

**THE EFFECT OF HUMAN CAPITAL ON ECONOMIC
GROWTH IN THE CARIBBEAN**

by

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The study utilises a traditional production function framework to measure the contribution of human capital to economic growth in Barbados over the period 1964-1993. The main finding is that when one takes account of qualitative improvements of the labor force in the growth accounting process, labor's contribution explains nearly 50% of economic growth in the country over the period of investigation. This is more than double labor's contribution when qualitative improvements are ignored.

I. INTRODUCTION

Since the beginning of the decade of the 1960s, it has increasingly been recognized that the concept of accumulation need not be limited to technology and physical capital but is also applicable to the cluster of factors, including health, education, on-the-job training and general skills of the labor force, which is collectively referred to as human capital.

The pioneering work of Solow (1957) and Denison (1962) suggested that in the process of accounting for economic growth in the US economy, the traditional factors of physical

capital and labor explained only a small fraction of the observed changes in output, leaving a substantial residual. As far as developing countries are concerned, studies by Williamson (1969) in the Philippines and Selowsky (1969) in Chile seem to suggest that the educational contribution to growth in these two countries, although not as large as was found by Denison (1962) for the United States, was nevertheless moderately significant. Physical capital formation accounted for a much larger share of output growth than was normally observed in developed economies. These studies, and the others that followed them, imputed a large part of the unexplained residual to increases in the level of education of the labor force, without necessarily setting out the framework by which such contribution could be measured.

The process of integrating knowledge acquisition into the theories of growth owes its genesis to the modern growth theories, led by endogenous growth models of which Romer (1986) is the main proponent. These theories recognise, inter alia, that the accumulation of knowledge is not only endogenously determined but knowledge itself may have an increasing marginal product.

While it is recognised that both human capital and physical capital, along with technological progress provide the main impetus for economic growth, the determinants of human capital accumulation have attracted less attention in the literature than physical capital mainly because of the extreme difficulties of measuring the former.

Early attempts to measure the educational component of human capital made use of literacy rates and school enrollment ratios. While the latter may be considered an improvement on the former, both are rather unsatisfactory. Literacy rates capture only a basic level of overall education but ignore the fact that some people are much better educated than others. Similarly, school enrollment ratios measure future capital rather than the present.

The wage or income-based approach to human capital measurement avoids some of the pitfalls that come from equating levels of education directly with human capital. It is based on the idea that the amount of human capital a person possesses should be reflected in pay. The underlying assumption is that wage rates and therefore labor incomes are determined endogenously by the marginal productivity of the worker. The latter, in turn, is determined by all the exogenous characteristics (such as education, experience, health and cognitive skills) which define human capital. This approach also has its drawbacks but in general, it represents a measure of improvement over the first two.

Barro and Lee (1993) and more recently, Mulligan and Sala-i-Martin (1995) provide recent examples of studies that have adopted this approach to measure human capital. This study is largely based on this approach.

The paper has two broad objectives:

- (i) to provide a framework for measuring human capital (mainly educational capital) in Barbados, a country which has a tradition of high literacy rates as a result of significant investment in education.

- (ii) to ascertain the contribution to economic growth of human capital, along with physical capital and labor inputs.

The organisation of the paper takes the following sequence: Section II outlines the theoretical framework underpinning the analysis; Section III deals with data sources and the empirical problem of generating the time series data necessary for the measurement of human capital contribution to growth. Section IV utilizes the framework of Section II and the information generated in Section III to measure past contribution of human capital to growth for Barbados. Finally, Section V concludes the paper with a brief summary and some remarks on possible policy implications.

II. THEORETICAL FRAMEWORK

Following Selowsky (1969) one can consider the contribution of human capital growth as having two components.

- (i) The effect of increases in the educational level of the labor force. This is the effect of increases in the level of schooling and general health of the labor force. This effect can be termed as "human capital deepening", analogous to physical capital deepening in capital theory.
- (ii) The contribution of human capital that derives from maintaining the average level of schooling of the labor force. This part can be considered as the contribution of human capital that derives from the efforts to equip additions

to the labor force with the same skills as the existing labor force. In this paper it is denoted as the "maintenance" component of human capital.

