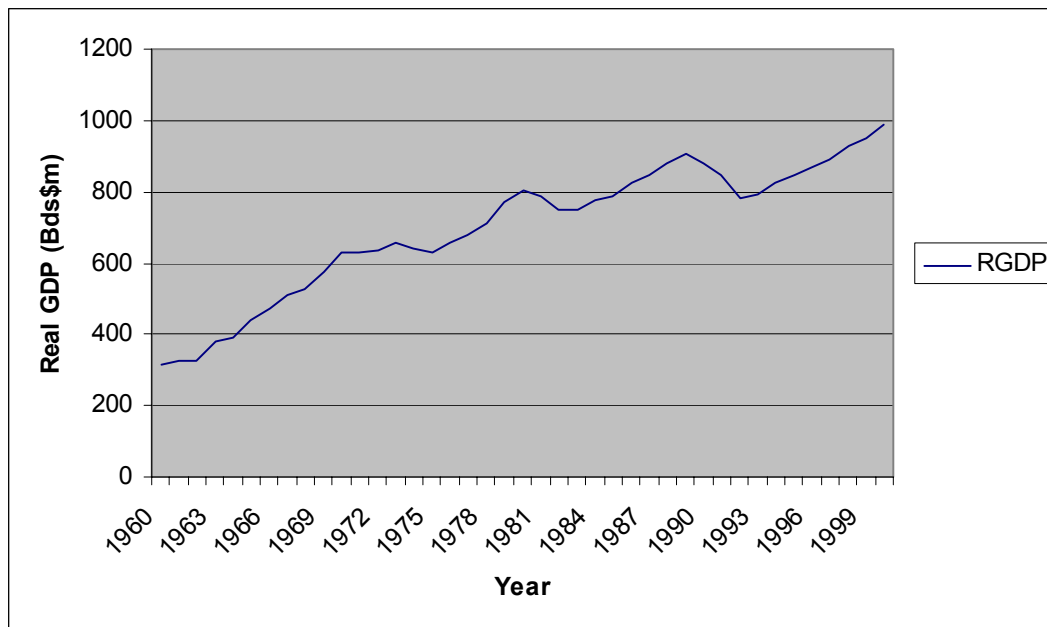
tourism and manufacturing sectors as the average annual growth rate was negative for the 1980-85 period.

Economic activity during the early 1980s was adversely affected by several events. First, export earnings from sugar declined as a result of the reduction in the US import quota from 20,000 tonnes in 1980 to 5000 tonnes in 1988. Secondly, the decline in economic activity in the Caribbean Community (CARICOM) severely affected regional manufacturing exports. Finally, the greatest impact on the economy was the closure of major electronic components assembly operations between 1983 and 1986 due partly to the global over-production of computer chips and relatively high operating costs in Barbados. In 1986, there was a marked increase in economic activity as the economy recorded a growth rate of approximately 5 percent, due mainly to the expansion of government's capital works program. Changes in the income tax structure resulting in a rise in real disposable income, and hence aggregate demand, contributed partly to the high growth rate in 1986. The economy made a modest recovery during the 1985-90 period as the average annual growth rate rose to 2.3 percent. The tourism sector was particularly buoyant during the 1986-89 period recording an average growth rate of 10 percent per annum. In 1990, there was a slump in all the major sectors except in non-sugar agriculture.

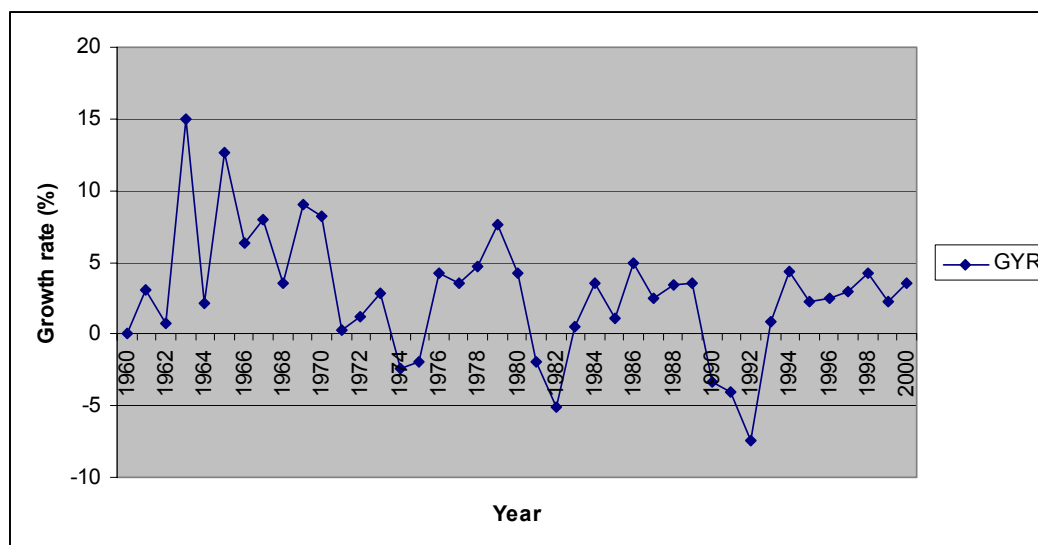
The 1990s was also characterized by low growth rates in real GDP and real GDP per capita. The period 1990-95 saw a significant decline in economic activity which forced the Government to seek financial assistance from the International Monetary Fund (IMF) and the World Bank. Real GDP declined from Bds \$909m in 1989 to Bds \$784.1m in 1992, while real GDP per capita fell from Bds \$3492.50 in 1989 to Bds \$2932.31 in 1992. The decline in output was accompanied by significant fiscal and balance of payments (BOP) deficits thus forcing the Government to implement a structural adjustment program incorporating both stabilization policies to curb aggregate demand and structural reform programs to boost aggregate supply [see Downes, 1994]. Since 1992, there has been a steady recovery in economic activity as the real GDP increased from Bds \$784.1m in 1992 to Bds \$982.5 m in 2000.

The analysis of real GDP and real GDP per capita over period 1960-2000 would indicate that although there were factors accounting for the long-term trend in output (i.e., an average growth rate of 2.9 percent), the pattern of growth during the period was affected by several events. A periodisation of the growth path shows significant fluctuations over the four decades and a general slowing down of the average annual growth rate [see Figure 1]. External events have significantly affected domestic activity in such a small, open developing economy. The commodity and oil price increases of the 1970s and the recessions in the USA in 1979-83 and 1989-91 had an adverse impact on the Barbadian economy. The growth performance has been dependent, to a large extent, on the performance of the export sectors – sugar, light manufacturing and tourism.

*Figure 1(a): Real GDP for Barbados 1960-2000 (Bds #m)*



**Figure 1(b): Growth Rate of Real GDP for Barbados 1960-2000 (%)**



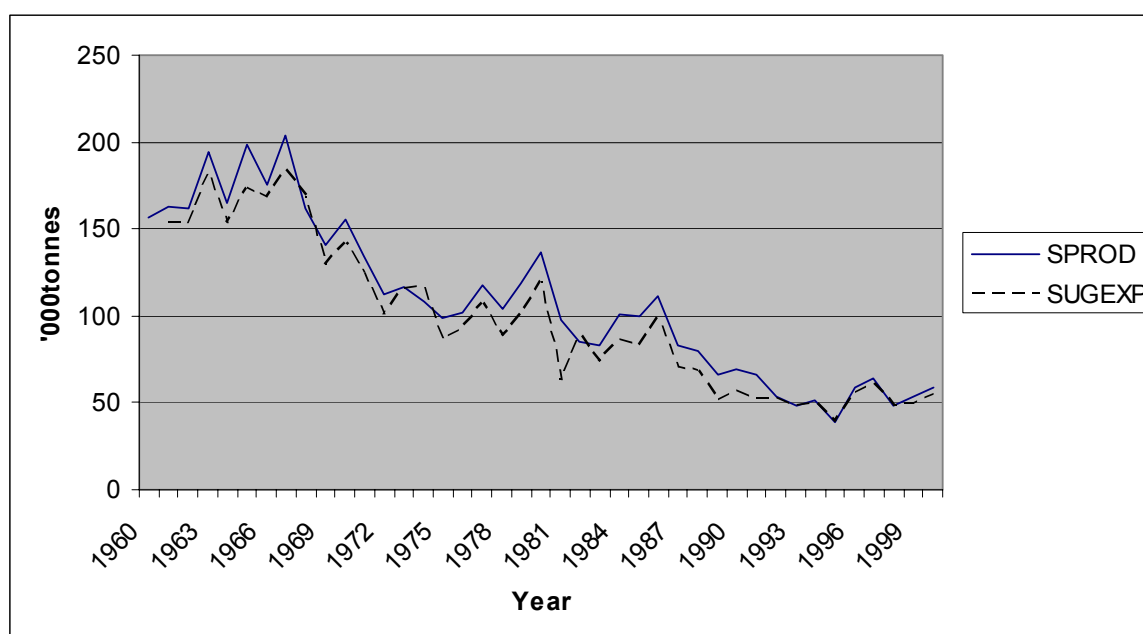
The recovery time, that is, the time taken for real GDP to return to its level before a shock, lengthened over the three major shocks. In the case of the 1974 shock, the recovery time was 3 years, while the 1981 and 1990 shocks involved a recovery time of 7 and 9 years, respectively. The longer recovery time may have been associated with the intensity of shocks and the delays in implementing adjustment measures. In both the 1981 and 1990 cases, political elections were due and held in these years. The same parties were returned to office after these elections and so they might have delayed taking corrective measures until after elections. The government subsequently sought assistance from the International Monetary Fund (IMF) to deal with the effects of these shocks.

Development policy and planning have been directed towards diversification of the production structure since the 1950s. While structural change in an economy can result from 'natural forces' such as changes in consumer preferences, technical change and producer behaviour, deliberate government policy plays a very important role in the process. Underlying the growth process in the economy are significant inter- and intra-sectoral changes. The growth of aggregate output is a combination of shares of various sectors' output in total output and the growth rates of these sectors. The growth of aggregate output can also be assessed in terms of the growth rates of individual sectors, the shares of labour employed in the individual sectors and the labour productivity of

individual sectors relative to overall labour productivity. As resources are shifted from low to high labour productivity sectors, there is an increase in the overall rate of growth.

A key feature of the change in the structure of production in Barbados over the 1960-2000 period was the decline in the contribution of the agricultural sector (especially sugar agriculture) to total production. The share of sugar agriculture in total GDP declined from 20 percent in 1965 to 2.6 percent in 2000, while the contribution of non-sugar agriculture fell from 6.3 percent to 3.7 percent over the period. There has been a general decline in the production and export of sugar over the past four decades [see figure 2]. Manufacturing and tourism have been the main targets of the government's diversification program. Over the 1960-2000, the share of manufacturing in total production varied between 9 and 12 percent, while the tourism sector (i.e., hotels and restaurants) recorded an increase in its contribution to GDP from 8.3 percent in 1970 to 15 percent in 2000 [see Table 4]. Both the manufacturing and the tourism sectors have benefited from fiscal incentives granted by the Government [see Cox, 1982; Phillips, 1982; Downes, 1985]. Foreign investment has played an important role in the development of these sectors. By offering fiscal incentives such as accelerated depreciation allowances, duty-free importation of raw materials and capital equipment and subsidized rental accommodation, the government expected an inflow of foreign investment to supplement domestic capital formation. By lowering the unit costs of production, Barbados would become an attractive country in which to invest capital and hence create employment opportunities.

**Figure 2: The Production and Export of Sugar 1960-2000 (tonnes)**



In the light-manufacturing sector, foreign-owned companies have been the main exporters of goods and employers of labour services (i.e., garments, chemicals, electronic components, data processing). In the tourism sector, large hotels are owned primarily by foreign concerns.

