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HUMAN CAPITAL DEVELOPMENT AND ECONOMIC GROWTH IN SURINAME

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Human Capital Development and Economic Growth in Suriname

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ABSTRACT

This paper investigates the effects of human capital on economic growth in Suriname for the period 1971 to 2011. Many empirical studies indicate that the accumulation of this form of capital has a significant impact on macroeconomic growth. At the same time some studies show an overestimation of the role of human capital in growth. In this research, we measure human capital through education indicators. We argue that the development of human capital stimulates countries to be innovative and develop modern production technology to catch up with more developed countries. The findings of this investigation indicate that human capital also affects long-run macroeconomic growth in Suriname through primary and secondary education.

Contents

1. Introduction

Long before the political independence of Suriname in 1975, the mining sector has been the centre of attention of policymakers and, as such, many investments were made to exploit this natural capital. Since then, mining remains a sector of high economic importance for the Surinamese economy. In its country development plan (2010), the government of Suriname has stated to achieve sustained annual economic growth of six per cent. However, to realize this level of growth, the country needs to develop sustainable engines of growth. As natural resources are exhaustible, these need to be exploited as effectively and efficiently as possible. In order to mitigate the significant dependence on natural resources, the country must moreover diversify and initiate the development of other sectors with a renewable and sustainable nature and with a higher added value. Investing in knowledge, i.e. in the development of human capital, is crucial to enhance the skill level of the Surinamese labour force and thus increase productivity of the entire economy.

Many scholars emphasize the importance of human capital development for the well-being of the individual. Schultz (1961) defines human capital as the useful skills and knowledge acquired by people. Investments in education and health are investments in human capital. Mincer (1958) and Becker (1962) also demonstrate that higher levels of human capital lead to increased individual future wages and possibilities. Lucas (1988) and Romer (1989) demonstrate that human capital development has a vital impact on macroeconomic growth. Accumulated human capital in individuals, results in a more productive labour force since the accumulation of knowledge also leads to innovation and technological progress. A higher productivity therefore ultimately results in a rise of national income. Based on this, it is argued that human capital must be an important determinant for economic growth.

This paper investigates whether human capital development has contributed to macroeconomic growth in Suriname during the period 1971 to 2011.

The purpose of this study is to identify human capital as a sustainable and renewable engine of macroeconomic growth of the Surinamese economy so that policy makers will undertake conscious efforts to invest in and improve education.

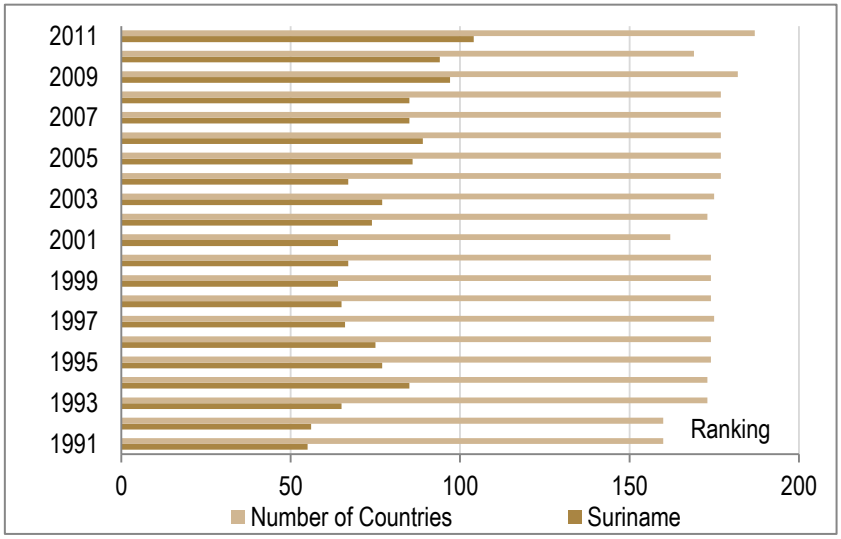
In section two of this paper, human capital development in Suriname is reviewed through several education indicators. Section three briefly reviews economic growth in Suriname. Section four constitutes the literature review on human capital. In section five, econometric methods are used to test the effects of human capital formation on economic growth in Suriname. Finally, section six presents the conclusion and policy recommendations.

