The Correlation between GDP growth and Human Development in the Caribbean

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Abstract: This paper offers an analysis of the impact of GDP growth on Human Development in the Caribbean. To do so, I define an econometric model as the expression of the impact of GDP Growth on the Human Development. In the equation, GDP growth rate is used as an expression of GDP growth and the Human Development Index (HDI) is used as an expression of Human development.GDP per capita is also added to complete the equation. Pattern for the year 2017 is used as benchmark. In both the simple and multiple regressions of the model, results show that the effects are positive. From this, it can be inferred that there is a positive correlation between GDP growth and Human Development in the Caribbean countries.

Key Words: GDP growth rate, GDP per capita, Human Development Index, Caribbean region

I. INTRODUCTION

Human development is the process of enlarging people's freedoms and opportunities and improving their well-being. It is about the real freedom ordinary people have to decide who to be, what to do, and how to live. In short, human development is about people's capabilities. Basic capabilities include good health, access to knowledge, and a decent material standard of living. Other capabilities central to a fulfilling life could include the ability to participate in the decisions that affect one's life, to have control over one's living environment, to have societal respect, to enjoy freedom from violence, and to relax and have fun.

The human development Index (HDI) is a statistical tool used to measure a country's overall achievement in its social and economic dimensions.. It is an easy-to-understand numerical measure made up of what most people believe are the very basic ingredients of human well-being: health, education, and income. This index was developed by Pakistani economist Mahbub ul Haq. Dr. Haq argued that existing measures of human progress failed to account for the true purpose of development which is to improve people's lives.In particular, he believed that the commonly used measure of Gross Domestic Product failed to adequately measure well-being.Working with Nobel Laureate Amartya Sen and other gifted economists, Dr. Haq published the first Human Development Index Reportin 1990,which was commissioned by the United Nations Development Programme.It has been since an annual feature of every Human Development Report, ranking virtually every country in the world.

In literature, a number of authors (Amartia Sen, Megnad Dessai, Ranis, Stewart and Ramirez, Schultz, Suri et all., Paul Streeten, etc.) have tried to analyze the impact of GDP growth on human development with special emphasis on the role that income plays in improving social well-being. Alongside GDP per capita, this paper uses GDP growth rateas an expression of GDP growth, and the Human Development Index as an expression of Human development as to determine the correlation between GDP growth and Human development.This paper is structured in three main stages: a review of existing literature, the econometric model for the studyand the conclusion.

II. LITERATURE REVIEW

Theories on Human Development

UNDP (1990) in the First Global Human Development report concluded that people are the real wealth of a nation. Human Development is all about "process of enlarging people's choices". It mainly focused on building of human capabilities, enhancement of freedom and process of achieving outcomes. The Report treats human beings primarily as inputs in production process. Education, skill formation and health are means for enhancing quality of human capital. Further, the report also addressed how the economic growth translates into human development. The report strongly recommends the restructuring of budgetary expenditures, including

military expenditures, and creating an international economic and financial environment conducive to human development.

Pal and Pant (1993) in their paper "An Alternative Human Development Index" made an attempt to modify UNDP methodology and make new alternative measures of human development index with regard to Ranking of Indian States. The conventional methods obviously focused on three variables such as education, health and material well-being, but the alternative measure focused on one more variable that is poverty. The inclusion of poverty alleviation is an explicit social goal, considering distribution of income in the measurement of human development.

Mahbub ul Haq (1997) in his work "Reflection on Human Development" examines that human development is more than GNP growth, more than income and wealth and more than producing commodities and accumulating capital. A person's access to income may be one of the choices, but it is not the sum total of human endeavor. People are the real wealth of nations. The basic capabilities for human development consist of health, education, access to resources and community participation. Without these, many choices are simply not available, and many opportunities in life remain inaccessible.

Amartya Sen (2000) suggested that society's standard of living should be judged not by the average level of income, but by people's capabilities to lead the lives they value. Nor should commodities be valued in their own right instead, they should be seen as ways of enhancing such capabilities as health, knowledge, self-respect and the ability to participateactively in community life. Therefore, expansion of human capabilities implies greater freedom of choice.