**Table 4**

**Sectoral Distribution of Real GDP, 1965-2000**

%

Sector	1965	1970	1975	1980	1985	1990	1995	2000
Agriculture: Sugar	19.9	10.55	9.55	7.18	5.39	5.35	1.93	2.5
Non-Sugar	6.3	4.05	3.8	3.12	4.19	4.04	4.29	3.7
Mining and Quarrying		0.15	0.2	0.53	0.93	0.74	0.86	0.8
Manufacturing	10.2	8.32	10.3	11.82	10.39	9.98	9.87	9.0
Electricity, Gas, Water		1.23	1.5	2.09	2.72	2.99	3.54	3.8
Construction	9.4	7.31	6.6	7.03	6.34	6.82	6.69	7.3
Wholesale/Retail Trade		19.56	18.2	19.52	19.58	19.52	29.22	20.1
Tourism		8.27	9.3	13.83	11.51	14.42	15.19	15.5
Transport/Storage/Comm	7.7 <sup>a</sup>	7.10	7.2	6.19	7.46	7.14	8.17	8.2
Business/General Services	22.5 <sup>b</sup>	19.81	14.2	15.96	17.89	17.19	17.16	16.8
Government Services	11.1	13.65	15.0	12.71	13.58	13.67	13.18	12.2
Other	14.9							
<b>Total</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>

Notes: <sup>a</sup> -Transport/Public Utilities; <sup>b</sup> - Distribution; <sup>p</sup> - Provisional

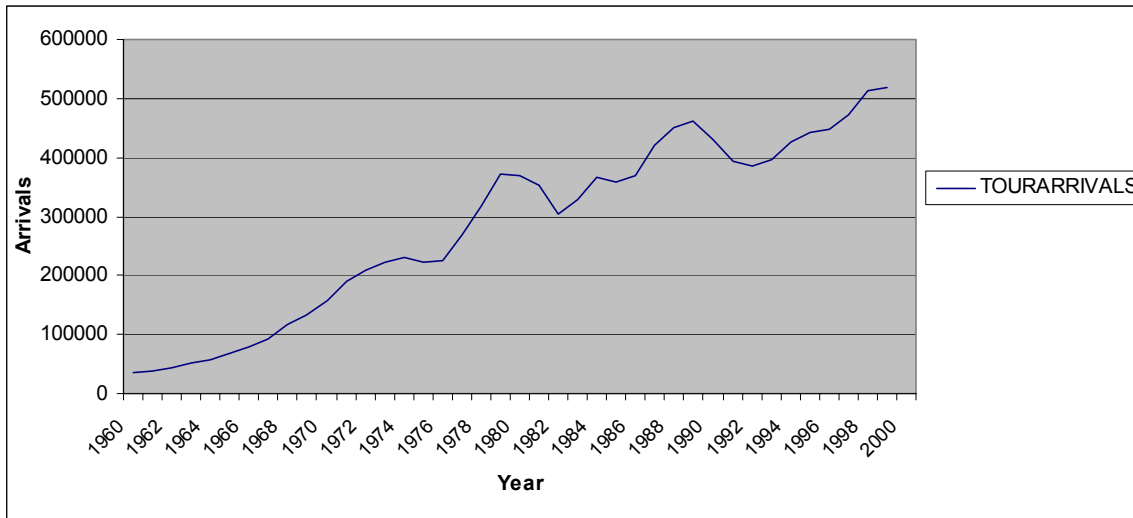
Source: Barbados Economic and Social Report, 1979, 1980, 2001

Central Bank of Barbados: Barbados Economic and Social Report, 2000

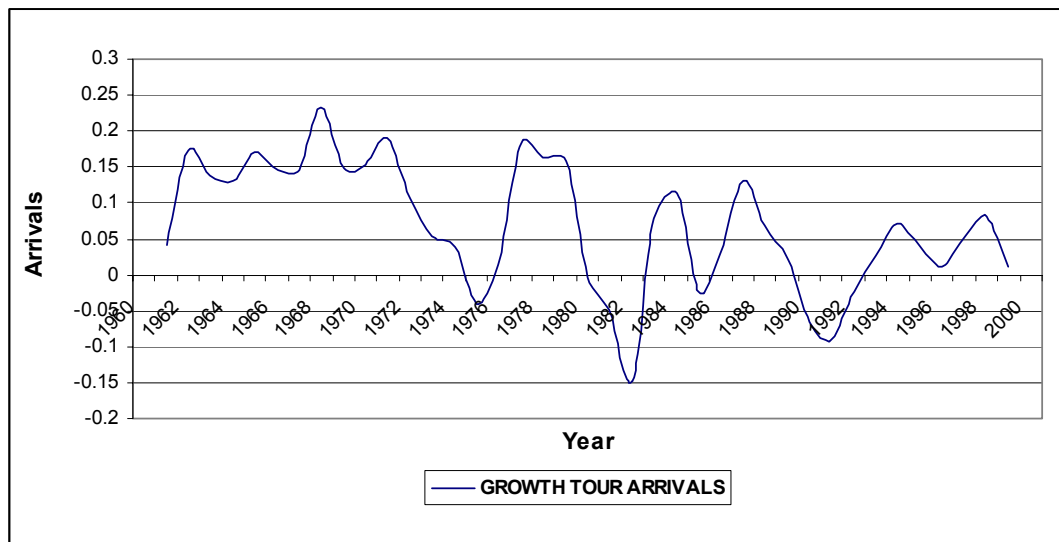
The services sector (distribution, tourism, business and Government) has increased significantly since the 1960s. In 1965, this sector accounted for 40 percent of the GDP, while in 2000, it accounted for 65 percent. The wholesale/retail trade (distribution) sector has been the largest sector over the study period, accounting for approximately 20 percent of total output. In recent years, the Government has sought to actively promote new tourism services (e.g., eco-tourism, sports tourism), financial, business and professional services.

In the tourism sector, long-stay visitors tend to originate from the UK and Europe, while short-stay cruise ship visitors originate from the USA. Over the period 1960 to 2000, stay-over tourist arrivals increased from 35,535 to 545,027 persons, that is, an average annual growth rate of 7.1 percent. Tourist arrivals have therefore doubled the population of Barbados thereby raising questions about the carrying capacity of the country and the environmental impact of tourism-related activities. Cruise-ship passenger arrivals have also grown significantly, from 51,593 in 1966 to 533,278 in 2000. The bed capacity in hotels increased significantly over the 1965 to 2000 period. In 1965, total hotel-bed capacity was estimated at 3,250, while in 2000, the estimate was 12,240, that is, an annual average growth rate of 3.9 percent. This long term trend however masked the rise and fall of hotel bed capacity over the period. Between 1965 and 1982, hotel bed capacity rose from 3,250 to a peak of 14,400 (that is, an average annual growth rate of 9.2 percent). By 2000, hotel bed capacity had declined to 12,240. The decline in hotel bed capacity reflects the general declining trend in the growth rate in long-stay tourism over the study period [see Figure 3].

**Figure 3(a): Long-stay Arrivals 1960-2000 (number)**



**Figure 3(b): Growth Rate of Tourist Arrivals (%)**



Carey (1989) noted that between 1979 and 1984, overbuilding occurred among the luxury hotels in Barbados. The tourism sector has seen a switch from long-stay visitors to cruise ship visitors. The average length of stay has remained relatively constant over the study period ranging between 6.3 and 9.8 nights. The period 1974 to 1982 recorded higher than average lengths of stay with a range of 8.2 to 9.8 nights. Long-stay visitor arrivals, especially from the UK and Europe have been partly affected by the appreciation of the Barbados dollar vis-à-vis the pound and the euro. The nominal exchange rate between the

pound sterling and the Barbadian dollar declined from Bds \$4.80 for £1 (Bds \$1 = £0.20) in 1960 to Bds \$2.98 for £1 (Bds \$1 = £0.34) in 2000. In the case of the euro, the rates were Bds \$2.89 for ECU 1 in 1979 and Bds \$1.85 for ECU/EURO 1 in 2000.

Barbados is regarded as a mature tourist destination having developed its industry much earlier than other Caribbean destinations [Whitehall and Greenidge, 2000]. The general downward trend in the growth of tourist arrivals has been attributed to changing airfares, the high degree of substitutability of Barbados' tourism product, variations in the exchange rate for the Barbados dollar and political instability and natural disasters in the Caribbean (i.e., negative externality for Barbados) [see Roman and Blenman, 1987; Hall, 1989].

In recent years, the Government has been actively promoting the country as a centre for the establishment of international financial and business services. Legislation has been passed to enable the establishment of international business companies (IBCs), foreign sales corporations (FSCs), exempt insurance and management companies, offshore banks and societies with restricted liability. By the end of 2000, there was an estimated 7468 offshore companies licensed in Barbados with approximately 91 percent of them being IBCs and FSCs. The net operating surplus of offshore banks increased nearly six-fold between 1992 and 1999. In 1992, net operating surplus was estimated at Bds \$252.7m (9.3 percent of GDP at factor costs), while in 1999, the estimate was Bds \$1383m (33.4 percent of GDP). This sector has however been the target of international scrutiny with regards to tax regulations and money laundering.

The development of the telecommunications system and other facilities has been integral to the growth of the 'new services' sector. Information services (data processing, software development) also expanded in the 1990s. For example, employment in Barbados Investment and Development Corporation (BIDC)-assisted enterprises providing information services increased from 1123 in 1989 to a peak of 2972 in 1997. Over the past three years, there has been a slight decline in such information/data processing services.

The evidence suggests that there has been moderate growth and significant structural change in the economy of Barbados since the 1960s. Real GDP increased by a modest 2.9 percent per annum over the 1960 to 2000 period. There have been periods of recession in the economy induced primarily by external factors and, in some cases, compounded by domestic policy responses. The economy has recorded significant inter- and intra-sectoral changes since the 1950s. Agricultural production has declined in importance, while the services sector has become dominant. Barbados has therefore made the transition from an agricultural-based economy (i.e., sugar production) to a services-based economy (i.e., tourism, financial and general business services). Although there are difficulties in aligning sectoral output and employment data and measuring output in the services sector, the available evidence suggests that the shift to a services-oriented economy has been accompanied by a fall in labour productivity in the services sector. The main services sub-sectors (tourism, government and general business services) displayed a fall in the output-employment ratio over the period, while agriculture/fishing and manufacturing showed an increase in the ratio. In addition, there has been a considerable expansion in the number of enterprises (especially small operations) since the 1960s. The Government's role has been largely parametric, in that it has provided the necessary policy and institutional framework for the private sector to operate. The key question that needs to be asked is what factors underlie the process of growth and structural change in Barbados over the period.

### **2.3 Explaining Barbados' Growth Performance: A Literature Review**

The key issue relating to this study is what factors have accounted for the growth and development of the Barbadian economy over the past four decades, given its small size ( a population of 269,100 and a land area of 431 square kilometers), little or no natural resources (only sand, sea soil and small deposits of oil and natural gas) and openness to international trade and investment. Several descriptive studies have been undertaken in recent years [Worrell, 1982; Howard, 1989; Wickham, 1997; Blackman, 1998; Downes and Carter, 2000]. These studies have qualitatively identified a number of factors which may account for the success of Barbados over the four decades: investment in human capital (education and training, health and nutrition), a well-developed social infrastructure (roads, ports, telephones and telecommunications), political stability and the rule of law

(i.e., good governance), good social capital (trust and social networks), sound political and economic management, sheer 'economic luck' with respect to the trading arrangements for sugar and the ability of its people to migrate to more developed states and the lack of social disharmony and conflict. Given the qualitative nature of some of these variables, it is difficult to determine the relative importance of the various variables over time and possible interaction amongst them.

Recently, attempts have made to use quantitative methods to identify economic determinants of economic growth. Boamah (1997) used a growth accounting framework to analyze economic growth over the 1963 to 1993 period. He found that the capital input accounted for 31 percent of real GDP growth, the labour input for 19 percent and the 'residual' factor for 50 percent. When the labour input was adjusted to consider 'human capital widening' (i.e., human capital derived from maintaining the average level of schooling of the labour force) and 'human capital deepening' (i.e., the increase in the educational level of the labour force), he found that 'human capital widening' accounted for 19 percent of real GDP growth and 'human capital deepening' for 29 percent of the growth. The adjustments increased the contribution of human capital input to 48 percent and reduced the 'residual' to 20 percent.

Wood (1993) examined the relationship between 'financial development' and economic growth in Barbados over the period 1946-90, using causality tests. He found that over the period 1946-90, a 'bi-directional' causal relationship existed between financial development (as measured by the ratio of broad money (M2) to real GDP) and economic growth. He noted that the bi-directional relationship was particularly strong during the 1969-80 period since financial development did not affect economic growth during the 1946-68 period when the money and capital markets were grossly underdeveloped. Craigwell et al (2001) revisited the 'finance-growth nexus' for Barbados and found that over the period 1974 to 1998, there was a 'one-way' causal relationship from 'financial development' (using three measures) to economic growth. There was no evidence of a 'bi-directional' relationship as identified by Wood (1993).

Greenidge and Peter (1999) also used causality testing to examine the relationship between exports and real GDP over the 1970-1997 period. They found that there was no causal relationship between *aggregate* exports and real GDP. They however identified long-run cointegrating relationships between output and the export of services and output and sugar exports. A bi-directional long-run relationship was found between output and sugar exports.

Williams and Daniel (1991) undertook a regression analysis of the factors affecting economic growth in Barbados over the 1972-1986 period. They found that gross fixed capital formation, exports and government debt as a proportion of GDP had positive effects on economic growth, while government size (the ratio of government expenditure to GDP) and special interest group activity (i.e., the ratio of government employment to total employment) had a negative impact on growth.

Lewis and Craigwell (1998) used the regression approach to identify the factors influencing economic growth over the 1960-91 period. They reached the following conclusions:

- i. Real GDP per capita, real capital stock per capita, a measure of human capital, the ratio of public to private capital stock, per capita real government consumption and the short-term interest rate formed a cointegrating or long-run equilibrium relationship;
- ii. Physical capital and a measure of human capital had a positive impact on economic growth;
- iii. The ratio of government consumption expenditure to output (a measure of government's distortionary policies); the ratio of public to private capital stock and the short-run interest rate had a negative impact on economic growth.

Belgrave and Craigwell (1997) found a statistically significant effect of the share of government capital expenditure on housing, community development, health and agriculture in total government expenditure on economic growth over the period 1969 to 1992. The share of government expenditure on education was however insignificant.

The World Bank (1994) undertook a cross-country analysis of economic growth of Caribbean countries (including Barbados), covering the period 1979-1990. This growth accounting exercise indicated that factor accumulation (capital and labour) accounted for 32 percent of real GDP growth, while total factor productivity growth (the residual factor) accounted for 68 percent. Given the large value of the residual, the study concluded that changes in total factor productivity reflected technical change. The regression analysis found that exports and domestic investment had statistically significant positive effects on economic growth, while foreign investment and the ratio of government consumption expenditure to GDP had negative effects on growth.

In summary, the use of quantitative techniques (growth accounting and regression analysis) to analyze the growth experience of Barbados (and other Caribbean countries) points to the role of human capital development, domestic capital investment, financial development and exports in promoting economic growth in a small developing country such as Barbados. The distorting effect of government policies can however retard economic growth. These studies have however excluded the influence of non-economic variables in the growth process.