Most of the studies ignore the latter component of human capital contribution to growth but as Selowsky (1969) points out, its neglect tends to under-estimate human capital's contribution to growth and over-estimate the part of growth attributable to increases in the number of workers.

The following section outlines the procedure for deriving the two components of human capital.

A. *The General Model*

Consider an augmented neoclassical production function:

$$Y = F(K, L_0, L_1, \dots, L_n, Z) \tag{1}$$

where Y denotes aggregate output, K , the flow of services of physical capital stock, and $(L_0, \dots, L_1, \dots, L_n)$, man-hour inputs of members of the labor force with 0, ... i, ..., n years of schooling, respectively. Similarly, Z represents the contribution to growth of other factors such as external orientation, technology, etc. that may help explain the output level.

Equation (1) is a modified form of Solow's 1957 growth model that has been used extensively by, among others, Selowsky (1969), Feder (1983), Ram (1987) and Lin (1994). By differentiating equation (1) with respect to time and writing Y', L'_i respectively for $\frac{dY}{dt}, \frac{dL_i}{dt}$ etc. one can rewrite equation (1) as:

$$Y' = f_k K' + f_{l_0} L'_0 + f_{l_1} L'_1 + \dots + f_{l_n} L'_n + f_z Z' \quad (2)$$

where f_k, f_{l_i} represent the marginal productivities of physical capital $\left(\frac{\partial F}{\partial K}\right)$ and labor with i years of schooling $\left(\frac{\partial F}{\partial L_i}\right)$, respectively. Assume that wages reflect marginal productivities; then

$$Y' = f_k K' + \sum_{i=0}^n W_i L'_i + f_z Z' \quad (3)$$

In equation (3), W_i is the real wage of individuals with i years of schooling.

$$\text{Let } L = \sum_{i=0}^n L_i, \text{ therefore } L' = \sum_{i=0}^n L'_i$$

Thus one can write equation (3) as

$$Y' = f_k K' + W_0 L' + \sum_{i=0}^n (W_i - W_0) L'_i + f_z Z' \quad (4)$$

The term $f_k K'$ is the contribution of physical capital to growth and $W_0 L'$ the contribution of the uneducated component of all members of the labor force. The expression $\sum_{i=0}^n (W_i - W_0) L'_i$ can be considered as the contribution of the two components of education. It must be noted that so long as education creates external economies not captured by wage differentials, this term would underestimate the true contribution of education. On the other hand it would overestimate the contribution to the extent that innate ability, family connections, etc. are correlated with years of schooling.

To disaggregate the educational contribution into the two components mentioned above, let $a_i = \frac{L_i}{L}$ be the proportion of the labor force with i years of education. This represents the relative distribution of workers by years of schooling. From equation (4), the expression $\sum_{i=0}^n (W_i - W_0) L'_i$ may be written as $\sum_{i=0}^n (W_i - W_0) (a_i L)'$ which, in turn

becomes

$$L' \sum_{i=0}^n (W_i - W_0) a_i + L \sum_{i=0}^n W_i a'_i - W_0 L \sum_{i=0}^n a'_i \quad (5)$$

(since $(a_i L)' = (L a'_i + L' a_i)$)

By definition $\sum_{i=0}^n a_i = 1$ and hence $\sum_{i=0}^n a'_i = 0$.

The term $L \sum_{i=0}^n W_i a_i'$ in expression (5) is considered as the contribution to growth due to changes in the relative distribution of workers by years of schooling and $L' \sum_{i=0}^n (W_i - W_o) a_i$ as contribution to output deriving from the effort to equip additions to the labor force with the same skills as the existing labor force. It represents the "maintenance" component referred to earlier. One can now write equation (4) as

$$Y' = f_k K' + W_o L' + \sum_{i=0}^n (W_i - W_o) a_i L' + L \sum_{i=0}^n W_i a_i' + f_z Z' \quad (6)$$

$$\text{and hence } \frac{Y'}{Y} = \frac{f_k K'}{Y} + \frac{W_o L'}{Y} + \frac{L' \sum_{i=0}^n (W_i - W_o) a_i}{Y} + \frac{L \sum_{i=0}^n W_i a_i'}{Y} + \frac{f_z Z'}{Y} \quad (7)$$