2. Human Capital Development in Suriname

To measure human development, the Human Development Index (HDI) was developed in 1990 by the United Nations Development Programme (UNDP). This index combines indicators of income, education and health to determine an individual's well-being and to

measure his/her capacity to innovate and to create knowledge in order to enhance efficiency and productivity. The UNDP (1990, 1996) points out that human development is 'a process of enlarging peoples' choices' and the development opportunities for counties can only be created through economic growth that 'stresses people and their productive potential'.

Figure 1: HDI Ranking of Suriname



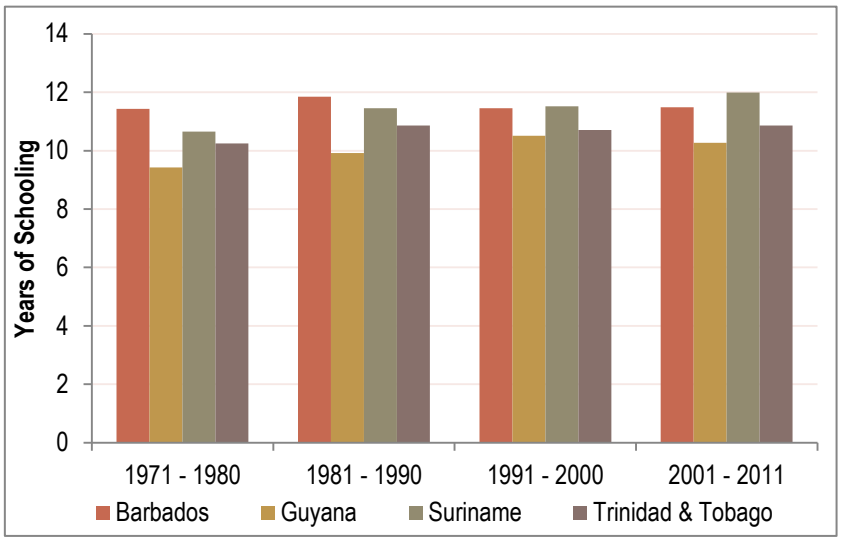
Source: UNDP (2013)

Investigating the HDI performance, Suriname, in 1991, found itself in a 55th place out of 160 countries, while it was ranked 104th out of 187 countries in 2011 (figure 1). This decline could imply that the country's human development indicators had deteriorated during 1991 and 2011. However, as this was not the case, it seems more evident that the process of improving human development in Suriname was slower than in other countries. The deterioration was, therefore, of a relative nature because the HDI of Suriname itself almost remained at a constant level.

Expected Years of Schooling

The "Expected Years of Schooling" indicates the number of years a pupil is expected to receive formal schooling, including years of repetition. In 2011 the expected years of schooling for Suriname is 13.2 years (UIS, 2013). This implies that an average pupil in Suriname is expected to complete secondary education, but not on average university education, as primary education covers 6 years and secondary education covers 7 years of schooling. However, comparing this figure to those of Guyana, Barbados and Trinidad and Tobago, Suriname has a higher school life expectancy since 2001. The expected years of schooling in Suriname has increased from 10.2 years in 1971 to the aforementioned 13.2 years in 2011 (figure 2).

Figure 2: Expected Years of Schooling (period averages)