#### **2.4 Explaining Economic Growth in Barbados: A Further Analysis**

The review of the limited quantitative studies that have been undertaken on economic growth in Barbados highlights a number of key factors influencing the growth process. In this section, a more in-depth analysis is undertaken, with particular attention being paid to factors such as investment in human capital, investment in physical capital, the structure and performance of the export sector, the stability and transparency of institutions and the quality and consistency of macroeconomic policy. This approach enriches the quantitative analysis by examining in more detail the factors affecting the determinants of economic growth.

### *2.4.1 Investment in Human Capital*

It is well recognized in the literature on small developing countries, that the quality of the human resource is critical to the growth and development process [see Jalan, 1982; Demas, 1965]. Given the limited number of persons needed to produce a range of goods and services, these countries have to focus on increasing the quality of the labour force which in turn enhances productivity and growth. The government of Barbados recognized this relationship and since the 1950s has invested significantly in education, training, health and nutrition. In 1960/61, the government's current expenditure for education was Bds \$4.0m, while capital expenditure was Bds \$0.25m. By 1999/2000, current expenditure was Bds \$305.2m and capital expenditure was Bds \$29.7m (see Table 5). These figures represent an average annual growth rate of 11.8 percent and 13.0 percent, respectively. If the inflation rate of 6.6 percent per annum is used as a deflator, then the real increase in current expenditure on education was 5.2 percent per annum and, for capital expenditure, 6.4 percent per annum. Over the 1960/61 to 2000/1 period, the share of government expenditure devoted to social development (education, health, social security/welfare, housing and other social services) rose from 42.1 percent in 1960/61 to 52.1 percent in 2000/1. The share of current government expenditure spent on economic services (agriculture, water/post office, roads/transport) declined from 27 percent in 1960/1 to 13.1 percent in 2000/1. A noticeable feature in the government's fiscal accounts is the rise in the expenditure for debt charges from 3.2 percent in 1960/1 to 15 percent in 2000/1.

The increase in real government expenditure on education is reflected in the qualitative changes which have taken place in the educational system over the past four decades. By virtue of its compulsory school-leaving age of 16 years, Barbados, in effect, has 'universal' primary and secondary level education. Enrolment in the primary and secondary school system increased from 32,598 in 1950/51 to a peak of 57,485 in 1969/70. Since the 1970s, there has been a gradual reduction in the public school enrolment, reflecting the steady reduction in the school age population. The school age population (5-19 years) declined from 87,100 in 1970 to 66,900 in 1990. Using the 5-19 years age group, the gross primary and secondary school enrolment increased from 60 percent in 1960 to 73.2 percent in

1990. When the 5 to 14 years age group is used, the gross enrolment rate at the primary and secondary levels rose from 83.6 percent in 1960 to 111.6 percent in 1990.

**Table 5**  
**Central Government Current Expenditure by Function**  
**1960/61 – 1999/2000 (Bds \$m)**

Function	1960/61		1970/71		1980/81		1990/91		2000/1	
	Bds\$m	%	Bds\$m	%	Bds\$m	%	Bds\$m	%	Bds\$m	%
General Services	5.10	23.6	18.92	22.8	61.59	15.6	146.89	15.3	260.89	17.2
Defence	0.10	0.50	0.14	0.2	8.38	2.1	25.59	2.7	40.33	2.7
Education	3.96	18.3	19.22	23.1	92.93	23.5	221.40	23.1	353.29	23.3
Health	2.61	12.1	15.54	18.7	61.67	15.6	141.01	14.7	203.50	13.4
Soc Sec/Welfare	2.34	10.8	10.47	12.6	47.80	12.1	87.80	9.2	151.15	10.1
Housing	0.07	0.3	0.18	0.2	8.55	2.2	48.02	5.0	55.01	3.6
Other Soc Services	0.13	0.6	0.41	0.5	9.48	2.4	12.82	1.3	25.23	1.7
Economic Services <sup>1</sup>	5.83	27.0	13.63	16.4	74.09	18.8	141.54	14.8	197.58	13.1
Debt Charges	0.70	3.2	4.64	5.6	30.49	7.7	132.19	13.8	225.82	14.9
Tot Expenditure <sup>1</sup>	21.62		83.14		394.98	15.6	957.27		1513.79	
Expenditure as % of GDP (%) <sup>2</sup>	17.2		28.7		25.7		32.3		35.3	

Notes: <sup>1</sup> Total expenditure includes unallocated expenditure for some years.

<sup>2</sup> GDP is Gross Domestic Product at factor costs in current prices for the calendar year.

Source: Central Bank of Barbados: Annual Statistical Digest, 1978, 2000

Several changes have taken place in the school system since the 1950s [see Hunte, 1991; Newton, 1991, Shorey and Rose, 1996]. These include the abolition of fees at Government-owned secondary schools in January 1962, the introduction of comprehensive schools to cater to those who were unable to get a place in the limited number of grammar schools, improved teacher training facilities, and the introduction of technical and vocational education in the school system, to name a few. In addition, the nutritional needs of primary school children have been met through a free school meals scheme.

The private school system coexisted with the public school system over the period. The private school system has been much smaller than the public school system. With the expansion of the public school system by the government, the number of private schools

has declined significantly over the years. Very few primary and secondary private schools still exist today.

Tertiary level education also expanded significantly over the 1960-2000 period. The main institutions providing tertiary level education include the Barbados Community College (opened in 1969), the Samuel Jackman Prescod Polytechnic (opened in 1970) and the Cave Hill Campus of the University of the West Indies (opened in 1962). Enrolment in tertiary level institutions grew from 1,047 in 1967/68 to 9,370 in 1997/98. Several persons are also engaged in post-secondary education in a number of private institutions (e.g., information technology, management, accounting, secretarial studies, etc).

The investment in education is reflected in the improved quality of the labour force that produces output. Available data indicate that the percentage of the labour force whose highest level of education is at the primary level declined from 46.8 percent in 1981 to 20.4 percent in 1999, while those with the highest level of education being secondary rose from 48.8 percent in 1981 to 63.3 percent in 1999 [see Table 6]. While the numbers of those with technical and vocational education remained relatively small, the percentage of those with university education rose from 4.0 percent in 1981 to 12.9 percent in 1999. According to human capital theory, an improvement in the level of education of the labour force is expected to result in a higher level of output and productivity. As expected then, the labour productivity (as measured by the ratio of real GDP at factor cost to the number of employed persons) grew from Bds \$3719 in 1960 to an estimated Bds \$7829 in 2000, revealing an average annual growth rate of approximately 2 percent.

**Table 6**  
**Labour Force by Highest Level of Education Attained 1981-1999 (%)**

<b>Level of Education</b>	<b>1981</b>	<b>1984</b>	<b>1986</b>	<b>1991</b>	<b>1993</b>	<b>1996</b>	<b>1999</b>
Primary	46.8	41.0	37.6	28.5	24.9	20.8	20.4
Secondary	48.8	53.9	55.6	63.5	65.6	63.8	63.3
University	4.0	4.4	5.9	7.3	8.8	10.8	12.9
Technical	0.4	0.8	0.9	0.7	0.6	4.1	2.5
Other/None	0.1	0.0	0.0	0.0	0.1	1.4	0.9
<b>Total (%)</b>	100.0	100.0	100.0	100.0	100.0	100.0	100.0
<b>Total ('000)</b>	112.4	112.3	116.9	129.6	132.8	135.4	136.6

Source: Barbados Statistical Service: Labour Force Reports (various issues)

The improvement in the educational system has also resulted in an increase in the degree of female participation in the labour force. With an increasing number of females taking advantage of government-provided education – from primary to tertiary level – the level of female labour market participation has increased since the 1960s. While there has been a decline in the male labour market participation rate from 84.1 percent in 1960 to 74.8 percent in 2000, the female rate rose significantly from 45.7 percent in 1960 to 62.7 percent in 2000 [see Table 7]. Although females still dominate certain traditional occupations (sales and service, clerical), there has been a growth of females in professional, technical, administrative and managerial occupations. Although quantitative data are difficult to obtain, the private sector has invested in on-the-job training and in institutional training, thus enhancing the human capital of the country.

**Table 7**  
**Labour Market Participation Rates, 1960-1999**  
**(%)**

<b>Year</b>	<b>Male</b>	<b>Female</b>	<b>Total</b>
1960	84.1	45.7	62.2
1970	78.2	43.4	59.1
1976	75.4	51.3	62.4
1980	75.8	55.4	64.9
1985	73.3	55.6	63.8
1990	75.5	60.3	67.3
1995	74.7	62.7	68.2
2000	74.8	62.7	68.4

Source: Barbados Population Census Report (1960, 1970);  
Barbados Statistical Services: Labour Force Reports  
(for data 1976-2000)

The investment in education has been complemented by the public investment in health and nutrition. In 1960/61, the government's current expenditure in health was Bds \$2.6m (12.1 percent of expenditure), while in 2000/1, it stood at Bds \$203.5m (13.4 percent of expenditure), that is, an average annual growth rate of 11.5 percent (i.e., in real terms, a growth rate of 5 percent per annum) [see Table 5]. Capital expenditure on health was variable over the period but increased from Bds \$0.6m in 1960/61 to Bds \$8.9m in 2000/1, that is, an average annual growth rate of 7.0 percent or in real terms, a rate of 0.4 percent per annum.

Health care in Barbados is delivered through public as well as private facilities. Private health care is mainly curative and is provided on a 'fee-for-service' basis, while public health care is comprehensive in nature and is delivered free of charge to those who are unable to pay. A system of hospitals and polyclinics is involved in the delivery of public health care.

Eight polyclinics and four satellite stations provide primary health care to residents throughout the country. The polyclinics were built during the 1980s in order to relieve the hospital service of cases that did not require tertiary care as well as to service more adequately the health care needs of the population at large. Polyclinics also provide additional service in the areas of maternity and childcare, family planning, ophthalmic, dental and public health services. There are four geriatric hospitals, one psychiatric and a main general hospital to serve the special needs of the population.

A drug service was implemented in 1980. Under this service drugs are provided free of charge to individuals over 65 years of age and children under 16 who choose to use the service. Moreover, those who suffer from diabetes, asthma, epilepsy and hypertension are also able to benefit from the service.

A cadre of well-qualified staff is involved in the delivery of health care in Barbados [see Table 8]. Over the years, the Government of Barbados has been able to improve the quality of health care by training and recruiting a greater number of specialized staff.

**Table 8**  
**Selected Health Care Workers, 1983-1999**

Category	1983	1985	1987	1989	1991	1993	1995	1997	1999
Medical Practitioners	213	207	136	233	276	218	172	291	333
Nurses (trained)	718	681	-	-	-	-	-	-	-
Nurses (registered)	-	-	613	730	686	274	358	632	1019
Midwives	n.a.	n.a.	n.a.	n.a.	n.a.	69	63	3188	407
Nurses/Midwives	n.a.	n.a.	n.a.	n.a.	n.a.	225	157	105	n.a.
Psychiatric Nurses	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	336
Nursing Assistants	n.a.	n.a.	n.a.	n.a.	342	204	135	273	414
Dentists/Dental Surgeons	25	27	27	32	38	40	50	51	57
Optometrists	n.a.	7	6	5	9	6	10	11	11
Medical Technologists	n.a.	n.a.	n.a.	n.a.	39	17	25	32	49
Diagnostic Radiographers	n.a.	n.a.	n.a.	n.a.	3	4	4	14	16
Pharmacists/Chemists	110	103	78	116	139	156	105	169	145
Physiotherapists	n.a.	n.a.	7	14	14	14	9	19	32
Population '000	251.8	253.0	253.7	256.9	262.5	263.9	264.4	266.1	267.4

Source: Ministry of Employment, Labour Relations and Comm Dev: Digest of Labour, various issues

Improvements in the health of Barbadians have resulted from high levels of public investment in health (and education) over the years. This level of commitment by various government administrations has led to successful immunization programs in the fight to eradicate disease and improve sanitary living conditions. The progress that has been achieved through the above measures is readily seen through such indicators as life expectancy, infant mortality rate and the birth rate during the 1960-1999 period [see Table 9]. The death rate has remained more or less constant and is comparable to those of developed countries. A successful family planning program has contributed to the decline in the birth rate, while infant mortality rate has been significantly reduced. Today, the life expectancy of the average Barbadian male has increased to 73 years, up from 63 years in 1960. With respect to the female life expectancy, the rate moved from 68 years in 1960 to 78 in 1999.

**Table 9**  
**Rates of Birth, Death and Infant Mortality in Barbados**  
**Selected Years**

Indicator	1960	1965	1970	1975	1980	1985	1990	1995	1999
Birth Rate	34.0	26.1	21.0	18.9	16.6	16.9	16.5	13.1	14.5
Death Rate	9.0	7.8	9.0	8.4	8.1	8.4	8.2	9.4	9.0
Infant Mortality	60.0	39.0	46.0	33.0	15.5	17.5	15.5	13.2	10.0

Source: *Barbados Economic Report*, various issues

*Caribbean Development Bank*: Selected Indicators of Development 1960-98 (data for 1960, 1970, 1980, 1990)

The generation of employment opportunities in order to reduce the relatively high level of unemployment and poverty has been one of the main objectives of economic growth and development policy. The labour force grew from 92,200 in 1960 to 138,400 in 2000 (i.e., 1 percent per annum), while employment increased from 85,000 to 125,500 (i.e., 1 percent per annum) over the 1960-2000 period. Census data on unemployment indicate a rate of approximately 7 percent in 1960 and 1970. Labour force survey data however indicated an increase in the unemployment rate between 1980 and 1990, with a peak of 24 percent in 1993. Between 1974 and 2000, the rate varied between 10.4 and 24 percent.