Let the average wage, $\bar{W} = \frac{\sum_{i=0}^n W_i a_i}{\sum_{i=0}^n a_i}$

Therefore $\sum_{i=0}^n (W_i - W_o) a_i = (\bar{W} - W_o) \sum_{i=0}^n a_i = 1$

Hence equation (7) becomes

$$\frac{Y'}{Y} = \frac{K f_k K'}{Y K} + \frac{L W_o L'}{Y L} + \frac{L}{Y} (\bar{W} - W_o) \frac{L'}{L} + \frac{\bar{W} L}{Y} \frac{\sum_{i=0}^n W_i a_i'}{\bar{W}} + \frac{f_z Z'}{Y} \quad (8)$$

$$\text{or } \frac{Y'}{Y} = \frac{\alpha_k K}{K} + \frac{\alpha_b L}{L} + \frac{\alpha_e L}{L} + \frac{\alpha_q Q}{Q} + R \quad (9)$$

where $\alpha_k = \frac{K f_k}{Y}$ represents the share of physical capital in total output, $\alpha_b = \frac{W_o L}{Y}$

the share of the labor input in total output if every worker were uneducated, and

$$\alpha_e = \frac{(\bar{W} - W_o) L}{Y} \text{ the share of "educational" inputs in total output. } \frac{Q'}{Q} = \frac{\sum_{i=0}^n W_i a_i'}{\bar{W}}$$

also denotes the relative change in an index of the quality of labor input, and

$\alpha_q = \frac{\bar{W} L}{Y}$ labor observed share in output. R is a residual summarizing the contribution of other factors to the growth rate.

In discrete approximation of the time derivatives one can re-write (9) as:

$$\frac{\Delta Y}{Y} = \frac{\alpha_k \Delta K}{K} + \frac{\alpha_b \Delta L}{L} + \frac{\alpha_e \Delta L}{L} + \frac{\alpha_q \Delta Q}{Q} + R \quad (10)$$

Both parts of equation (10) can be computed for any time period for which data exist for output capital, labor as well as for the respective shares of capital and labor.

III. DATA SOURCES AND MEASUREMENTS

It can be seen from section II that the weights for the changes in the schooling distribution of the employed labor force are relative wages by categories of educational levels achieved. The 1960 census report for Barbados puts the literacy rate at about 95%. That means that for the period of the analysis almost every member of the labor force would have attained at least primary school level of education. Therefore it is not realistic to obtain the contribution of the labor force in total output if every worker were uneducated. The paper therefore estimates the contribution to output as if every worker were educated up to the primary level.

Three categories of the labor force with different levels of skill and knowledge are identified: those with educational level up to the primary school (L_1), those with secondary/technical and vocational training (L_2) and those with tertiary level of education¹ (L_3). Data for these categories of educational levels are available from various census data as well as Labor Market Information Bulletin published by the Ministry of Labor. The median salaries for the country's civil servants for the three categories identified were assumed to reflect the wages and/or salaries paid to the respective categories in the overall economy.² These were assembled from various issues of the "Schedule of Emoluments" published annually by the Ministry of Finance. Information on gross capital formation and the labor force employed were obtained from the "Annual Statistical Digest of the Central Bank of Barbados, while data for the stock of capital was taken from Boamah (1984).

As explained in section II, α_b represents the share of labor input in total output if every worker were only educated to the primary school level, α_q is the observed share of total labor input and α_k is the share of physical capital in total output. Similarly, α_e denotes the imputed share of labor input attributed to educational quality improvements beyond the primary school level.

As shown in equation (10) the measurements of α_b and α_q are straightforward.