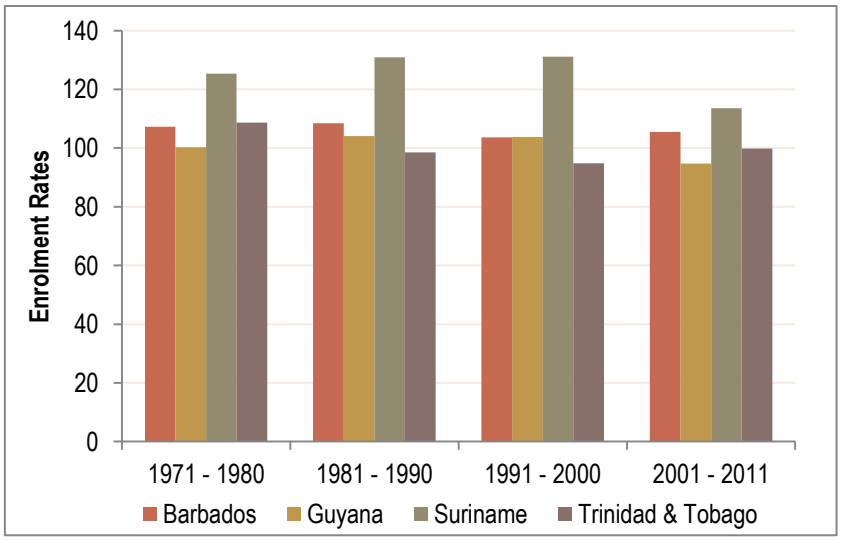


Source: UNESCO Institute for Statistics (UIS), 2013

Enrolment

The primary school enrolment ratio indicates the number of children who are enrolled in primary education as a percentage of the total children of that official school age population (UIS, 2013). For Suriname, this indicator has consistently been higher than 100% since 1971 (figure 3).

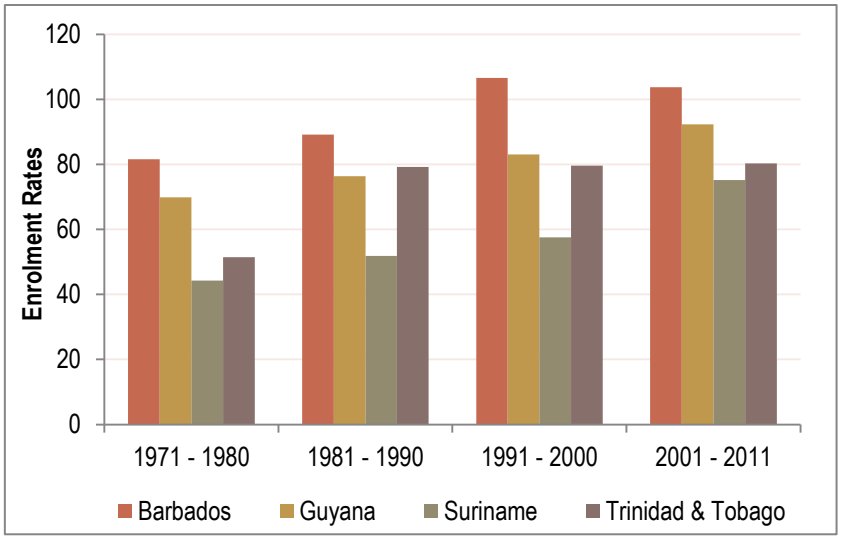
Figure 3: Primary School Enrolment Rates (period averages)



Source: UIS, 2013

The primary school enrolment ratio of Suriname has ranged from 106.6% and 150.1% in the period 1971 to 2011 and has shown a declining trend. Van Dijck et al (2000) stress the primary enrolment rates of Suriname have been on a global level until the late eighties, while the secondary enrolment rates of Suriname have always been below the Caribbean level, but approximately comparable to middle-income countries in Latin America.

Figure 4: Secondary School Enrolment Rates (period averages)



Source: UIS, 2013

Contrary to the high primary school enrolment ratios for Suriname, the average secondary school enrolment ratio is only 56.0% for the period 1971 to 2011 (figure 4). This rate ranged from 34.4% to 85.3% during the period under consideration.

Formal primary education in Suriname is free of charge and the literacy rate of the estimated 524,000 population of Suriname is approximately 95 per cent. Eligibility to be enrolled in pre-primary education (two years) starts at four years of age. Pupils from the age of six are eligible to be enrolled in primary education. By law, school attendance is mandatory for children from 7 to 12 years old. Secondary education in Suriname amounts to six to eight years, depending on the educational institute and at tertiary level, Suriname has only one university en several higher vocational institutions.

Martin and Piras (1998) indicated that the educational sector in Suriname faces several challenges, such as absenteeism of teachers. Furthermore the acquired skills of students of especially vocational education, are limited. Official Development Assistance (ODA) from the Netherlands has been of great importance for the strengthening of this sector. Between 1993 and 1998, the share of education in GDP amounted to 5%, while this sector employed 30% of public workers and 12.5% of the labour force.

Van Dijck et al (2000) indicate that the country's literacy rate has been approximately 85% in 1995 according to the Ministry of Education and Community Development. However, the quality of education has been an issue. Between 1990 and 1995, the many primary schools in the interior of the country were destroyed in a civil war. Not all of these schools were rebuilt which led to the lack of access to primary education for children in the interior. The most recent literacy rate for Suriname was estimated at 94.7% in 2009 (UIS, 2013).