Unemployment rates (defined in terms of job search over a 3-month period before the survey period) have historically been high compared with several other countries, with the rate for females being higher than that for males. Barbados has a chronic youth unemployment problem. In 1985, the unemployment rate among the 15-19 years age group was 53.3 percent, while that for the 20-24 years age group was 30.9 percent. In 1995, the figures were 52.9 and 31.1 percent, respectively. The youth (15-24 years of age) unemployment rate however declined from 40.5 percent in 1994 to 21.8 percent in 1999.

The government has been the largest single employer of labour accounting for the employment of approximately 24,000 persons (i.e., about 18 percent of the labour force). Since the mid-1990s, there has been a steady growth in the number of persons classified as 'employer' or 'self-employed' in the private sector.

Although the reduction of income inequality and poverty has been an objective of government policy, little information is available on the extent to which these have changed. Studies on the extent of inequality have been sporadic and inconsistent with respect to the definition of income, while only one study has been undertaken on poverty. The available data point to the following conclusions:

- ❑ a modest reduction in household income inequality between 1978 and 1996 (i.e., the Gini coefficients were 0.48 and 0.38, respectively);
- ❑ a redistribution of individual and household income towards the middle 40 percent of the income units (i.e., a growth of the middle income class);
- ❑ the lowest incomes are found in agriculture, manufacturing and distribution, while the highest incomes are found in the professional and financial services sector; the middle income group tends to occupy the public and commercial sectors;
- ❑ approximately 8 percent of the population lived in poverty during the early 1990s, while 12.7 percent of all households were below the poverty line;

The general results indicate a strong link between poverty and labour market conditions. Poor households have low levels of human capital, which means that they can only obtain low paying jobs in a highly segmented labour market or remain unemployed.

The social investment undertaken by the government in the areas of education and health has enhanced the human resources of the country over the 1960-2000 period. These areas of social investment accounted for an average of 37 percent of total current expenditure. Capital expenditure on social investment was more variable over the period and depended on the timing of major social investment projects. For example, in 1960/61, capital investment in health and education accounted for 9 percent of total capital expenditure, while in 1990/91, the share was 37 percent, and in 1999/2000, it was 14 percent. Capital expenditure, in addition to being lumpy, has been adjusted by the government in order to meet fiscal deficit targets.

The significance of the human capital variable in both the growth accounting and regression analyses of economic growth reflects the social investment (health and

education) undertaken by the government and the qualitative changes in the impact variables in these social sectors. The high ranking of Barbados in the HDI is also reflective of the degree of social investment and qualitative changes in the social sector.

#### 2.4.2 *Investment in Physical Capital*

Early theories of economic growth emphasized the role of savings and investment in physical capital (plant, machinery and equipment) in the growth process. Over the period 1973 to 2000, savings deposits with commercial banks increased from Bds \$122.2m in 1973 to Bds \$1898.7m in 2000, that is, an average annual growth rate of 10.7 percent. Allowing for an average inflation rate of 7.2 percent over the period, 'real' financial savings increased by 3.5 percent per annum. Time deposits increased from Bds \$95.9m in 1973 to Bds \$939.3m in 1999, giving an average annual growth rate of 8.8 percent. In 'real' terms, the rate of growth was 1.6 percent. Given the relatively underdeveloped nature of the financial sector, most personal savings takes the form of commercial bank deposits and in recent years credit union deposits and shares. The ratio of savings and time deposits to GDP rose from 17.4 percent in 1960 to 66.1 percent in 2000. The gross national savings to GDP has however declined over the past two decades, from 25.5 in 1980 to 15.1 in 2000 [see Table 10]

**Table 10**  
**Savings and Investment in Barbados**  
**1960 - 2000 (Bds \$m)**

Year	Saving and Time Deposits		Gross Nat Savings		Government Savings		Investment	
	Bds \$m	%GDP	Bds \$m	% GDP	Bds \$m	% GDP	Bds \$m	% GDP
1960	21.9	17.4	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
1965	47.2	29.9	n.a.	n.a.	6.0	3.8	n.a.	n.a.
1970	120.80	41.7	n.a.	n.a.	4.9	1.7	n.a.	n.a.
1975	273.90	39.1	72.4	10.3	24.1	3.4	156.2	22.3
1980	571.40	37.2	390.9	25.5	46.2	3.0	424.3	27.6
1985	860.00	39.4	491.1	22.5	17.3	0.8	371.8	17.0
1990	1386.20	46.7	632.7	21.3	-7.8	-0.3	648.2	21.9
1995	1807.00	57.2	655.3	20.7	107.4	3.4	568.2	18.0
2000	2838.00	66.1	646.5	15.1	203.3	4.7	946.9	22.1

Notes: (i) Savings and Time deposits refer to those in commercial banks  
(ii) Gross National Savings is defined as Gross Capital Formation (in national accounts) plus the balance in the current account of the Balance of Payments. This approach has been used by the IMF.

- (iii) Government Savings refers to the balance in current account of the Central Government's fiscal accounts.
- (iv) Investment refers to Gross Capital Formation.
- (v) GDP is gross domestic product at factor cost calculated in current prices.

Source: Central Bank of Barbados: Annual Statistical Digest (various issues); Balance of Payments (various issues)  
Barbados: Economic and Social Report (various issues)

Government savings (that is, the current account balance) have been largely positive in nominal terms since the 1960s. The government savings to GDP ratio has however been very small (less than 5 percent). Deficits on current account were recorded in four fiscal years since 1965/66 (i.e., 1973/74, 1976/77, 1987/88 and 1990/91). Government savings have been used to help finance its capital works projects (roads, buildings, etc) which have been supported by foreign loans.

The nominal value of gross capital formation (gross investment) increased from Bds \$156.2m in 1975 to Bds \$946.9m in 2000, that is, an average annual growth rate of 7.5 percent [see Table 10]. There is no deflator for capital goods; hence the inflation rate is used as a deflator. The result suggests that 'real' gross investment hardly grew during the period. The investment-GDP ratio was generally under 0.25 over the 1975 to 2000 period. Much of the capital investment was in private sector building activity. Gross investment (in current prices) increased between 1975 and 1982, but declined between 1983 and 1985. There was a steady increase in the value of capital formation over the 1986 to 1990 period, but a significant decline occurred between 1990-92 when the government implemented a structural adjustment program. Since 1993, there has been a significant increase in gross capital investment, especially in the private construction sector. Total private foreign investment was largely erratic in Barbados over the 1970-2000 period. While there was a general growth in such investment in the early 1970s and the 1990s, there was stagnation in this investment during the late 1970s and the 1980s [see Belgrave and Ward, 1997].

It seems that there was a close association between the pattern of gross capital formation and economic growth over the 1975–2000 period. Over the sub-period 1975-80, the average annual growth rate of 'real' capital formation was 12.1 percent, while it was –10.3 percent during the 1980-85 period. During the 1985-90 period, too, the growth of 'real' gross investment was 8.1 percent and, for the 1990-95 and 1995-2000 periods, the rates of

growth were  $-5.7$  and  $8.3$  percent, respectively. This pattern is reflected in the pattern of average annual growth rates of real GDP [see Table 3]. While economic growth can be fuelled by investment in physical capital, an expansion in physical capital can result from a growth of output via the accelerator model of investment (i.e., the relationship can be bi-directional).

#### *2.4.3 Structure and Performance of the Export Sector*

International trade has been an important part of economic life in Barbados since its colonization by the British in the seventeenth century. Between 1650 and 1960, sugar exports to the UK and, to a lesser extent USA, were the main source of ‘foreign currency’ and the main propeller of economic growth. Sugar exports took place under special preferential arrangements with the UK. Since the 1960s, the government has adopted a diversification program involving light manufacturing and tourism.

While the export price of sugar increased from Bds \$195 per tonne in 1960 to Bds \$1,132 per tonne in 1999, both the amount of sugar produced and exported have declined significantly [see Figure 2]. In 1960, the amount of sugar produced was 156,000 tonnes and the amount exported was 143,300 tonnes. By 1999, the amount of sugar produced was 55,200 tonnes and the amount exported was 49,300 tonnes. In effect, over 90 percent of sugar produced in Barbados was destined for the export market. Given the downward trend of sugar production, its impact on economic growth has been insignificant over the study period.

In the area of domestic exports, light manufacturing has made a moderate but uneven contribution to economic growth. As indicated earlier, the government has promoted manufacturing development by offering fiscal incentives to both local and foreign manufacturers. The main exports from the manufacturing sector have been clothing, electronic components, chemicals and miscellaneous goods. While chemicals and miscellaneous product group recorded a steady increase over the 1960-1999 period, there has been some stagnation in clothing and electrical components since the mid-1980s. The value of chemical exports increased from Bds \$292,000 in 1960 to Bds \$52.2m in 1999,

while miscellaneous exports grew from Bds \$488,000 in 1960 to Bds \$100.5m. in 1999. Unfortunately, there is no export price index beyond 1990 to calculate the constant price value of exports. Electrical components were particularly prominent during the mid-1980s when the value of exports of electrical components rose from Bds \$9.5m in 1975 to Bds \$336.0m in 1984 but since 1986, there has been a significant decline in exports in this category. The prominence of electrical components in the 1980s reflected the production activities of large multinational companies such as Intel and CORCOM. Exports were geared primarily to non-regional markets.

Along with the food and beverages sub-sector, the clothing sub-sector has historically been an important area of manufacturing activity. Production has been geared towards both the regional (CARICOM) and extra-regional markets (i.e., USA). Clothing exports grew from Bds \$130,000 in 1960 to a peak of Bds \$70.4m in 1983. Since the mid-1980s, there has been a decline in the exportation of clothing. Production activity in the manufacturing sector was adversely affected by the decline in economic activity within CARICOM in the 1980s.

The tourism sector has witnessed significant growth and change since the 1950s. The government has sought to promote the sector as a major foreign exchange earner through the granting of fiscal incentives. During the early stages of tourism development, tourists came mainly from the USA and the Caribbean. Since the mid-1960s, the promotional activities of the government and private enterprise have resulted in a significant degree of market diversification. Tourist arrivals from the Caribbean have declined significantly, while arrivals from European markets have grown impressively. In 1960, approximately 41 percent of long-stay visitors came from Caribbean countries, while 27 percent came from the USA. By 1980, the market had become more diversified, with the following arrivals: UK - 15%, USA – 23%, Canada – 23% and the Caribbean – 23%. By 1999, the UK market had grown significantly and accounted for 39 percent of visitor arrivals, while the share for the USA had declined slightly to 21 percent [see Table 11]. The Canadian and Caribbean markets had also fallen off slightly. Barbados' tourism marketing personnel targeted new markets in Germany, France, and Belgium.

**Table 11**  
**Tourist Arrivals, 1965-1998**

Period	UK		USA		CANADA		CARICOM		Other		Total	
	No	%	No	%	No	%	No	%	No	%	No	%
1960	2102	5.9	9716	27.3	3755	10.6	14638	41.2	5324	15.0	35535	100
1965	6673	9.8	19811	29.0	14212	20.8	20842	30.5	6880	10.1	68418	100
1970	12083	7.7	57111	36.5	39609	25.3	33450	21.4	14164	9.1	156417	100
1975	24802	11.2	54894	24.8	75517	34.1	38070	17.2	28203	12.7	221486	100
1980	56226	15.2	85971	23.2	84934	23.0	84398	22.8	558386	15.8	369915	100
1985	38822	10.8	148093	41.2	70573	19.7	62840	17.5	60464	16.8	359135	100
1990	94890	22.0	143295	33.2	57841	13.4	62298	14.4	73768	17.1	432092	100
1995	126621	28.6	111983	25.3	53373	12.1	58635	13.3	91495	20.7	442107	100
2000	226787	41.6	112153	20.6	59957	11.0	87424	16.1	58375	10.7	544696	100

Source: Central Bank of Barbados: Annual Statistical Digest

Over the period 1960 to 2000, the number of long-stay tourists increased from 35,535 to 544,696, representing an average annual growth rate of 7.1 percent [see Figure 3]. The average length of stay varied between 6 and 9 nights over the 1960-99 period. Cruise ship tourist arrivals have also seen a significant increase since the mid-1960s. In 1966, 51,593 cruise ship tourists visited the country, while in 2000, 533,278 persons visited, representing an average annual growth rate of 7.1 percent [see Table 12].

Estimates of tourist expenditure (hotels and selected outlets) show a significant growth over the 1974 to 1999 period. In 1974, total tourist expenditure amounted to Bds \$156.6m, while in 1999, it was Bds \$1332.5m, representing an average annual growth rate of 8.9 percent. Although the tourism sector imports a large percentage of its inputs, it is expected that the multiplier effects of tourism expenditure on the domestic market would be significant.

**Table 12**  
**Tourism Performance Indicators, 1966-1999**

Year	Stayover Tourist Arrivals	Cruise Ship Arrivals	Average Length of Stay (nights)	Hotel Bed Occupancy Rate (%)	Hotel Room Occupancy Rate (%)
1966	79104	51593	6.5	51.8	54.2
1970	156417	79635	5.3	45.9	42.9
1975	221486	98546	8.6	40.9	44.9
1980	369915	156461	9.8	65.3	68.9
1985	359135	112222	6.3	39.5	43.9
1990	432092	362611	6.8	55.2	57.5
1995	442107	484670	7.4	56.7	57.0
2000	545027	533278	7.3	60.4	56.9

Source: Central Bank of Barbados: Annual Statistical Digest, 2000

#### 2.4.4 *Macroeconomic Management*

The maintenance of a stable macroeconomic environment is an important element in the economic growth process. A stable macroeconomic environment would involve low rates of inflation, balance in the fiscal and balance of payments accounts, a stable exchange regime and appropriate trade policies.