The expression for α_k was obtained residually as $\alpha_k = (1 - \bar{W}Y)$. The variable $\Delta Q/Q$ represents the growth rate in the quality index of the labor force but there is no readily available data on it. To obtain a series for this recall from equation (8) that:

$$\frac{\Delta Q}{Q} = \frac{\sum_{i=1}^3 W_i \frac{a_i'}{W}}{\bar{W}} = \frac{1}{\bar{W}} \sum_{i=1}^3 W_i \left(\frac{L_i}{L} \right)' \quad (11)$$

Through a process of differentiating $\left[\frac{L_i}{L} \right]$ with respect to time and rearranging

terms, the expression for $\frac{\Delta Q}{Q}$ in equation (11) becomes

$$\frac{\Delta Q}{Q} = \frac{1}{\bar{W}} \sum_{i=1}^3 W_i \alpha_i \left(\frac{\Delta L_i}{L_i} - \frac{\Delta L}{L} \right) \quad (12)$$

$$\text{or } \frac{\Delta Q}{Q} = \frac{W_1 a_1}{\bar{W}} \left(\frac{\Delta L_1}{L_1} - \frac{\Delta L}{L} \right) + \frac{W_2 a_2}{\bar{W}} \left(\frac{\Delta L_2}{L_2} - \frac{\Delta L}{L} \right) + \frac{W_3 a_3}{\bar{W}} \left(\frac{\Delta L_3}{L_3} - \frac{\Delta L}{L} \right) \quad (13)$$

Thus a series on $\Delta Q/Q$ can easily be derived from the available information on the a_i 's, L_i 's, W_i 's and \bar{W} .

Figure 1 represents the evolution of employed labor in Barbados by different levels of education for the period 1963 to 1993. As expected, with the exception of L_1 which decreased over the period, L_2 and L_3 increased on average. Figure 2 illustrates the time series behavior of relative wages by level of education for the three classes identified. It demonstrates that over the period of investigation relative wages followed a declining trend, particularly for those individuals with higher levels of education.

Individuals with university level education received nearly six times the real average wage in 1963, but by 1993 they were paid only two and a quarter times the average wage. A logical explanation for this is that in 1963, individuals with university level education were relatively more scarce and hence received a higher wage premium. In later years as proportionately more people acquired higher education the wage premium gradually declined.

The relative wages of workers with only primary school education showed the least variation from the mean over the period of investigation. Those individuals received a little over 58% of the real average wage in 1993 compared with 69% in 1963 but it is noteworthy that in 1993 they received one-quarter the real wages of individuals with university level education compared with only one-ninth³ in 1963.

IV. EMPIRICAL RESULTS

The results obtained from applying Barbados' data to model (10) are presented in tables 1 and 2. (See tables A1 and A 2 in the appendix for the full results). Table 1 presents the results of aggregating the labor force without taking explicit account of labor quality improvements.

That is, the formula $\frac{\Delta Y}{Y} = \alpha_k \frac{\Delta K}{K} + \alpha_l \frac{\Delta L}{L} + R'$ was utilised, where α_k and α_l are the respective shares of capital and labor defined such that $\alpha_k + \alpha_l = 1$. The table suggests that for the period 1964 to 1993, out of an average growth rate of real output of 4.96%, increases in capital inputs accounted for 1.48% and labor 0.99%, leaving a residual averaging 2.49%. In other words, increases in capital inputs accounted for approximately 30% of the growth rate of real output, labor approximately 20%, leaving 50% accounted for by other factors.

Table 2 presents the results when the employment data is disaggregated to account for labor quality improvements. The results in this scenario suggest that, on average, the contribution to real growth of unskilled labor (that is, if it were assumed that every worker were educated only to the primary level) during the period 1964-1993 was about 13.8% (growth rate 0.68%) and that arising from the effort to equip new job entrants with just enough education to maintain the educational level of the entire work force as previously existing was approximately 6.2% (growth rate 0.31%). At the same time the contribution to growth as a result of qualitative improvements of the work force (human capital deepening) was a significant 29.4% (growth rate 1.46%). In sum, the total contribution to growth by labor when qualitative improvements are taken into account amounts to a significant 49.4% as compared with only 20% when labor quality improvements are ignored. Increases in capital inputs continue to contribute approximately 30% to the growth rate of real output. The residual in this case contribute only 20.8%, compared with about 50% when one does not take labor quality improvements into consideration.