Subramanian (2003) in his paper identified the important determinants of human development to estimate their relative effects on the human development and suggest measures to augment human development in the countries with high, medium and low human development index indices. Life expectancy at birth has been the dominant variable in determining the value of HDI in countries with high HDI and countries with low HDI, combined enrolment ratio is found to be the dominant variable in the determination of HDI in countries with medium HDI. LEB, adult literacy rate and combined enrolment ratio had the greatest influence on HDI in countries with low human development, per capita real GDP had the greatest influence on HDI in countries with medium HDI for the world as a whole.

Nayak (2007) in his article Human Development – Conceptual and Measurement Issues made an attempt to describe evolution and concept of human development which emerged as a new approach to development and the methodological issues relating to its measurement. It provides for various changes in the methods of measurement brought out by UNDP, the planning commission GOI and the individual researchers at different points of time since 1990.

Economic Growth and Human Development

Kumar (1993) examined the relationship between human development and economic growth of sixteen states in India for the period of 1960to 1987. He focused on whether human development leads to economic growth and vice-versa. He concluded that human development improved much faster than growth of income in all the states. The gaps in human development between states have been considerably narrowed down during this period.

UNDP (1996) Global Human Development Report 1996 discussed the nature and strength of the links between economic growth and human development. The two disturbing findings are growth has been failing over much of the past 15 years in about 100 countries, with almost a third of the world's people. And the links between growth and human development are failing for people in the many countries with lopsided development – either good growth but little human development or good human development but little or no growth. The report concludes that the links between economic growth and human development must be deliberately forged and regularly fortified by skillful and intelligent policy management. It identifies employment as critical for translating the benefits of economic growth into the lives of people.

Haq (1997) studied the challenged conventional theories and argued that there is no automatic link between economic growth and human development, economic growth is a necessary but not a sufficient condition for human development. Therefore, a strong government intervention is necessary for balancing and strengthening the human development goals. He suggested that without a sound social infrastructure, economic growth cannot translate itself into human development. Economic growth has to be consciously transformed into the lives of the people otherwise, it would be endangered.

Ranis and Stewart (2000) examined the relationship between economic growth (EG) and human development (HD) form two chains. Cross-country regressions show a significant relationship in both directions, with public expenditures on health and education, notably female, especially important in the chain from EG to HD and the investment rate and income distribution significant in the HD to EG chain. Evidence over time has strong sequencing implications: countries initially favoring economic growth lapse into the vicious category,

while those with good HD and poor EG sometimes move into the virtuous category. Where choice is necessary, human development should be given sequencing priority.

Mazumdar (2001) examined the causal relationship between social development and economic growth. The economic growth does not automatically transformed into a better quality of life consequently the problem faced by the policy makers in those countries is to emphasize improvement in social indicators of development that are directly related to human well-being without hindering the economic growth of the country.

Stewart et al (2001) concludes that an increase in economic growth automatically leads to advances in human development. This study infers that human development has to occur prior to or simultaneously with improvement in economic growth, if a country is to reach a virtuous cycle. The policies that emphasize economic growth alone is futile in sustaining high level of human development.

Prabhu and Kamdar (2002) identified the relationship between economic growth and social attainments within the human development framework. Theyrecognized the fact that economic growth contributes to enhancing the level of attainments, which in turn leads to higher productivity and subsequently high rate of economic growth.

Mehta (2003) examined the complex links between economic growth and human development with reference to India. Though his results exhibit a degree of dependence particularly in short-termlinks, there are longer-term links wherein high levels human development help economic growth and economic growth, in turn, facilitate human development. Conversely, weak human development results in low growth, which undermines the prospect of future human development. It is only when the links are forged with policy, commitment and determination that they can be mutually reinforcing with the help of government actions and policies

Sengupta (2003) studied the Economic Growth and its impact on Human Development in the Indian Economy and computation of HDI was undertaken for the 15 major states of the country for the period of 1991-93 using UNDP methodology. In addition, he also used other indicators such as Clean Drinking Water, Sanitation facilities, Good Housing Facilities accessibility like Electricity, TV and News Papers and concluded that for a country like India - Literacy Rate and Life Expectancy alone are insufficient to convey the achievement as far as human development is concerned.

Rains (2004) described the ultimate goal of the development process as economic growth, which is an imperfect proxy for more general welfare, or as a means towards enhancing human development. The greater freedom and capabilities improve economic performance and human development will have an important effect on growth. Similarly, increased incomes will increase the range of choices and capabilities enjoyed by households and governments, which enhance human development.