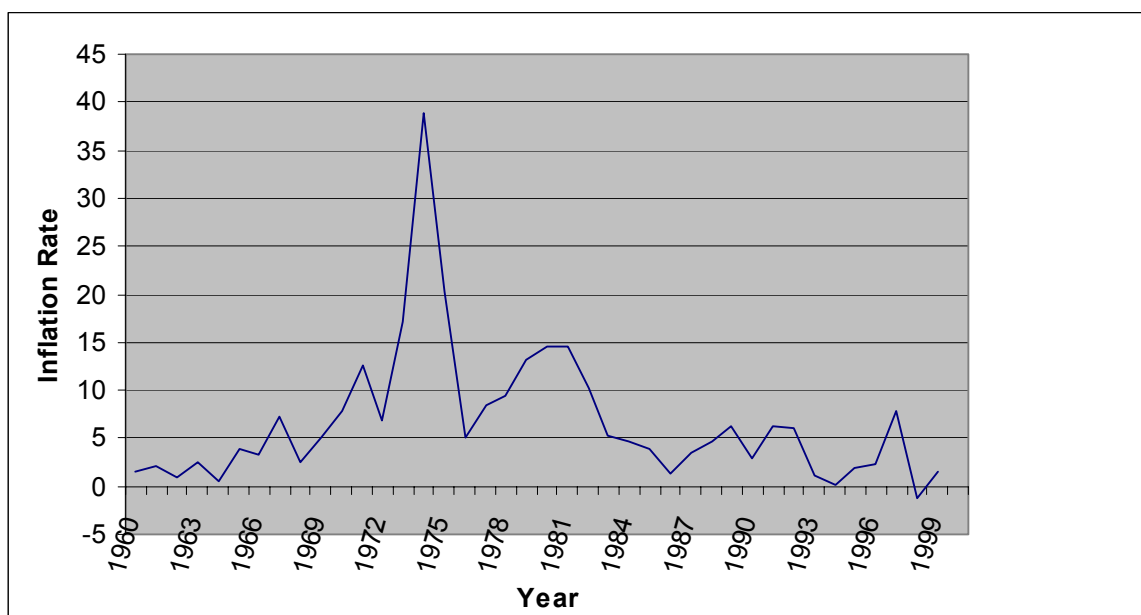
An examination of the inflationary experience since the 1960s points to two major episodes of relatively high inflation rates in Barbados: 1969-1975 and 1979-82 [see Figure 4]. Both periods were associated with external shocks: the commodity price increases in the late 1960s and early 1970s and the oil price increases in 1973/74 and 1979/80. The inflation rate rose from 2.6 percent in 1968 to a peak of 38.8 percent in 1974. After a decline in the rate to 5.0 percent in 1976, it rose again to 14.6 percent in 1981. Econometric analyses of inflation in Barbados since the 1960s point to the strong influence of 'cost push' elements such as import prices and, to a lesser extent, labour costs and the credit rate [see Downes 1985a; Cumberbatch, 1997]. The other periods when inflation was of economic concern were:

- i. in 1967 when the pound sterling, to which the dollar was tied, was devalued (i.e., the inflation rate was 7.3%);
- ii. in 1991-92 when taxes, commodity prices and user charges/fees were increased in the wake of the government's structural adjustment program (i.e., the rates were 6.3 and 6.1%, respectively);
- iii. in 1997 with the implementation of the value added tax (i.e., the inflation rate was 7.7%).

These events were associated with moderate spurts of inflation, that is, between 6 and 8 percent. The country's history of a relatively stable inflation rate can be partly attributed to its exchange rate policy. Barbados has maintained a fixed exchange regime with its main trading partners over the years, first with the UK and then with the USA. Because of its colonial background, Barbados maintained a fixed exchange rate with the pound sterling until July 1975. During the 1974-75 period, the value of the pound began to increase against the US dollar, thus making imports from the USA more expensive. Since the USA

became a major trading partner, a decision was taken to tie the Barbadian dollar to the US dollar in 1975.

**Figure 4: Inflation Rates in Barbados 1960-2000 (%)**



The fixed exchange rate with a major trading partner has become a nominal policy anchor for Barbados over the years. The government has not changed the exchange rate of Bds \$2 to US \$1 since 1975. If the ratio of the consumer price index of the USA to the retail price index of Barbados is used as a measure of the real exchange rate (assuming that the nominal exchange rate is fixed), then it is noted that there was some appreciation in real exchange rate between 1976 and 1989. The ratio fell from 1.16 in 1976 to 0.97 in 1989, indicating that the country had lost its competitive edge during the period. Estimates of the real effective (trade weighted) exchange rate (REER) from the IDB for the period 1980 to 1997 suggest a fall in the REER between 1980 and 1985 (i.e., an appreciation) [see Table 13], then a rise in the rate between 1986 and 1990 (a depreciation) and a subsequent fall in the rate over the 1991-97 period (i.e., an appreciation). In effect, the exchange rate policy of Barbados has been adopted to curb the inflation rate associated with devaluations, to curb speculative activity associated with exchange rate expectations and capital flight. This has been at the cost of some degree of overvaluation and loss of competitiveness. In

recent years, efforts have been made to enhance international competitiveness by increasing productivity and moderating nominal wage increases [see Downes, 1994a].

**Table 13**  
**Real Exchange Rate, 1976-1998**

<b>Year</b>	<b>Real Exchange Rate (1995=100)<sup>1</sup></b>	<b>Real Effective Exchange Rate (1990=100)<sup>2</sup></b>
1976	116.2	-
1977	114.0	-
1978	112.0	-
1979	110.2	-
1980	109.3	114.5
1981	105.3	106.0
1982	101.1	97.9
1983	99.4	93.1
1984	98.9	87.4
1985	98.6	86.2
1986	99.0	92.3
1987	99.5	98.7
1988	98.7	101.3
1989	97.5	97.8
1990	99.7	100.0
1991	97.8	98.2
1992	95.0	95.4
1993	96.6	94.5
1994	99.1	93.1
1995	100.0	91.7
1996	100.5	90.3
1997	95.5	89.0
1998	98.3	92.6

Notes: <sup>1</sup> calculated as the ratio of the USA consumer price index to the Barbados retail price index (see IMF)

<sup>2</sup> trade weighted index using the period average nominal exchange rate

Sources: IMF: International Financial Statistics (various issues)

IDB: Economic and Social Progress in Latin America (various issues)

The government's role in the economy has been largely to provide the legislative and institutional framework within which the private sector can operate. Although the government has engaged in modest direct production, it has provided incentives and policy measures to boost production, employment and foreign exchange generation in the private sector. Since independence in 1966, the government recorded a deficit in its current revenue (i.e., government dissaving) on four occasions (1973/74, 1976/77, 1987/88 and 1990/91). These deficits led to Balance of Payment problems which resulted in the need

for IMF assistance. Over the past four decades, the government has recorded a chronic deficit in its overall fiscal account. The overall deficit rose from Bds \$5.3m in 1960/61 (i.e., 4.2 percent of GDP at factor costs) to Bds \$248.2m in 1990/91 (i.e., 8.4 percent of GDP) but declined to Bds \$73.2m in 1999/2000 (i.e., 1.8 percent of GDP). The history of fiscal deficits provides evidence of a 'political expenditure cycle' with spurts in the overall fiscal deficit (due to increases in expenditure) around election time.

Expenditure policy has been geared towards the provision of social infrastructural services and economic services. Social services (health, education, housing and community services) have accounted for over 50 percent of current expenditure and a rising share of capital expenditure over the period. In the case of economic services (agriculture, water, roads, trade, industry and tourism), the share of current and capital expenditure has been declining since the 1960s. This partly reflects the emphasis that the government has placed on private sector development in the economy.

There have been shifts in the tax policy over the years. First, there was a marked shift from direct to indirect taxation during the 1984-87 period. Secondly, a number of special levies were imposed on individuals and companies during the 1982-83 period (health, training, transportation, employment). Finally, tax reform was introduced in the 1990s with the streamlining of the **direct** tax system (the removal of several levies and the reduction in the number of marginal tax rates) and the **indirect** tax system with the introduction of the value added tax (VAT) and the removal of several indirect taxes in 1997.

The tax revenue to GDP at factor cost has doubled since the 1960s. In 1960, the ratio was 17.9 percent, while in 1999 it was 36.8 percent. In the case of direct taxes (taxes on income and profit), the tax-GDP ratio moved from 7.3 percent in 1960 to 10.5 percent in 1980 and then declined during the 1980s to 8.4 percent in 1990 as special levies were used. By 1999, the tax-GDP ratio rose to 12.7 percent. In case of indirect taxes (taxes on goods and services), the tax-GDP ratio rose from 2.6 percent in 1960 to 17.6 percent in 1999 [see Table 14]. The relatively high total tax revenue to GDP ratio suggests that the role of the

government may have led to market distortions, which would have had a negative impact on economic growth. The distortions may not have been able to counter the growth enhancing nature of government expenditure as suggested in the work by Lewis and Craigwell (1998).

The country experienced significant BOP problems in 1970, 1973, 1976, 1981 and 1989-91, the last period being the most severe and requiring major economic engineering. Barbados has had to seek assistance from the IMF on three occasions: 1977 (a CCF loan), 1982-83 (CCF and Standby loans) and 1992-93 (CCF loans with important conditionalities) [see Haynes, 1997].

An examination of the periods of significant BOP deficits show a close association with the fiscal deficit position and its financing by the Central Bank of Barbados. An essential lesson that can be drawn from the Barbadian economic experience is that excessive borrowing from the Central Bank to finance a fiscal deficit can result in a significant BOP problem. The inability of the government to control its fiscal deficit can derail the effort at promoting economic growth since it would need to concern itself with short-run stabilization policy.

**Table 14**  
**Estimates of Tax-GDP Ratios, 1960-1999**  
%

Year	Total Tax Revenue		Taxes on Profit/Income		Taxes on Goods/Services	
	Bds \$m	%	Bds \$m	%	Bds \$m	%
1960	22.5	17.9	9.1	7.3	3.3	2.6
1965	32.7	20.7	12.0	7.6	7.8	4.9
1970	75.7	26.1	32.8	11.3	15.8	5.4
1975	176.3	25.2	82.7	11.8	38.2	5.4
1980	387.5	25.2	161.6	10.5	106.3	6.9
1985	606.5	27.8	204.2	9.4	166.7	7.6
1990	891.8	30.1	249.6	8.4	285.7	9.6
1995	1081.5	34.2	376.5	11.9	438.0	13.9
1999	1523.3	36.8	527.8	12.7	731.3	17.6

Note: These estimates are based on the government's fiscal year April 1 – March 31, and the calendar year value of GDP at factor costs

Source: Central Bank of Barbados: Annual Statistical Digest, Ministry of Finance & Economic Affairs: Economic Report

The government has also used commercial policies to bring the BOP under control and also to protect local production. Prior to the introduction of a common external tariff within the Caribbean integration movement, CARICOM, the government had made extensive use of tariffs to control imports. With the agreement among CARICOM members to introduce a common external tariff and work towards a single market and economy (CSME), the degrees of freedom to use import tariffs to control imports have been greatly reduced. The government then used a mixture of import licensing and stamp duties to control imports. The movement towards trade liberalization and the creation of the CSME has resulted in the ‘tariffication’ of all restrictions on imports and the reduction or removal of stamp duties. It is expected that tariff will be reduced over time in accordance with the country’s obligations for trade liberalization under the WTO. This reduced ability to use commercial policy to control the trade aspect of the BOP means that a greater role has to be played by fiscal and monetary policies in order to avoid severe BOP disequilibrium.

In summary, the government has sought to maintain some degree of macroeconomic stability in order to create an environment for positive economic growth. Inflation rates have been generally low to moderate except when external shocks resulted in spikes in the rate. The fiscal accounts have generated some government savings, which have been used to finance capital works projects. With the exception of periods around political elections, the overall fiscal deficit has been manageable. However, the rise in the tax-GDP ratio suggests that government policies may have been creating market distortions, thus retarding economic growth. Monetary policy has been used to maintain balance in the BOP and, in some cases, to provide credit for productive sectors. Selective credit control has been used, but the Central Bank has resorted to changing the interest rate and establishing special credit lines to finance economic enterprises.

#### *2.4.5 Institutional Environment*

Institutions generally refer to the organizations established to coordinate economic and other activities and the ‘rules of the games’ designed to ease economic transactions. Barbados, as a small open developing country, where the costs of making an incorrect

decision can be high, has paid attention to the maintenance of a stable and creditable institutional environment. The ability to access funds and other forms of assistance depends on the ratings given to the country by various international organizations.

Barbados has a reputation for being a stable democratic country in which elections are free and fair and the citizens enjoy a wide range of political and social liberties. Since the introduction of elections in 1946, two political parties have administered the government: the BLP (1946-1961; 1976-1986 and 1994 to present) and the DLP (1961-1976 and 1986-1994). Both parties have espoused a liberal democratic political philosophy hence there has been no extremes in terms of political philosophy. There has been smooth transition from one administration to the next. Both parties have experimented with the establishment of public corporations in order to hasten the process of economic change.