In other words the residual or what is usually referred to in the literature as total factor productivity (see Jorgenson and Griliches, 1967) becomes the most important factor explaining growth rates in Barbados if no account is taken of labor quality improvements. However, labor's contribution to growth becomes the most dominant when one takes labor quality improvements into consideration, explaining nearly half the growth rate of output. Total factor productivity in this case accounts for only 20% of economic growth. This

suggests that through labor quality improvements technical progress in Barbados has largely been embodied in labor.

The robust contribution to growth in Barbados resulting from qualitative improvements in labor is further supported by the results of an exploratory regression of a general production function in which labor disaggregated into the respective educational levels enter as separate arguments along with physical capital. The results (available on request) put the estimated combined share of labor in output at approximately 80% compared with only 44% when an aggregated labor variable is fitted with physical capital. The share of physical capital is approximately 12%.

V. CONCLUSIONS

The main conclusion from the paper is that human capital has contributed significantly to economic growth in Barbados over the period 1964-93 considered. The analysis also suggests that technical change over the period has largely been embodied in labor. This is consistent in an economy like Barbados which is famous for the high investment in education and which boasts a literacy rate of over 90%.

The results of the study have some implications for policy. Physical capital has traditionally been subsidized in Barbados by way of fiscal incentives because of its perceived importance in stimulating economic expansion. The results of this study suggest that investment in human capital is an equally effective way to stimulate economic

growth so that public policy to upgrade the labor force should continue to receive high priority in the country's development strategy.

While the results appear plausible, they need to be taken with caution to the extent that the study is based on the neo-classical marginal productivity theory of labor which assumes that labor is paid the value of its marginal product. Naturally market imperfections such as institutional wage setting as obtains in Barbados would create a divergence between marginal product and real wages.

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NOTES

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1. To be classified in this category, a person must be a university graduate, at the minimum.
2. The assumption is made for convenience in view of the total lack of published information on wages and salaries paid in the private sector. Nevertheless, the relative wages by levels of education in the private sector are not likely to deviate substantially from those in the civil service.
3. Institutional facts such as the influence of labor unions may have been partly responsible for the declining wage differential between the least and highest educated workers.

TABLE 1

Contributions to Growth in Barbados
(Without Accounting for Labor Quality)
Selected Years

Year	$\Delta Y/Y$	$\alpha_k (\Delta K/K)$	$\alpha_l (\Delta L/L)$	R
1965	0.13424	0.00139	-0.00477	0.13762
1968	0.05267	0.00966	0.02603	0.01698
1971	0.02779	0.02182	0.01294	-0.00697
1974	-0.02298	0.03124	-0.00067	-0.05355
1977	0.03596	0.02774	-0.00440	0.01262
1980	0.04395	0.03120	0.02664	-0.01281
1983	0.00491	0.01678	-0.00658	-0.00529
1986	0.05106	0.01571	0.03390	0.00145
1989	0.03597	0.01039	0.02291	0.00268
1993	0.00808	0.01055	-0.00935	0.00688
Average ^a				
1964-1993	0.04962	0.01484	0.00982	0.02487

Note ^a: The Calculations of the average contributions cover the entire period of analysis and have been restricted to the period of positive rate of growth of output.

TABLE 2

Contributions to Growth in Barbados
(Accounting for Labor Quality)
Selected Years