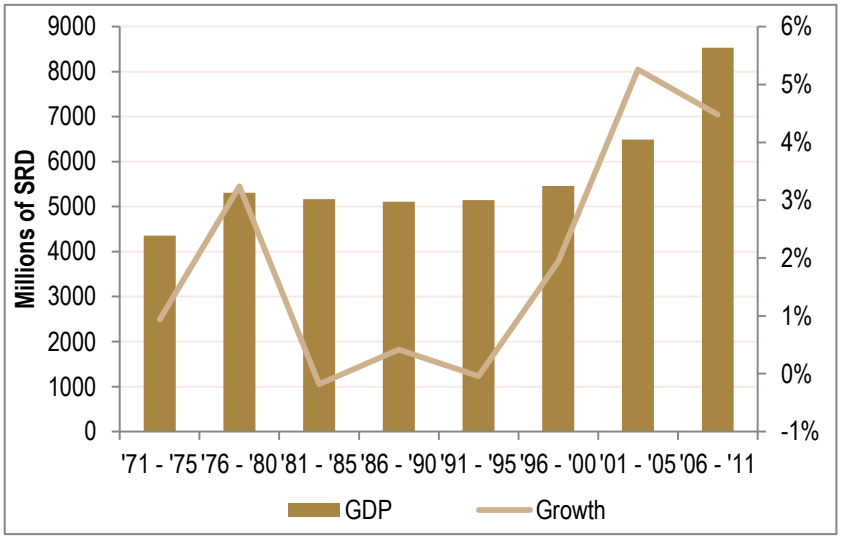
The Ministry of Education and Community Development of Suriname (2004) points out that the quality of formal education in Suriname has deteriorated since political independence was

gained in 1975. This deterioration was due to the fact that the educational sector in Suriname has to face, amongst other things, outdated curricula, lack of qualified teachers (especially secondary and higher education), high rates of repeaters and drop-outs, inadequate school infrastructure, limited possibilities for further education and gender inequality. These issues were already listed earlier by Martin and Piras (1998) and Van Dijck et al (2000). Therefore, the contribution of this sector to human development in Suriname has not been optimal. Furthermore the Ministry of Education and Community Development of Suriname points out that lack of Information Technology (IT) usage in education is another major issue the educational sector in Suriname has to deal with. Approximately 20% - 25% of the government budget is allocated for the educational sector. However, a large part of the expenditures is on salaries of educational staff (teachers) and non-educational staff (e.g. cleaning personnel and security guards).

3. Economic Growth in Suriname

Economic growth in Suriname went through different phases in the period 1971 to 2011. In this period, growth averaged 2.1% and was mainly driven by the production and exports of primary and secondary mining products (bauxite, alumina, oil and gold).

Figure 5: Economic Growth in Suriname (period averages)



Source: Central Bank van Suriname, 2013

From independence (1975) to 1992, Suriname has experienced relatively low levels of growth as a result of several events and circumstances like governance inexperience, downturn in commodity prices and an interior armed conflict. Some structural reforms in the period 1992-1996 accompanied by relatively sound macroeconomic policy measures revived the economy (Van Dijck, Dijkstra, De Jong, Martin and Vos, 2000). From 2000 onwards, economic growth became more sustainable on an average level of 4.6% while per capita growth averaged 3.4% (Central Bank of Suriname, 2012) as a result of investments in the

mining, infrastructure, and construction sector. Moreover, these developments were supported by largely prudent fiscal and monetary policies.

4. Literature Review

Economic growth theory distinguishes between exogenous and endogenous (or new) growth theories. In exogenous theories, technological progress is determined outside the economic model, while in endogenous theories this factor is determined from within the model. What all these growth theories agree on is the crucial role of capital formation (Weil, 2013).

In neoclassical growth theory, Solow (1956) explains that economic growth is mainly driven by capital, labour and total factor productivity. Total factor productivity however is regarded to increase at an exogenous rate. Todaro and Smith (2006) indicate that a shortcoming of the neoclassical growth theory is the absence of technological progress, resulting in loss of explanation power of economic growth of especially more industrialized countries. In contrast, endogenous growth theories attempt to explain these unexplained determinants of growth. The importance of investments in human capital and savings are stressed in these endogenous growth theories.