Development planning has been used by both administrations of government and they have relied on the same cadre of competent public officials to implement various economic policies. The private sector has been seen as the group to advance economic activity in the country and the government has provided incentives to promote such development. The Heritage Foundation calculates an Index of Economic Freedom incorporating a range of institutional factors which determine economic freedom: corruption, non-tariff barriers to trade, the fiscal burden of government, the rule of law, regulatory burdens, restrictions on banks, labour market regulations and black market activities [see <http://www.heritage.org>]. The score for Barbados has declined from 2.90 in 1996 to 2.30 in 2002, signifying that Barbados has had a high degree of economic freedom (i.e., 'mostly free'). In 2002, Barbados ranked 26 out of 161 countries.

A recent survey of selected key informants on their perceptions of governance in Barbados has indicated that the governance structure is well respected. The areas of governance covered in the survey include participation in the political process, government's stewardship, the quality of bureaucracy, the relationship between the state and the market and dispute resolution. The level of governance was regarded as being high to very high in most of the categories [see Downes, 2001]. Barbados has enjoyed high credit ratings by

such agencies as Standard and Poor and is regarded by Freedom House as a 'free' country. For example, in Freedom House's ranking of political right and civil liberties, Barbados was given a value of 2 (best value) for the period 1980 to 1992 (with the exception of 1984 and 1985 when it received a value of 3). Barbados has also recorded the lowest per capita work stoppages in the Caribbean [see Downes and Nurse, 2002].

The functioning of national institutions, the absence of corruption and respect for the rule of law have been critical to this small developing country which has to rely on foreign investment and assistance. Although these are qualitative variables, they are important to the growth and development process as they ensure low transaction costs and low levels of country risk.

### **3 A Quantitative Analysis of Economic Growth**

The analytical history of the growth process in Barbados provided in the previous section gives some insights into the factors affecting economic growth over the 1960 to 2000 period. As a qualitative analysis, it cannot determine the extent to which various factors (economic and non-economic) affect the growth process. In this section, a quantitative analysis of economic growth in Barbados is undertaken using two techniques: growth accounting and regression analysis.

#### **3.1 Growth Accounting**

As Barro (1999) indicates, growth accounting is a decomposition procedure which provides a "breakdown of observed economic growth into components associated with changes in factor inputs and a residual that reflects technological progress and other elements" (p. 119). Growth accounting provides a "preliminary step for the analysis of fundamental determinants of economic growth" (p. 119). He further notes that growth accounting is useful "if the fundamental determinants that matter for factor growth rates are substantially independent from those that matter for technological change" (p. 119).

Regression analysis is used to identify the statistical significance of various factors in the growth process and to determine the extent to which these factors influence economic

growth. It complements growth accounting by examining the factors influencing total productivity growth.

The growth accounting exercise begins with the specification of a production function, in this case, for the overall economy as:

$$Y = F(A, K, L) \quad (1)$$

where  $Y$  is the aggregate flow of output,  $K$  is the aggregate flow of physical capital services,  $L$  is the aggregate flow of labour services and  $A$  is the technology factor.

Totally differentiating equation (1) with respect to time, we have

$$DY/dt = F_A dA/dt + F_K dK/dt + F_L dL/dt \quad (2)$$

Assuming that

- i. the technology factor reflects Hicks-neutrality, that is, with a constant capital-labour ratio, the ratio of marginal products is also constant;
- ii. the owners of the factor inputs are paid the value of the marginal productivity of the factors

then, the standard growth accounting equation is given as:

$$g_Y = g_A + \alpha_K g_K + \alpha_L g_L \quad (3)$$

where  $g_Y$ ,  $g_K$  and  $g_L$  are the growth rates of output, capital services and labour services, respectively and  $\alpha_K$  and  $\alpha_L$  are the factor shares and  $g_A$  is technical change.

Equation (3) can be re-written to reflect total factor productivity growth (TFPG) or the so-called 'Solow residual':

$$\text{TFPG} \equiv g_A = g_Y - \alpha_K g_K - \alpha_L g_L \quad (4)$$

If the production function reflects constant returns to scale, then we have the condition that

$$\alpha_K + \alpha_L = 1 \quad (5)$$

which can be derived from a simple Cobb-Douglas production functional form.

Although equations (3) and (4) are widely used in the literature, there are limitations which must be borne in mind, especially in the case of small developing countries with imperfect

factor and commodity markets. These limitations stem from the underlying assumptions used in the derivation of the equations, that is, factors are paid the value of their marginal products and constant returns to scale exists. In developing countries, these conditions are unlikely to hold so that the results of applying equations (3) and (4) must be regarded as first approximation [see Bruno (1971) for a discussion of the imperfect market case].

The growth accounting framework discussed above was applied to the case of Barbados over the period 1960 to 1999. One of the problems in applying the framework is the lack of suitable data to reflect the ‘true’ variables; hence there are measurement errors in the analysis. For this exercise, aggregate output is measured as real or constant price gross domestic product at factor costs (1974 is used as the base year). The capital variable is an estimate of capital stock derived from the perpetual inventory method given as:

$$K_t = I_t + (1 - \delta)K_{t-1} \quad (6)$$

where  $K_t$  and  $K_{t-1}$  are the stocks of capital at time  $t$  and  $(t-1)$ , respectively;  $I_t$  is the constant price value of gross investment and  $\delta$  is a depreciation rate for capital stock. In the case of Barbados, two types of capital (investment) data are collected: machinery and equipment (ME) and construction and building materials (CBM). Constant depreciation rates are used for these components – 6.5 percent for (CBM) and 14.8 percent for ME – and the import price indices for these components are used as deflators. Boamah (1984) provides estimates of capital stock for the period 1958-1981, while the author updated the estimates from 1982 to 1999.

The labour input used in this study adjusts for quality as reflected in the level of education attained by the employed labour force and the wage rate/ salary attached to the different categories of educated labour.

Let  $L_i$  be the number of persons employed with a level of education given by  $i$ , where  $i = 1$  (primary),  $i = 2$  (secondary) and  $i = 3$  (tertiary) and  $w_i$  be the ‘weight’ given to each category of employed person. Since general wage/salary data are unavailable for different categories of educated labour in the private sector, we follow Boamah (1995) and use selected categories of labour in the public sector. The weighting factor,  $w_i$ , is given as:

$$w_i = \frac{S_i}{S_{i_0}} \quad (7)$$

Where  $S_i$  is the selected salary level for a person with  $i^{\text{th}}$  level of education and  $S_{i_0}$  is the salary level for a reference category (i.e., a person with a primary level of education). The labour factor used in this study is given as:

$$L_t = \sum_{i=1}^3 w_{i_0} L_{it} \quad (8)$$

where  $w_1$  (i.e., primary level) is set equal to 1 and  $w_2$  (secondary) is 1.54 and  $w_3$  (tertiary) is 4.58 for 1980. This approach is similar to that used by Bowles (1971).

The growth accounting exercise also requires the estimation of  $\alpha_L$  and  $\alpha_K$ . Available data from the national accounts of Barbados for the periods 1960, 1974 and 1975 indicate that the shares of compensation of employees in gross domestic product were 51.8%, 60.3% and 59.4%, respectively. This gives an average estimate of  $\alpha_L$  at 0.57, while for  $\alpha_K$ , it is 0.43 (assuming constant returns to scale). In addition to these estimates, cross-country estimates of  $\alpha_L = 0.7$  and  $\alpha_K = 0.3$  are used.

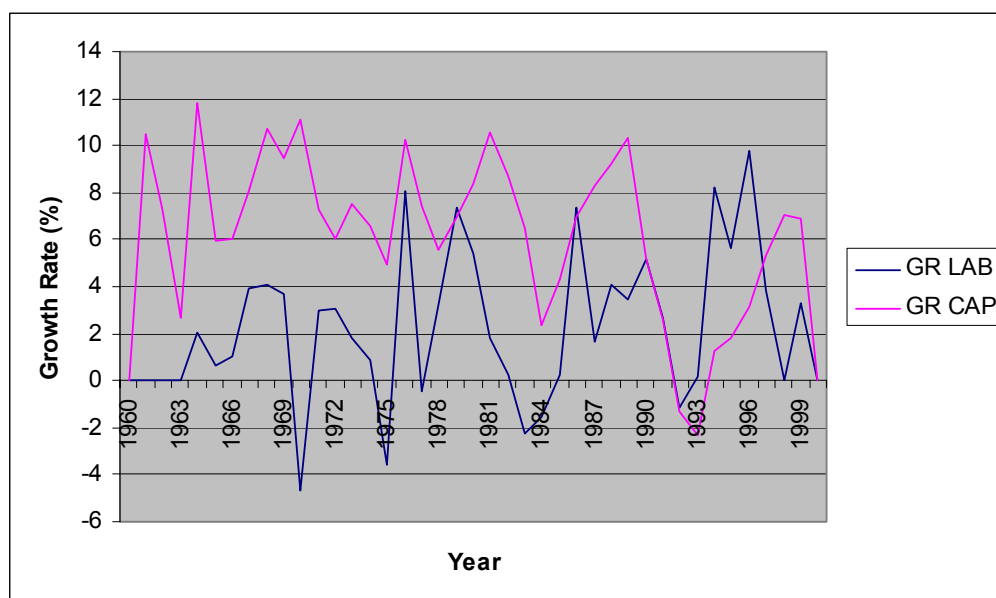
The data indicate that over the 1960-99 period, total physical capital stock grew by an average annual rate of 6.61 percent, while the labour input grew by 2.35 percent per annum. As indicated earlier, the growth of real GDP over the period was 2.88 percent per annum [see Table 15]. There was a downward trend in the growth rate of physical capital stock over the period, while there was a slight upward trend in the growth of human capital [see Figure 5].

**Table 15**  
**Growth Rates of Output and Inputs for Selected Periods**  
**1960-1999 (%)**

Period	Real GDP	Building/ Construction Capital	Machinery/ Equipment Capital	Total Physical Capital	Labour Factor
1960-73	5.77	7.80	9.81	8.37	1.31
1975-80	5.02	10.14	2.81	8.03	4.83
1982-89	2.83	8.80	-1.49	7.10	1.88
1992-99	2.83	2.31	8.53	3.37	4.53
1960-99	2.88	6.72	6.01	6.61	2.35

The growth experience of Barbados over the past four decades indicates three periods of decline in output: between 1973 (peak) and 1975 (trough), between 1980 (peak) and 1982 (trough) and between 1989 (peak) and 1992 (trough). These periods of decline were due primarily to external shocks – oil price increases and recession in the main trading partners. The analysis of the sources of economic growth therefore focuses on the growth periods: 1960-73, 1975-80 and 1992-99.

**Figure 5: Growth Rates for Physical Capital Stock and Human Capital 1960-1999 (%)**



Over the 1960-73 period, the physical capital growth was the main source of growth followed by the ‘residual factor’. As Oulton (1997) notes, the ‘residual factor’ which is sometimes interpreted as ‘total factor productivity growth (TFPG)’ can be attributed to several elements:

- advances in scientific and technical knowledge
- learning-by-doing and learning from others
- organizational changes
- legislative and regulatory changes
- transfers of inputs from low to high marginal productivity areas (and vice versa)
- economies of scale
- development of some specialized inputs
- errors in the data

The negative value and increasing contribution of the residual factor since 1975 needs further investigation. Given the numerous factors attributed to the ‘residual factor’, it is difficult to identify its main determinants without regression analysis. The data suggest a growing importance of the ‘labour factor’ in the economic growth of Barbados with its dominance being shown during the 1992-99 period [see Table 16]. There was a general slow down of total factor productivity growth over the period [see Fig 6].

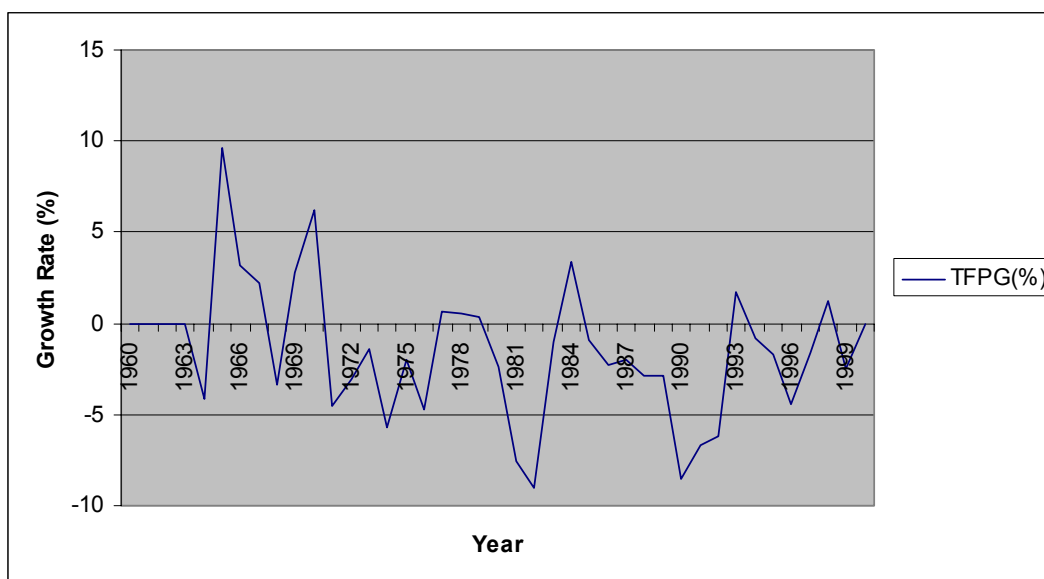
**Table 16**  
**Sources of Output Growth**  
(%)

<b>Period</b>	<b>Physical Capital</b>	<b>Labour Factor</b>	<b>Residual</b>
1960-73 (a)	3.60 (62.3)	0.75 (13.0)	1.43 (24.7)
(b)	2.50 (43.3)	0.92 (15.9)	2.36 (40.8)
1975-80 (a)	3.45 (68.7)	2.75 (54.8)	-1.18 (-23.5)
(b)	2.41 (48.0)	3.38 (67.3)	-0.77 (-15.3)
1982-89 (a)	3.05 (107.8)	1.07 (37.8)	-1.30 (-45.9)
(b)	2.13 (75.3)	1.32 (46.6)	-0.62 (-21.9)
1992-99 (a)	1.44 (50.9)	2.56 (90.5)	-1.17 (-41.3)
(b)	1.01 (35.7)	3.15 (111.3)	-1.42 (-50.2)
1960-99 (a)	2.86 (99.0)	1.34 (46.4)	-1.34 (-45.3)
(b)	2.00 (62.9)	1.58 (54.7)	-0.69 (-23.9)

Notes: (a) where  $\alpha_K = 0.43$ ;  $\alpha_L = 0.57$  (based on Barbadian data)

(b) where  $\alpha_K = 0.3$ ;  $\alpha_L = 0.7$  (based on international benchmarks)

**Figure 6: Growth Rates of Total Factor Productivity Growth 1960-1999 (%)**



While the actual contributions of physical capital and labour (human capital) are sensitive to the values of the factor shares ( $\alpha_K$  and  $\alpha_L$ ), the growth accounting exercise indicates a significant contribution of physical capital to economic growth and a growing importance of ‘human capital’.