Ghosh (2006) examined the two-way nexus between economic growth and human development. The developed regions always have positive relationship between EG and HD, while, the poor sates that have failed to catch up with the rich ones in terms of per capita income have to manage to catch up in terms of the human development. Social sector expenditure appears to have been an important factor in achieving regional convergence in human development through its positive effects on literacy rate, life expectancy at birth and human development.

Oommen (2007) attempted to examine the relationship between economic development and social sector development with the help of investment on education and health sector. In fact, the study states that the correlation between economic growth and social sector development is not significant. However there exists a high positive correlation between health and education sector development.

III. THE MODEL

This research is concerned with 17 Caribbean countries, namely Antigua and Barbuda, The Bahamas, Barbados, Cuba, Dominica, Dominican Republic, Grenada, Haiti, Jamaica, Saint Kitts and Nevis, Saint Lucia, Saint Vincent, Trinidad and Tobago, Belize, Suriname, and Guyana. The remaining territories in the Caribbean are omitted since they are overseas regions belonging to countries outside of the Caribbean.

The year 2017 is used as benchmark. The software STATA12 is used for the econometric calculations. Logarithm with base 10 is used for data conversion to logarithm. Data for this section is primarily sourced from The World Bank official website, and the United Nations Development Program.

The following equation is considered to be the expression of the impact of GDP Growth on the Human Development in the Caribbean assuming the function is linear in logarithms:

$$logHDI = logGDP_{rate} + logGDP_{pc} + u \qquad \qquad (1)$$

Where:
$logHDI$ = Value of the Human Development Index;
$logGDP_{rate}$ = Value of the GDP growth rate in country y at period t;
$logGDP_{pc}$ = Value of the GDP per capita in year logGDP_rate are taken;
$u = Error term$;

The simple regression with the variables $logHDI$ and $logGDP_{rate}$ consists of the following:
$$logHDI = \beta_0 + \beta_1(logGDP_{rate}) + u \qquad (2)$$
The estimated equation (with estimates and standard errors) is:
$$logHDI = -.1461 + .0313logGDP_{rate}$$
$$(.0198) \qquad (.0537)$$

N = 16
R-squared = 0.0238

The multiple regression with all of the variablesconsists of the following:
$$logHDI = \beta_0 + \beta_1(logGDP_{rate}) + \beta_2(logGDP_{pc}) + u \qquad (3)$$

The estimated equation (with estimates and standard errors) is:
$$logHDI = -.6449 + .0068logGDP_{rate} + .1293logGDP_{pc}$$
(.0514)   (.0194)   (.0532)
N = 16
R-squared = 0.8833

All of the variables are highly and jointly significant at 1% level (at any level). The assumption of linearity in parameters is satisfied. The assumption of no perfect collinearity is satisfied as there are no perfect linear relationships among the independent variables. The assumption zero conditional mean is satisfied as the error u has an expected value of zero for any values of the independent variables. Besides, the assumption of homoscedasticity is satisfied (see Appendix section). Thus, I conclude that the regression model satisfies the Gauss-Markov assumptions.

IV. RESULTS
Table 1: The following table displays the results (OLS coefficients, t-values, t-tests (2-tailed), intercepts, number of observations, and R-squared) of my simple and multiple regressions.

Independent Variables	Simple ($logHDI$)	Multiple ($logHDI$)
$logGDP_{rate}$	.0313 (0.58)	.0068 (0.35)
$logGDP_{pc}$	N/A	.1293 (9.78)
Intercept	−.1461 (−7.36)	−.6449 (−12.53)
Observation	16	16
R-squared	0.0238	0.8833

Source: The author's calculations using Stata12

Table 2: The following table displays the calculation for each variable within the single and multiple regressions analyzed in this study.

Variables	# of Observation	Mean	Standard Deviation	Minimum	Maximum
$logHDI$	16	-.1372	.0500	-.3027	-.0931
logGDP_rate	16	.2824	.2460	-.0655	.7041
logGDP_pc	16	3.910	.3620	2.884	4.49

Source: The author's calculations using Stata12

Interpretations
For the Simple Regression Model:
$$logHDI = \beta_0 + \beta_1(logGDP_{rate}) + u$$

$\beta_0 = -.1461$: An intercept coefficient that has no significance.
$\beta_1 = .0313$: A one percent increase in GDP growth rate in any of the Caribbean countries listed in the study will increase their Human Development Index by 0.03%.