Human capital theory has proved that the development of human capital has significant positive effects on a microeconomic as well as on a macroeconomic level. Schultz (1961) and Becker (1962) indicate that expenditures on education and health and the acquisition of information regarding the economic system are investments in human capital. Human capital, in turn, raises initial income and enlarges potential and possibilities. Arrow (1962) states that learning takes place by doing. This is a practical and, sometimes, informal process of the acquisition of knowledge and skills. Nelson and Phelps (1966) explain that education helps people on their way to perform better professionally. Education improves one's potential to process and interpret information. It also enables the worker to understand and use modern technology that was developed elsewhere. Their research showed that "the rate of return to education is greater, the more technologically progressive the economy is".

As human capital benefits individual income, so does accumulation of this form of capital raises national income. Mincer (1981), Lucas (1988) and Romer (1989) explain how human capital development is a precondition for macroeconomic growth as the rates of return of labour and capital depend on the level of human capital. In this regard, human capital embodied in human beings enhances the level of labour and capital productivity and also the possibilities to exploit available physical capital. More educated people develop more skills that increase their ability to operate sophisticated machinery, programs and processes resulting into rising personal levels of output and income.

The level of human capital availability is crucial as it endogenously explains differences in economic growth rates of countries. Romer (2001) explains how these differences, especially between poor and rich countries, can eventually be eliminated. This phenomenon called

convergence explains the underlying process of how poor countries catch up to richer countries by improving both labour and capital productivity. Investing in education increases knowledge and skill levels and enables the employment of better technologies.

Viaene and Zilcha (2001) explain that endogenous economic growth is a result of efficient investments in human capital. Furthermore they explain that higher initial levels of human capital decrease economic inequality. Education creates equal chances as rising personal income of poorer households catch up with households with higher incomes. They indicate that this occurs especially when technology is integrated effectively in public education**.** Hanushek and Woessman (2007) recommend countries must focus more on enhancing the quality of education instead of enhancing enrolment ratios. Both the quality of education, knowledge and experience of workers strongly affect economic growth. Considering the average years of schooling as the most appropriate proxy for human capital, Son (2010) indicates that since the past decades, developing countries have been producing human capital at a higher pace than more developed countries. In this process, the labour market plays a central role, as knowledge absorbed at school is applied on the job. Human capital may increase the output per worker with 5 to 10 per cent. De La Fuente (2011) supports the view that human capital boosts economic growth through productivity. He argues that the human capital elasticity effect on economic growth should at least be around 60 per cent. However, the quality of schooling data played a vital role in obtaining the proper coefficient for the impact of education on growth in many previous studies. Hanushek (2013) explains that improving the quality of education is crucial for developing countries to achieve long-run growth. Besides formal education, the role of cognitive development is also vital in the process of economic growth in especially developing countries.

In this paper we use education as a measure for human capital. Nehru, Swanson and Dubey (1995) measured human capital stock through the years of educational attainment. This determinant proves to be of importance for labour productivity, which boosts overall economic output. The Commission on Growth and Development installed by the World Bank (2008) stresses that the years of schooling is a "convenient summary indicator for education", but that other factors, such as family background and the quality of education, also matter for growth. Barro (1996) and Barro and Lee (2011) suggest that enrolments in primary and secondary formal education are reasonable indicators for the level of education as they find a strong positive relation between school attainment and initial GDP per capita.

5. Data-analysis and Results

Data ranging from 1971 to 2011 is used to analyse the impact of human capital formation on economic growth in Suriname. The data sources are presented in appendix 1, while descriptive statistics of relevant variables are presented in appendix 2. All variables are measured in natural logarithmic real terms. The variables in the model are derived from literature with respect economic growth (e.g. Weil, 2013). They were also selected because

they have probably impacted economic growth of Suriname during the period under investigation. The long-run model used in this empirical research is presented in equation 1:

$$\ln(\mathrm{GDPC_t}) = \beta_0 + \beta_1 \ln(\mathrm{HC_t}) + \beta_2 \ln(\mathrm{GE_t}) + \beta_3 \ln(\mathrm{XP_t}) + \epsilon \qquad \textbf{Equation 1}$$

GDP per capita (GDPC), the dependent variable, is measured by the Gross Domestic Product. Human capital (HC), government expenditure (GE) and total exports of goods and services (XP) are used as determinants of economic output. HC is measured by education indicators, namely primary school enrolments (PE) and secondary school enrolments (SE).