### 3.2 Regression Analysis

Growth accounting focuses on the relative contributions of the growth factor inputs (e.g., capital deepening, human capital accumulation) and the growth in efficiency or total factor productivity (the residual) to the growth process over time. Given its production function framework, other determinants of economic growth cannot be easily examined. Indeed, such a framework has to be supplemented by regression analysis in order to identify the determinants of factor accumulation and total factor productivity growth (i.e., Solow’s residual or factor of ignorance).

The regression analysis framework used in this study employs recent developments in time series regression, namely, cointegration. The framework involves the following steps:

- i. the use of economic theory and analytical economic history to identify the key variables of interest;

- ii. an investigation of the temporal properties of each of the variables; this involves pre-testing the variables to determine their order of integration, that is, the stationarity of the variables;
- iii. a check for the existence of a ‘meaningful long run’ economic relationships among the variables; this step seeks to determine the extent to which the variables are cointegrated;
- iv. the formulation of an ‘error correction model’ which incorporates both the short-run dynamics and long-run tendencies of the relationship of interest;
- v. the use of diagnostic tests and economic theory consistency criteria to evaluate the estimated relationship; the key element is to ensure that the chosen explanatory variables provide a reasonable representation of the data-generating process.

The economic literature on small developing countries and the historical review of the economy of Barbados over the 1960-2000 period indicate that economic growth as measured by changes in real gross domestic product (GDP) is likely to be influenced by:

- physical capital deepening/accumulation
- human capital accumulation
- exports
- macroeconomic stability (low inflation, small fiscal deficit, etc)
- financial development
- various institutional and non-economic factors

As a first approximation, the economic growth model for Barbados can be specified as:

$$G_y = f(g_k, g_L, g_x, INF, FP, MD, \theta) \quad (9)$$

where  $g_y$  is the growth of real GDP,  $g_k$  is the growth of physical capital stock,  $g_L$  is the growth of the labour input (i.e., human capital)  $g_x$  is the growth of the export of goods and services, INF is the inflation rate, FP is the fiscal policy variable (i.e., the expenditure to GDP ratio), MD is the ratio of savings and time deposits to GDP (i.e., a measure of financial development),  $\theta$  represents other economic and non-economic factors. These explanatory variables can be classified into ‘long run’ factors ( $g_k, g_L, g_x$ ) and ‘short run’ factors (INF, FP, MD) which underlie the real GDP growth process.

The data used in this study are as follows:

- i. economic growth ( $g_y$ ) is measured by real (constant price) GDP at factor costs;
- ii. physical capital growth ( $g_k$ ) is measured by the estimated stock of capital (building and construction, machinery and equipment) as indicated earlier;
- iii. human capital (labour factor) growth ( $g_L$ ) is given by a measure of the number of persons employed adjusted by their level of education and weighted by their relative salary levels;
- iv. the growth of real exports ( $g_x$ ) is given by two variables: the growth of domestic and re-exports of goods and tourist arrivals ( to reflect the extent of export services); data on the export of goods and services are only available from 1970;
- v. the inflation rate (INF) is given as the rate of growth of the retail price index;
- vi. the fiscal policy (FP) position is measured indirectly by using the ratio of real government current expenditure to real GDP. This measure is sometimes used to reflect the ‘distortionary source’ of government policies since government expenditure plans determine the tax policies which are implemented. In the case of Barbados, the government expenditure to GDP ratio is almost the same as the tax revenue to GDP ratio. The expenditure-GDP ratio can also provide an expansionary effect on the economy in the short run.
- vii. the financial development (FD) variable is the ratio of savings and time deposits in commercial banks to GDP

Given the openness of the Barbadian economy and its susceptibility to external shock, the change in the barter terms of trade (the ratio of export prices to import prices) was also used as a regressor. The regression analysis covered the period 1960 to 1999. The sources of the data are given in the appendix.

The key variables in the analysis were first checked to determine their temporal properties. Since trended or non-stationarity economic data pose certain difficulties for regression analysis (e.g., the existence of a spurious regression result), it is useful to ‘test’ the data to determine whether each variable is stationary over a given period. If the level of a variable is rejected for stationarity, then the first difference of that series is tested for stationarity. If

the first difference is stationary, it is said to be integrated of order zero,  $I(0)$ , which implies that the level of the series is integrated of order one,  $I(1)$ , that is, the variable has a unit root. Two classes of tests are used to determine whether the variables have a unit root:

- Augmented Dickey-Fuller (ADF) test
- Phillips-Perron (PP) test.

[see Harris, 1995].

The Eviews computer program was used to undertake the testing. The results indicate that real GDP, physical capital, 'human capital', real export of goods, barter terms of trade, tourist arrivals and the ratios of current government expenditure and deposits to GDP are non-stationary in their levels dimension, but stationary in their first difference dimension [see Table 17].

**Table 17**  
**Unit Root Tests**

<b>Variable</b>	<b>Augmented DF Test</b>	<b>Phillips-Perron Test</b>
1 Real GDP (ly)	(a) -2.93 (b) -2.76	(a) -3.08 (b) -4.47
2 Physical Capital (lc)	(a) -1.48 (b) -2.76	(a) -2.3(b) -3.40
3 Human Capital (lhc)	(a) 0.88 (b) -3.98	(a) 2.05 (b) -5.21
4 Real Domestic Export of Goods (lrexp)	(a) -2.44 (b) -4.26	(a) -2.09 (b) -4.20
5 Tourist Arrivals (ltarr)	(a) -3.37 (b) -3.22	(a) -3.05 (b) -2.91
6 Gov't Current Expenditure to GDP ratio (lexpgdp)	(a) -1.51 (b) -7.70	(a) -1.16 (b) -13.25
7 Terms of Trade (ltot)	(a) -1.27 (b) -3.80	(a) -1.59 (b) -5.78
8 Bank Deposits to GDP ratio (lmoneygdp)	(a) -0.35 (b) -4.37	(a) -0.22 (b) -6.82
9 Total Factor Productivity Growth (tfpf)	-4.32	-4.34

- Notes: (1) The variables are defined in natural logarithmic form (except tfpf);  
 (2) The level of the variable is given as (a) and the first difference as (b); for the ADF test there is an intercept and one lag for the differences and for the PP test the truncation lag is 3.  
 (3) The 5% critical value for the statistics is -2.94 and the 1% critical value is -3.61.

Since the levels of the variables of interest are non-stationary, the use of a 'levels equation' is likely to result in a 'spurious regression'. The focus of this study is on economic growth, and therefore the 'levels equation' would be of interest with respect to the long term relationship between real GDP and its determinants provided they form a cointegrating set. If a set of non-stationary variables yield a linear combination which is non-stationary, then the set is said to be cointegrated, that is, they form a 'long run equilibrium relationship'. As Radner (1974) notes, "in a world of uncertainty one would not expect economic magnitudes to be strictly constant through time; [hence] the appropriate concept [of equilibrium] would appear to that of a stationary stochastic process" (p. 71). The data series are therefore expected to move so that over time they do not drift too far apart. Cointegration analysis permits the separation of 'long run' information contained in the data from the complex 'short run' dynamics in the form of Granger's Representation Theorem [see Engle and Granger, 1987].

In order to establish a 'meaningful long run relationship' among the variables, a systems evaluation of the data using the Johansen (1988) procedure was used. The likelihood ratio test statistic indicates that at most one cointegrating equation exists among the log levels of the variables of interest: real GDP, physical capital stock, human capital, tourist arrivals and domestic exports. The inclusion of the terms of trade and real government current expenditure to GDP ratio variables does not change this basic result.

The inclusion of the commercial bank savings and time deposits to GDP ratio however results in the identification of three cointegrating equations [see Table 18]. A simple equation identification check was used to determine the equation endogenous variables in the situation where there are three cointegrating equations. This check involved the use of Granger causality testing and Johansen cointegration testing. Granger causality testing indicate that real GDP, physical capital stock and the ratio of government current expenditure to GDP can be considered as endogenous variables [see Table 19]. Johansen cointegration tests indicate that  $lc$  and  $ly$  are cointegrated and that  $lexpgdp$ ,  $lc$  and  $lmoneygdp$  form one cointegrating equation.

**Table 18**  
**Johansen Cointegration Tests**

	Variables	Likelihood Ratios			
		Number of Equations: 0	1	2	3
1	ly lc lhc ltarr	64.94*	16.35	8.07	0.75
2	ly lc lhc ltarr lexp	90.58*	39.33	17.47	6.61
3	ly lc lhc ltarr lexpdp	92.17*	38.90	20.10	8.71
4	ly lc lhc ltarr lexpdp ltot	118.62*	61.48	30.93	15.45
5	ly lc lhc ltarr lexpdp ltot lmoneygdp	206.02*	136.34*	75.71*	36.09
6	ly lc lhc ltarr lexpdp lmoneygdp	169.71*	103.10*	56.57*	18.89
7	ly lc lhc ltarr lmoneygdp	111.76*	56.79*	15.88	7.41

Note: The asterisk (\*) indicates the rejection of the hypothesis regarding the existence of a given number of cointegrating equations at the five percent level of significance using the likelihood ratio test. The prefix 'l' indicates the nature logarithm of the variable.

**Table 19**  
**Selected Pairwise Granger Causality Tests**

	Null Hypothesis	F-Statistic (Probability Value)
1	ly does not cause lc	10.74 (0.00025)
2	ltarr does not cause ly	7.05 (0.00282)
3	lexpdp does not cause ly	2.75 (0.07832)
4	lmoneygdp does not cause ly	5.69 (0.00737)
5	lc does not cause lexpdp	3.40 (0.04561)
6	lhc does not cause lexpdp	3.04 (0.06246)
7	lmoneygdp does not cause lexpdp	2.96 (0.06555)

In this study the following long-run cointegrating equations are derived from the Johansen procedure:

$$ly = 3.30 + 0.20 lc - 0.04 lhc + 0.16 ltarr \quad (10)$$

(0.04)      (0.05)      (0.03)

$$\text{lexpgdp} = 0.49 + 0.16 \text{lc} + 0.32 \text{lmoneygdp} \quad (11)$$

(0.01)    (0.05)

$$\text{lc} = -14.67 + 3.31 \text{ly} \quad (12)$$

(0.59)

These long-run cointegrating equations indicate that physical capital stock and tourist arrivals had a positive and significant impact on real GDP, while there was a feedback mechanism linking physical capital stock and real GDP. In addition, the ratio of government's current expenditure to GDP is influenced positively by physical capital stock and the ratio of savings and time deposits to GDP. The 'human capital' variable has a negative and insignificant effect on real GDP, but this result may be due to multicollinearity. The correlation coefficients matrix reveals that physical and human capital are highly correlated (0.94), while human capital and tourist arrivals show a relatively high degree of correlation (0.83).

Given the statistical insignificance of domestic exports and re-exports (i.e., the export of goods), this variable was dropped from subsequent work and the tourist arrivals (i.e., the export of services) is used as the variable to reflect the export orientation of the economy. The long-run equation for real output is taken as equation (10) above on the grounds of parsimony, since the inclusion of the terms of trade and the ratio of government expenditure to GDP variables does change the nature of the cointegrating relationship.

The existence of three cointegrating equations necessitates the use of instrumental variables to estimate the growth equation. The 'error correction model' of the growth process is used since it incorporates both long-run and short-run information. The residuals from equations (10) to (12) are used in the short-run dynamic error correction equation for the growth of real GDP. These residuals are labeled *ecm1*, *ecm2* and *ecm3*, respectively. Two approaches are used; first, the lag of *ecm1* (from equation 10) is used in the growth equation alone and second, the lags of *ecm1* (from equation 10), *ecm2* (from equation 11) and *ecm3* (from equation 12) are used in the growth equation. The rationale for the second approach stems from the need to incorporate deviations from long-run

equilibrium for the two endogenous variables, physical capital and the ratio of government current expenditure to GDP, which have a positive impact on economic growth. The results of the exercise are given in Table 20 which also presents the Ordinary Least Squares (OLS) and the Instrument Variable (IV) results for comparative purposes.