For the Multiple Regression Model:
$$logHDI = \beta_0 + \beta_1(logGDP_{rate}) + \beta_2(logGDP_{pc}) + u$$

$\beta_0 = -.6449$: An intercept coefficient that has no significance.

$\beta_1 = .0068$: A one percentage point increase in the GDP growth rate will increase the Human Development Index by 0.06%.

$\beta_2 = .1293$: A one percent increase in the GDP per capita will increase the Human Development Index by 0.12%.

V. CONCLUSION

After the analysis of the relationship between the GDP growth rate and the Human Development Index (HDI) in the Caribbeanregion, results support that there is a positive correlation between the two variables. In the simple as in the multiple regression of the model, GDP growth rate in the countries under study show a positive effect on their Human Development Index. Therefore, I conclude that there is a positive correlation between Caribbean countries GDP growth rate and their Human Development Index. After testing for robustness, I conclude that both GDP per capita and Human Development Index were jointly and separately significant to the model.

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APPENDIX
Appendix 1: Simple Regression of Variables $logHDI$ and $logGDP_{rate}$

```
reg logHDI logGDP_rate
```

Source	SS	df	MS
Model	.000894353	1	.000894353
Residual	.036747936	14	.002624853
Total	.037642289	15	.002509486

Number of obs = 16
F(1, 14) = 0.34
Prob > F = 0.5687
R-squared = 0.0238
Adj R-squared = -0.0460
Root MSE = .05123

logHDI	Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]
logGDP_rate	.0313795	.0537582	0.58	0.569	-.0839203 .1466794
_cons	-.1461302	.019864	-7.36	0.000	-.1887344 -.1035261

Source: The author's calculations using Stata12

Appendix 2: Multiple Regression of Variables $logHDI$, $logGDP_{rate}$ and $logGDP_{pc}$

```
. reg logHDI logGDP_rate logGDP_pc
```

Source	SS	df	MS
Model	.033248753	2	.016624376
Residual	.004393536	13	.000337964
Total	.037642289	15	.002509486

Number of obs = 16
F(2, 13) = 49.19
Prob > F = 0.0000
R-squared = 0.8833
Adj R-squared = 0.8653
Root MSE = .01838

logHDI	Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]
logGDP_rate	.0068781	.0194517	0.35	0.729	-.0351447 .0489008
logGDP_pc	.1293454	.0132196	9.78	0.000	.1007861 .1579048
_cons	-.6449836	.0514807	-12.53	0.000	-.756201 -.5337662

Source: The author's calculations using Stata12

Appendix 3: Summary of Variables $logHDI$, $logGDP_{rate}$ and $logGDP_{pc}$

```
. summarize logHDI
```

Variable	Obs	Mean	Std. Dev.	Min	Max
logHDI	16	-.1372676	.0500948	-.3027706	-.0931265

```
. summarize logGDP_rate
```

Variable	Obs	Mean	Std. Dev.	Min	Max
logGDP_rate	16	.2824336	.246072	-.0655015	.7041505

```
. summarize logGDP_pc
```

Variable	Obs	Mean	Std. Dev.	Min	Max
logGDP_pc	16	3.910253	.3620753	2.884047	4.49

Source: The author's calculations using Stata12

Appendix 4: F-test for Variables $logGDP_{rate} and logGDP_{pc}$

```
. test logGDP_rate

 ( 1)   logGDP_rate = 0

        F(  1,    13) =    0.13
             Prob > F =    0.7293

. test logGDP_pc

 ( 1)   logGDP_pc = 0

        F(  1,    13) =   95.73
             Prob > F =    0.0000
```

```
. test logGDP_rate logGDP_pc

 ( 1)  logGDP_rate = 0

 ( 2)  logGDP_pc = 0

        F(  2,    13) =   49.19
             Prob > F =    0.0000
```

Source: The author's calculations using Stata12

Appendix 5: Checking Homoscedasticity of Residuals

```
. estat hettest

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of logHDI

         chi2(1)      =      1.87
         Prob > chi2  =    0.1712
```

Source: The author's calculations using Stata12

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