All variables are tested for unit roots, using the Augmented Dickey-Fuller (ADF), Philips-Perron (PP) and Kwiatowski, Phillips, Schmidt and Shin (KPSS) unit root tests. In levels, the variables are integrated of the order one I(1). The results of the unit root tests are presented in appendix 3.

First the model with variables in levels is estimated by using Ordinary Least Squares (OLS) regression. Enders (2010) explains that the error term of an OLS regression of non-stationary variables indicates whether cointegration exists. An I(0) error term indicates the presence of cointegration, while an I(1) error term of regression implies the OLS should be measured in differences.

With the presence of cointegration, a Stock and Watson (1993) Dynamic OLS (DOLS) is used to estimate the long-run and short-run behaviour of the model, applying the HAC (Newey-West) approach to obtain valid standard errors. The DOLS model deals with endogeneity and serial correlation, by adding leads and lags of explanatory variables, and has the advantage to estimate relatively short time series. A general DOLS is expressed as:

$$Y_t = \beta_0 + \vec{\beta} X + \sum_{j=-m}^{n} \overrightarrow{\delta_j} \Delta X_{t-j} + \epsilon_t \qquad \textbf{Equation 2}$$

Y_t: $regressand$
β_0: $constant$
$\vec{\beta}$: $the\ vector\ of\ long-run\ coefficients\ (cointegrating\ vector)$
X: $matrix\ of\ regressors$
m: $lead\ length$; n: $lag\ length$
$\overrightarrow{\delta_j}$: $the\ short-run\ coefficients$
ϵ_t: $the\ residuals\ of\ the\ regression$

A DOLS with 1 lead and 1 lag is estimated and thereafter reduced using a general-to-specific reduction procedure, which is a method of stepwise elimination until only significant variables remain. The long-run results are presented in Equation 3. Non-stationarity of the DOLS residuals (ϵ) confirms the presence of cointegration. Thus, there is a long-run equilibrium relationship between the dependent variable and at least one explanatory variable. The estimated long-run equation is presented in box 1.

Box 1

$$GDPC_t = 0.44 \cdot PE_t + 0.40 \cdot SE_t + 0.23 \cdot GE_t + 0.14 \cdot XP_t - 2.38$$
*(4.33)*** *(5.28)*** *(3.05*** *(3.50)*** *(-1.24)*

(T-statistics in brackets) **Equation 3**

Model Specifications

R-Squared: 94.98 %
Adjusted R-Squared: 90.73%
S.E. of Regression: 0.03
F-Statistic: 22.46[c]
Observations: 25 after adjustments

Residual analysis

Normality: JB=5.04 | p-value = 0.08*
BPG-Hetero-test: p-value = 0.99
BG-LM test: p-value = 0.49
Durbin-Watson-Statistic: 1.49

, ** and * denote 10%, 5% and 1% levels of significance*

The residuals of the long-run model are reasonable and the coefficient of determination is 94.3% (Box 1). The Ramsey RESET test of omitted variables and the Cumulative Sum (CUSUM) test support the soundness of the long-run model (appendix 4).
Primary and secondary school enrolments significantly affect GDPC in the long run (Equation 4). However, the impact of PE exceeds the impact of SE. A 1% increase in primary enrolments cause a 0.44% increase in GDPC, while 1% increase in SE causes GDP to increase by 0.40%. The remaining explanatory variables seem to significantly and positively affect GDPC in the long run.