Year	$\Delta Y/Y$	$\alpha_k (\Delta k/k)$	$\alpha_l (\Delta L/L)$	$\alpha_e (\Delta L/L)$	$\alpha_q (\Delta Q/Q)$	R
1965	0.13424	0.00139	-0.00307	-0.00170	0.02987	0.10775
1968	0.05267	0.00965	0.01709	0.00894	0.02199	-0.00501
1971	0.02779	0.02182	0.00900	0.00393	0.01367	-0.02064
1974	-0.02298	0.03124	-0.00046	-0.00021	0.00642	-0.05997
1977	0.03596	0.02774	-0.00318	-0.00122	0.00391	0.00871
1980	0.04395	0.03012	0.01901	0.00763	0.00361	-0.01642
1983	0.00491	0.01678	-0.00434	-0.00224	0.00819	-0.01347
1986	0.05106	0.01571	0.02081	0.01309	0.02919	-0.02774
1989	0.03597	0.01039	0.01482	0.00808	0.00795	-0.00527
1993	0.00808	0.01055	-0.00545	-0.00389	0.01039	-0.00351
Average ^a						
1964-1993	0.04962	0.0484	0.00683	0.00309	0.01457	0.01030

Note ^a: The calculations of the average contributions cover the entire period of analysis and have been restricted to the periods of positive rates of growth of output.

FIGURE 1

Employed Labour in Barbados
(by Level of Education)

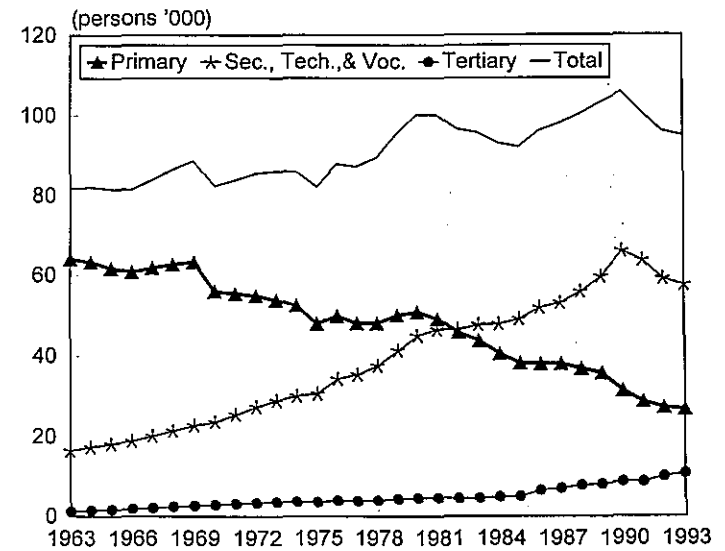
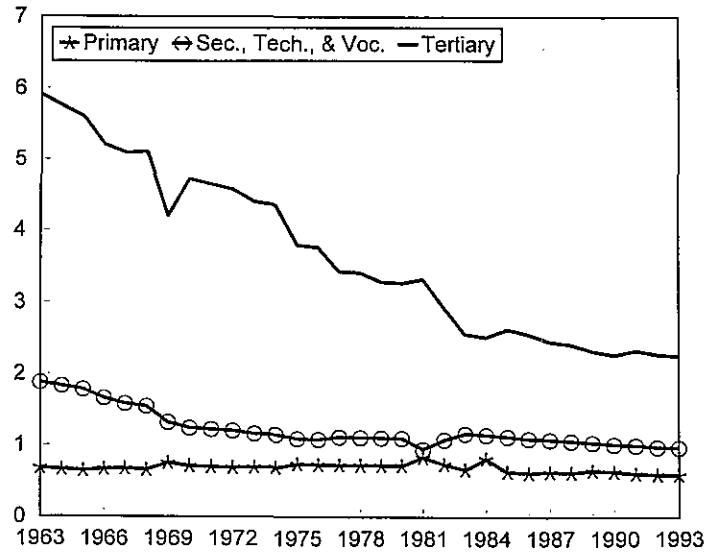


FIGURE 2

Relative Wages in Barbados
(by Level of Education)



APPENDIX OF TABLES

TABLE A1

Contributions to Growth in Barbados
(Without Accounting for Labor Quality)