The diagnostic tests suggest that the estimated regression equations are ‘well specified’ (that is, no serial correlation, normality of the residuals, structural stability, no misspecification, etc) and provide a good tracking of changes in real GDP over time. Overall, the OLS and IV regression results indicate:

- i. over the estimation period, the growth in physical capital stock (real investment) and tourist arrivals (an input into the provision of tourism services) were the dominant variables behind economic growth in Barbados;
- ii. the ratio of government current expenditure to GDP lagged one period also had a positive effect on economic growth;
- iii. the ratio of commercial bank savings and time deposits to GDP had a negative impact on real GDP growth in the OLS results, but was insignificant in the IV results;
- iv. inflation and changes in the barter-terms of trade had negative but small and insignificant effects on real GDP growth;
- v. the ‘human capital’ variable had a positive but generally insignificant effect on growth;
- vi. the significance of the lagged residual terms from the long-run equations (i.e.,  $ecm1$ ,  $ecm2$  and  $ecm3$ ) provides further evidence of cointegration. When the  $ecm1$  term enters the equations alone, the values of the coefficient suggest a moderate speed of adjustment to the long run steady state growth path when a disequilibrium occurs. This suggests moderate ‘costs of adjustment’ in the Barbadian economy [see Harris, 1995, pp 24-26]. These adjustment costs may be related to various ‘distortions’ in the economy: negative real interest rates on loans during the inflationary period 1973 to 1981, the relatively high degree of labour market protection [see Rama, 1995] and the increase in the tax ratio over the period. When the disequilibrium errors from the long-run government expenditure to GDP ratio

equation (ecm2) and the physical capital stock equation (ecm3) are added to the growth equation, the coefficients of error correction term in the growth equation (ecm1) increases suggesting a long adjustment period once these simultaneous effects are considered.

The regression results confirm the result of the growth accounting exercise with respect to the relative contributions of physical and human capital to the growth process over the 1960-99 period. Granger causality testing indicates that the growth in physical capital stock ‘causes’ the growth in human capital. Graca et al (1994) have argued that by assuming that physical and human capital interact in both the production and education technologies, then the level of physical capital influences investment in human capital. They further argue that economies in their early stages of growth, with low levels of human and physical capital, are driven by physical capital accumulation. After a ‘critical level’ of physical capital is reached, the economy takes off and enters a stage of sustained economic growth fuelled by human capital. While a significant degree of investment has taken place in education and training, the results probably suggest that the ‘critical level’ has not been fully reached.

The factors underlying total factor productivity growth were also examined. It is defined as:

$$tfpg = g_y - 0.43g_k - 0.57g_L = f(X) \quad (13)$$

where X is a vector of explanatory variables consisting of the growth of tourist arrivals, the growth of the government current expenditure to GDP ratio and inflation. The OLS regression equation is given by

$$tfpg = -0.03 + 0.27 g_{TA} + 0.09g_{expdp}^{(-1)} - 0.001 INFL \quad (14)$$

(-3.37) (4.61) (1.26) (-1.284)

$$adj R^2 = 0.40 \quad DW = 2.11 \quad F = 8.77 \quad SER = 0.03$$

Jarque-Bera Test for Normality of Residuals = 0.65; Breusch-Godfrey Serial Correlation Test (F Statistic) = 1.66; Ramsey RESET Test for Functional

Specification (F Statistic) = 1.24; Chow Forecast Test with 1995 as break point (F Statistic) = 0.13.

The results indicate that total factor productivity growth is driven by an 'export' variable, namely, tourist arrivals. This suggests that Verdoon's Law may hold for Barbados, that is, the expansion of external demand provides an 'economies of scale' argument for changes in productivity [see Downes and Leon, 1994]. Inflation has a negative but insignificant effect on productivity growth.

The quantitative analysis of economic growth in Barbados over the 1960-1999 period indicates the importance of physical capital growth, export of services (as measured by tourist arrivals) and government expenditure. Inflation has a negative impact on growth. Although human capital was not significant in the regression analysis, this may be due to some degree of correlation with physical capital.

Table 20a

Regression Results for Growth Equations 1964-1999 (gy is the dependent variable)

Variable	Ordinary Least Squares							
	1		2		3		4	
Constant	-0.01	(1.1-9)	-0.03	(-2.82)	-0.04	(-2.72)	-0.04	(-3.39)
Gc	0.41	(2.86)*	0.44	(2.98)*	0.44	(3.26)*	0.44	(3.33)*
Ghc	0.29	(2.42)*	0.27	(2.20)*	0.19	(1.55)	0.17	(1.56)
Gtarr	0.28	(5.85)*	0.29	(6.11)*	0.31	(6.41)*	0.32	(7.18)*
Gexpgdp(-1)	0.11	(2.05)*	0.10	(1.78)	0.21	(3.48)*	0.19	(3.64)*
Gmongdp	-0.19	(-3.09)*	-0.13	(-2.30)*	-0.09	(-1.40)	-0.11	(-2.24)*
Inflation	-0.001	(-1.96)			0.001	(0.49)		
Gtot	-0.08	(-1.27)			-0.03	(-0.41)		
ecm1(-1)	-0.27	(-2.43)*	-0.37	(-3.67)*	-0.73	(-2.99)*	-0.71	(-3.38)*
ecm2(-1)					-0.29	(-2.75)*	-0.25	(-3.62)*
ecm3(-1)					-0.08	(-1.93)	0.08	(-2.16)*
$\hat{R}^2$	0.71		0.68		0.76		0.78	
F	11.76		13.69		12.40		16.28	
DW	1.83		1.83		2.04		2.00	
SER	0.02		0.02		0.02		0.02	
Normality	0.13		2.56		1.45		0.92	
Serial Correlation	0.02		0.05		0.42		0.22	
ARCH	3.52		1.13		0.18		0.29	
RESET	0.15		0.26		1.08		0.91	
Chow	0.24		0.51		0.24		0.24	

**Table 20b**  
**Regression Results for Growth Equations: 1964-1999**

Variable	Instrumental Variables							
	1		2		3		4	
Constant	-0.02	(-1.46)	-0.04	(-2.48)	-0.06	(-2.32)*	-0.04	(-2.65)
Gc	0.59	(2.50)*	0.60	(2.46)	0.53	(1.91)	0.55	(2.37)*
Ghc	0.28	(2.12)*	0.22	(1.66)	0.06	(0.36)	0.15	(1.21)
Gtarr	0.26	(4.86)*	0.26	(4.93)	0.33	(5.39)*	0.32	(6.83)*
gexpgdp(-1)	0.12	(2.10)*	0.12	(2.00)	0.28	(2.93)*	0.20	(3.65)*
Gmongdp	-0.19	(-1.66)	0.60	(-0.75)	0.10	(0.51)	-0.09	(-1.32)
Inglation	-0.001	(-1.47)			0.002	(1.09)		
Gtot	-0.09	(-1.27)			0.03	(0.33)		
ecm1(-1)	-0.34	(-2.45)*	-0.43	(-3.35)*	-1.07	(-2.59)*	-0.80	(-3.12)*
ecm2(-1)					-0.45	(-2.22)*	-0.25	(-3.47)*
ecm3(-1)					-0.13	(-2.01)*	-0.09	(-2.23)*
$\bar{R}^2$	0.69		0.66		0.68		0.77	
F	9.78		11.31		8.46		14.44	
DW	1.84		1.90		2.15		1.93	
SER	0.02		0.02		0.02		0.02	
Normality	4.25		5.88		0.60		0.28	
Serial Correlation	0.25		0.53		0.76		0.12	
ARCH	2.41		0.83		0.99		0.14	
RESET	0.39		0.36		0.03		0.18	
Chow	0.36		0.36		0.24		0.33	

- Notes:
- i The asterisk (\*) indicates that the variable is statistically significant at the 5 percent level.
  - ii  $\bar{R}^2$  is the adjusted coefficient of multiple linear determinations.
  - iii DW is the Durbin-Watson statistic for first order serial correlation.
  - iv SER is the standard error of the regression equation.
  - v 'Normality' is the Jarque-Bera chi-square test for normality of the regression residuals.
  - vi 'Serial correlation' is the Breusch-Godfrey (Lagrange Multiplier) chi-square test for first order serial correlation.
  - vii 'ARCH' is the F-test for first order auto-regressive conditional heteroscedasticity in the residuals.
  - viii 'RESET' is the Ramsey's regression mis-specification F-test due to unknown omitted variables.
  - ix 'Chow' is the Chow F test for stability or structural breaks.
  - x The instruments used include  $gy(-1)$ ,  $ghc$ ,  $gtarr$ ,  $gexpgdp(-1)$ ,  $gmongdp(-1)$ ,  $inflation$ ,  $gtot$  and the appropriate  $ecm$  terms.

#### 4 A Concluding Assessment of the Growth Experience

The qualitative and quantitative analysis of economic growth in Barbados over the 1960-2000 period six factors which can explain the country's performance.

The *first* factor relates to the nature of the international environment within which Barbados has had to operate. Although it has been subject to external shocks, exports of goods and services have played a critical role in the country's growth and development. The regression analysis points to the important role of tourist services in the growth process.

The *second* factor relates to the growth of physical capital stock. Both the growth accounting and regression analysis exercises indicate the important role of the growth of physical capital in the growth process. Over the years the government has sought to encourage capital investment through several incentives; for example, accelerated depreciation allowances, low import duties and special income tax rates.

The *third* factor relates to the investment in human capital which been able to support physical capital investment. The government has invested a significant amount of funds in health and education over the years. The regression analysis indicates a positive impact for the human capital variable measured in terms of education. The growth accounting analysis points to the growing importance of human capital as a source of economic growth.

The *fourth* factor is the increase in government consumption expenditure relative to total output in the short-run. The regression analysis indicates a positive and lagged impact of the ratio of government current expenditure to GDP on economic growth. The result suggests that the government has had to intervene in the economy from time to time in order to promote economic growth.

The *fifth* factor involves the general maintenance of macroeconomic stability. Since the economy is vulnerable to external shocks, macroeconomic stability has involved the use of

a fixed exchange rate regime as a policy anchor, the maintenance of relatively low inflation rates and monetary and BOP stability. The analytical history of Barbados indicates that the government has sought to maintain macroeconomic environment although there were periods of macroeconomic instability.

The *sixth* factor is the quality of the country's institutions, namely a stable political party system with regular elections, active non-governmental organizations (such as the trade unions, church and social clubs), low levels of industrial disputes and work stoppages, free media, relatively low crime rates, the absence of corruption and a high regard for the 'rule of law'. During its economic crisis in the 1990s, the country was able to draw on the degree of trust and cooperation between the Government and the NGOs to form a social partnership (Government, trade unions and private sector) to ease the process of adjustment [see Downes, 1994].

It is clear that the quality of the factors of production (especially the human factor), the management of the economy the domestic, social, political and institutional environments and the external environment have been critical to the country's success. However, with changes taking place in the regional and global economies, the future growth and development of the country can be adversely affected unless strategic measures are taken. Barbados has to operate in an international environment characterized by radical changes in the generation and distribution of income and wealth, the integration of markets within economic blocs, trade liberalization and the reduction of preferential market access, the development and increasing use of new technologies (information, communications and materials), the re-distribution of aid and technical assistance to 'emerging' or transitional states. The data over the 1960-2000 period indicate a declining trend in the average annual growth rate of real GDP. This has been associated with a similar trend in the growth of physical capital stock and tourist arrivals. Over the period, the average annual growth rates have declined from about 5 percent in the 1960s to 1 percent in the 1990s. The significance of tourist arrivals in the long run growth process suggests that the tourism product has matured with a 'plateauing out' of the process. The revival of tourism via product development and aggressive marketing may be needed in order to raise the long-

run growth process. The declining role of growth of the physical capital stock in the context of a downward trend in the growth rate is suggestive that technological progress and innovation may not have been significant. The 'residual factor' in the growth accounting analysis was largely negative. It is possible that the growth of the services sector over the period may account for this feature since productivity growth in the services sector was lower than the overall average.

In terms of strategic response, the country would have to continue to enhance its human capital base (with greater emphasis on 'frontier skills'), forge greater linkages with Caribbean countries (especially with the formation of the Single Market and Economy), promote productivity management in order to be more competitive, identify international niche markets, maintain macroeconomic stability, engage in 'strategic development planning', reform its private and public sector organizations and provide a social safety net for the underprivileged. These measures would widen the ability of the country to capitalize on external market opportunities which are vital to its growth process. In addition, these measures would enhance the quality of the inputs needed to meet the challenges of the new economic environment. The maintenance of a 'stable' institutional environment and macroeconomic framework would reduce uncertainty and encourage investment. The country will still be subject to the volatility of the external economic environment but good macroeconomic management would reduce the negative impact which this volatility would have on economic growth.

## Appendix

### Sources of Data

**Real GDP:** Central Bank of Barbados: *Annual Statistical Digest* (various issues)

IMF: *International Financial Statistics Yearbook* (various issues).

Government Barbados: *Economic Report* (various issues).

**Tourist Arrivals:** Central Bank of Barbados: *Annual Statistical Digest*; Government of Barbados: *Economic Report* (various issues).

**Government Expenditure:** *ibid.*

**Retail Price Index:** *ibid.*

**Physical Capital Stock:** Boamah (1984), author's estimates.

**Human Capital:** Boamah (1975), author's estimates

**Savings/Time Deposits:** Central Bank of Barbados: *Annual Statistical Digest* (various issues).

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