The estimated short-run equation follows:

Box 2

$$\Delta GDPC = 0.45 \cdot \Delta PE_t - 0.11 \cdot \Delta SE_{t-1} + 0.11 \cdot \Delta GE_t - 0.04 \cdot \Delta XP_{t-1} - 0.53\, EC_{t-1}$$
*(3.88)*** *(-2.72)*** *(2.91)*** *(-2.05)** *(-3.69)***

(T-statistics in brackets) **Equation 4**

Model Specifications

R-Squared: 61.09 %
Adjusted R-Squared: 54.02%
S.E. of Regression: 0.03
Observations: 27 after adjustments

Residual analysis

Normality: JB=0.43 | p-value = 0.81
BPG-Hetero-test: p-value = 0.34
BG-LM-test: p-value = 0.96
Durbin-Watson-Statistic: 1.89

, ** and * denote 10%, 5% and 1% levels of significance*

The short run is estimated with two lags as we deal with annual data. As well as the long run, the short run is reduced. The negative and significant sign of the error correction term (EC) confirms the presence of cointegration. A short run deviation from equilibrium corrects by 53% every year. Thus, after recovery from a random shock, the system restores to

equilibrium state in slightly less than 2 years. The short-run model has a reasonable coefficient of determination. The residuals of the model also meet the requirements of a good regression (Box 2). The stability of the short-run model is affirmed by the Ramsey RESET test as well as the CUSUM test. The results of the stability tests are presented in appendix 4.

In the long and short run, primary enrolments have a significant positive effect on macroeconomic growth in Suriname. A possible explanation is the fact that attending school is mandatory for pupils between the age of 7 and 12 years. Amplifying the impact of primary education on economic growth in Suriname is perhaps the population growth. As the population grows, more pupils attend primary school over time. In the long run, secondary education also has a significant positive impact on growth. However, the short-run effect of secondary school enrolments seems to have an adverse impact on economic growth. Out-dated curriculum, lack of fully qualified teachers, many repeaters and drop-outs may all be among the causes of the negative impact of secondary education in the short run as the Ministry of Education and Community Development in Suriname (2004) indicates.

6. Conclusions and Policy Recommendations

The objective of this paper was to investigate whether human capital affects macroeconomic growth in Suriname for the period 1971 to 2011. Enhancement of human capital through schooling not only raises future incomes, but also mitigates poverty and improves the ability to absorb high level knowledge and technology that enables innovation.

Consistent with numerous studies, human capital also positively and significantly affects long-run economic growth of Suriname. Knowledge and skills absorbed at school are put in practice on the job and leads to enhanced labour productivity and economic growth. In the short run, secondary education impedes economic growth, which could be ascribed to shortcomings in the quality of education in Suriname.

Human capital formation in Suriname has to be stimulated through efficient investments in especially the school system. A stronger focus on the quality of education, instead of the quantity may enhance the impact of education on drivers of growth in the future. Secondary education must be improved, since its effect on growth is smaller than that of primary education. Furthermore, ICT education must be incorporated in formal education as technological progress is gaining increased global significance. Also important is the alignment of the educational system with the labour market. It is of extreme importance that the educational system produces knowledge and skills needed by the drivers of economic growth in Suriname. Therefore, educational policy must be a function of labour and overall economic policy.

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Appendices

1. Data, Measurement and Sources

Indicator	Definition	Source	Expectation
GDPC	Gross Domestic Product per Capita in Surinamese Dollars (SRD)* in constant 2007 prices	Statistical Compendium of the Central Bank of Suriname (2012)	n/a
PE	Total Primary School Enrolments	UNESCO Institute for Statistics (2013)	+
SE	Total Secondary School Enrolments	UNESCO Institute for Statistics (2013)	+
GE	Total Government Expenditures in millions of SRD in constant 2007 prices	Statistical Compendium of the Central Bank of Suriname (2012)	+
XP	Total Exports of Goods and Services in millions of SRD in constant 2007 prices	Statistical Compendium of the Central Bank of Suriname (2012)	+

Note: In the regression all variables are transformed into natural logs (LN).

* SRD is the currency of Suriname; US$ 1 = SRD 3.35

2. Descriptive Statistics

	GDPC	PE	SE	GE	XP
Mean	13,480.86	75,386.09	35,362.48	1,874.06	3,036.01
Median	13,132.77	73,463.50	34,248.00	1,913.82	2,963.06
Maximum	17,806.31	95,282.00	55,431.00	2,590.67	5,989.87
Minimum	11,599.75	60,085.00	23,504.00	769.62	567.03
Std. Dev.	1,678.22	10,728.35	7,999.05	433.93	1,204.03
Skewness	0.87	0.39	0.65	-0.40	0.22
Kurtosis	2.84	1.89	2.78	2.37	2.84
Jarque-Bera	5.23	2.46	2.27	1.78	0.36
Probability	0.07	0.29	0.32	0.41	0.83
Observations	41	32	31	41	41