Year	$\Delta Y/Y$	$\alpha_k (\Delta K/K)$	$\alpha_l (\Delta L/L)$	R
1964	0.02177	-0.01472	0.00411	0.03239
1965	0.13424	0.00139	-0.00477	0.13762
1966	0.07671	0.00198	-0.00119	0.07592
1967	0.09332	0.00433	0.03027	0.05872
1968	0.05267	0.00966	0.02603	0.01698
1969	0.10774	0.00250	0.02479	0.08046
1970	0.12710	0.02458	-0.05621	0.15874
1971	0.02779	0.02182	0.01294	-0.00697
1972	0.01195	0.01968	0.01376	-0.02149
1973	0.02798	0.01958	0.00434	0.00407
1974	-0.02298	0.03124	-0.00067	-0.05355
1975	-0.01904	0.02113	-0.02520	-0.01498
1976	0.04396	0.04846	0.03801	-0.04251
1977	0.03596	0.02774	-0.00440	0.01262
1978	0.04910	0.02357	0.01526	0.01026
1979	0.07900	0.01677	0.04023	0.02200
1980	0.04395	0.03120	0.02664	-0.01281
1981	-0.01899	0.09828	-0.00109	-0.11618
1982	-0.04895	0.03813	-0.01994	-0.06714
1983	0.00491	0.01678	-0.00658	-0.00529
1984	0.03609	0.01437	-0.01753	0.03925
1985	0.01092	0.01012	-0.00810	0.00891
1986	0.05106	0.01571	0.03390	0.00145
1987	0.02597	0.01690	0.01483	-0.00576
1988	0.03501	0.02215	0.01786	-0.00500
1989	0.03597	0.01039	0.02291	0.00268
1990	-0.03305	0.01055	0.02104	-0.06464
1991	-0.03896	0.00845	-0.04031	-0.00709
1992	-0.05705	0.00912	-0.03883	-0.02734
1993	0.00808	0.01055	-0.00935	0.00688

TABLE A2
Contributions to Growth in Barbados
(Accounting for Labor Quality)
Selected Years

Year	$\Delta Y/Y$	$\alpha_k (\Delta k/k)$	$\alpha_b (\Delta L/L)$	$\alpha_e (\Delta L/L)$	$\alpha_q (\Delta Q/Q)$	R
1964	0.02177	-0.01472	0.00272	0.00139	0.03599	-0.00361
1965	0.13424	0.00139	-0.00307	-0.00170	0.02987	0.10775
1966	0.07671	0.00198	-0.00079	-0.00040	0.01905	0.05687
1967	0.09332	0.00433	0.02039	0.00988	0.01649	0.04223
1968	0.05267	0.00965	0.01709	0.00894	0.02199	-0.00501
1969	0.10774	0.00250	0.01864	0.00614	0.01312	0.06733
1970	0.12710	0.02458	-0.03979	-0.01643	0.03344	0.12530
1971	0.02779	0.02182	0.00900	0.00393	0.01367	-0.02064
1972	0.01195	0.01968	0.00943	0.00433	0.01191	-0.03340
1973	0.02798	0.01958	0.00300	0.00133	0.01287	-0.00880
1974	-0.02298	0.03124	-0.00046	-0.00021	0.00642	-0.05997
1975	-0.01904	0.02113	-0.01856	-0.00664	0.00753	-0.02251
1976	0.04396	0.048459	0.02772	0.01029	0.00644	-0.04895
1977	0.03596	0.02774	-0.00318	-0.00122	0.00391	0.00871
1978	0.04910	0.02357	0.01096	0.00430	0.00371	0.00656
1979	0.07900	0.01677	0.02886	0.01137	0.00536	0.01664
1980	0.04395	0.03012	0.01901	0.00763	0.00361	-0.01642
1981	-0.01899	0.09828	-0.00091	-0.00018	0.00336	-0.11954
1982	-0.04895	0.03813	-0.01461	-0.00533	0.00359	-0.07073
1983	0.00491	0.01678	-0.00434	-0.00224	0.00819	-0.01347
1984	0.03609	0.01437	-0.01136	-0.00617	0.01245	0.02680
1985	0.01092	0.01011	-0.00512	-0.00299	0.01114	-0.00224
1986	0.05106	0.01571	0.02081	0.01309	0.02919	-0.02774
1987	0.02597	0.01690	0.00929	0.00554	0.00754	-0.01330
1988	0.03501	0.02215	0.01100	0.00686	0.01540	-0.02040
1989	0.03597	0.01039	0.01482	0.00808	0.00795	-0.00527
1990	-0.03305	0.01055	0.01329	0.00775	0.02800	-0.09264
1991	-0.03896	0.00844	-0.02335	-0.01596	0.00887	-0.01596
1992	-0.05705	0.00091	-0.02290	-0.01593	0.02610	-0.05344
1993	0.00808	0.01055	-0.00545	-0.00389	0.01039	-0.00351