3. Unit Root Tests Results

		GDPC		PE		SE	
		Level	Diff.	Level	Diff.	Level	Diff.
ADF	Intercept	-1.66	-2.23	-1.58	-0.99	-1.21	-6.46***
	Trend & Intercept	-1.73	-3.69**	-1.14	0.84	-2.90	-6.34***
	None	0.89	-2.06**	0.07	-4.22***	0.76	-6.37***
PP	Intercept	-0.75	-5.09***	-1.64	-4.13***	-1.03	-6.48***
	Trend & Intercept	-1.03	-5.12***	-1.05	-4.33**	-2.83	-6.35***
	None	1.16	-4.95***	0.06	-4.22***	0.76	-6.37***
KPSS	Intercept	0.21	0.20	0.54**	0.31*	0.70**	0.07
	Trend & Intercept	0.13*	0.14*	0.17**	0.09	0.09	0.06

		GE		XP	
		Level	Diff.	Level	Diff.
ADF	Intercept	-2.84*	-9.10***	-2.60	-6.66***
	Trend & Intercept	-2.81	-8.98***	-2.92	-5.73***
	None	0.53	-9.16***	0.20	-6.73***
PP	Intercept	-2.84*	-8.87***	-2.60	-9.89***
	Trend & Intercept	-2.81	-8.82***	-2.89	-12.53***
	None	0.60	-8.92***	0.81	-9.25***
KPSS	Intercept	0.09	0.12	0.32	0.31
	Trend & Intercept	0.10	0.12*	0.17**	0.27***

ADF and PP display t-statistics; KPSS displays LM-statistics

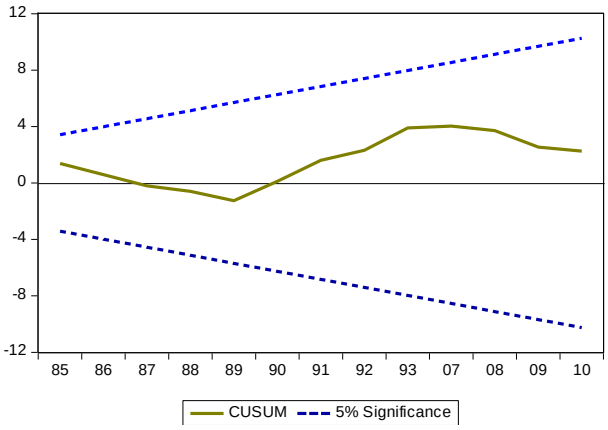
, ** and * denote results at 10%, 5% and 1% levels of significance*

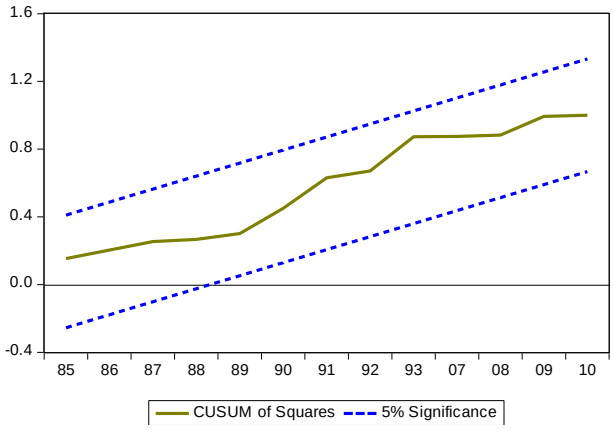
4. Stability Diagnostics

Long-run Estimation: Ramsey RESET test results

	Value	DF	Probability
T-statistic	0.46	12	0.65
F-statistic	0.21	(1, 12)	0.65
Likelihood ratio	0.44	1	0.51

Long-run Estimation: CUSUM and CUSUMSQ plots





Short-run Estimation: Ramsey RESET test results

	Value	DF	Probability
T-statistic	0.26	21	0.80
F-statistic	0.07	(1, 21)	0.80
Likelihood ratio	0.08	1	0.77

Short-run Estimation: CUSUM and CUSUMSQ plots