TABLE A3
Employed Labour in Barbados by Level of Education
(\$'000)

Years	L	L1	L2	L3
1963	81.7	64.1	16.4	1.2
1964	82.0	63.3	17.3	1.5
1965	81.6	61.8	18.1	1.7
1966	81.5	60.8	18.8	1.9
1967	84.1	61.8	20.1	2.1
1968	86.5	62.7	21.4	2.4
1969	88.7	63.3	22.7	2.7
1970	82.4	56.0	23.6	2.9
1971	83.9	55.4	25.4	3.1
1972	85.6	54.9	27.3	3.3
1973	86.1	53.7	28.8	3.5
1974	86.0	52.4	30.0	3.6
1975	82.1	47.9	30.6	3.5
1976	87.8	49.8	34.2	3.9
1977	87.2	48.0	35.3	3.8
1978	89.5	48.1	37.5	3.9
1979	95.5	49.9	41.3	4.3
1980	100.3	50.8	44.9	4.5
1981	100.1	49.0	46.4	4.6
1982	96.6	45.8	46.4	4.4
1983	95.7	43.6	47.6	4.5
1984	93.1	40.5	47.8	4.8
1985	92.1	38.1	49.0	5.0
1986	96.2	38.0	51.8	6.4
1987	98.0	38.0	53.0	7.0
1988	100.3	36.8	55.8	7.7
1989	103.2	35.7	59.5	7.9
1990	105.8	31.3	65.9	8.6
1991	100.8	28.6	63.6	8.6
1992	96.1	27.2	59.0	9.9
1993	95.0	26.8	57.5	10.6

Source: Annual Statistical Digest (1996), Central Bank of Barbados
Note: L₁: Primary, L₂: Sec, Tech & Voc.; L₃: Tertiary

TABLE A4
Real Wages in Barbados by Level of Education
(S'000)

Year	W1	W2	W3	W
1963	3.5	9.8	30.7	5.2
1964	3.5	9.7	30.5	5.3
1965	4.4	9.4	29.6	5.3
1966	3.8	9.4	29.4	5.7
1967	4.0	9.3	29.9	5.9
1968	3.8	8.9	29.5	5.8
1969	5.0	8.8	28.0	6.7
1970	4.6	8.1	31.0	6.6
1971	4.1	7.2	27.6	6.0
1972	3.9	6.8	25.8	5.6
1973	4.4	7.3	27.7	6.3
1974	3.3	5.5	20.8	4.8
1975	3.5	5.2	18.0	4.7
1976	3.3	4.9	17.1	4.6
1977	4.0	6.2	19.2	5.6
1978	3.7	5.7	17.5	5.1
1979	3.9	6.0	17.7	5.4
1980	3.4	5.2	15.5	4.7
1981	4.0	4.5	15.9	4.8
1982	3.6	5.3	14.4	4.9
1983	4.1	7.2	15.9	6.2
1984	3.9	6.9	15.2	6.0
1985	4.6	8.1	18.7	7.2
1986	4.5	8.0	18.7	7.3
1987	4.8	8.3	18.8	7.7
1988	4.6	7.9	18.0	7.4
1989	5.1	8.1	18.1	7.8
1990	4.9	7.8	17.6	7.8
1991	4.8	8.0	18.6	8.0
1992	4.6	7.5	17.6	7.7
1993	4.5	7.4	17.4	7.7

Note: W₁: Primary; W₂: Sec, Tech & Voc; W₃: Tertiary
Source: Annual Statistical Digest (1996), Central Bank of Barbados

