The Effectiveness of Government Expenditure on Education and Its Potential to Influence Economic Growth in the Caribbean: A Comparative Studies for The Bahamas

Abstract

Investing in education aids in human capital development and increases labour productivity. It is also a plausible means of improving the quality of life and can encourage sustainable economic growth in the Caribbean. The purpose of this paper is to access the efficiency of public spending on education and its potential to influence per capita economic growth. This particular research utilizes a panel Ordinary Lease Square model comprised of a data set for 18 Caribbean countries over the period 1960 to 2018 to analyze such effect. The results reveal that public expenditure on education does positively influence economic growth, alongside other variables. Unlike previous Caribbean research, this paper explores recommendations specific to The Bahamas, such as improving education quality measures. It also seeks to update the existing Caribbean literature by employing data from 1960 to 2018.

Keywords: public expenditure, education, economic growth, Caribbean, fiscal policy, panel OLS, Bahamas, sustainability, human capital development

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1. Introduction

Economist that specialize in development processes have consistently argued the significance of education on human capital development and economic growth. A substantial amount of literature pertaining to the effects of government expenditure on education and its potential to influence economic growth have developed since the works of Barro (1991) and Mankiw, Romer, & Weil (1992). Studies undertaken in both developed and developing nations have indicated the existence of positive externalities resulting from sufficient government resource allocation towards education; however, such studies are limited to select regions – often excluding the Caribbean (Swaroop, 1996). This is particularly surprising given that public expenditure on education in the Caribbean region is often comparable to government public expenditure in highly developed countries around the world. According to Bynoe, Craigwell, & Lowe (2012), the average amount of money spent on education in the Caribbean was 15% of total government expenditure between 1960 and 2009. Similarly, countries such Canada, the United States and the United Kingdom spent on average 14 %, 15% and 12% respectively on education between 1980 and 2009. Evidence suggests that effective public expenditure on education in the Caribbean is necessary to sustain economic development, and to improve the economic stability for most of its service-based economies (Psacharopoulos & Patrinos, 2002).

This paper proposes a way to determine the impact of government expenditure on economic growth per capita in The Bahamas using data compiled from 18 Caribbean countries spanning 1960 to 2018. It utilizes the panel Ordinary Least Squares (OLS) estimating method in order to achieve this. Unlike the majority of previous research conducted, this paper focuses primarily on the Caribbean region, using The Bahamas as its focal point. As compiled regional data, referencing this topic is limited; this paper seeks to extend existing Caribbean literature.

The paper is organized as follows; Section 2 provides a literature review on the efficacy of public spending on education. Literature addressing developed and developing countries, and then specifically the Caribbean, is subcategorized in this section. Section 3 contains the empirical model and data, as well as estimation procedure and results. Section 4 is the conclusion and the recommended policy implications.

2. Literature Review

2.1 Developed and developing countries

Numerous studies over the past few decades have featured the contributions of the education sector towards national economic growth. Most of these papers have successfully analyzed the notion of how public education expenditure can contribute to economic progress. Baffes & Shah (1998) provided empirical evidence that favors the hypothesis that education spending can stimulate economic growth. They argue that by investing in human capital, knowledge spillovers significantly contribute to the economic growth of a country. In conclusion, Baffes & Shah (1998) research recommends for countries ongoing a developing phase to improve their potential growth performances by adopting scholastic strategies that promote research in quality education and training. According to Schultz (1961), access to quality and improved education plays an important role in providing individuals with the opportunities necessary to develop their character and economic status. This is demonstrated in education's capability to broaden the development of human capital.

Ismail & Selvaratnam (1999) survey employed a simultaneous equation model to estimate the relationship between economic growth and human capital variables, such as education, in the

context of Malaysia. Their results indicate a strong relationship between education spending and economic growth. The percentage of government expenditure allocated towards vocational, technical, and other tertiary level education provided significant positive impacts on economic growth. Their results also indicated that technical and vocational education served in producing a skilled and semi-skilled workforce that was able to meet the needs of growing industrial sectors. The urge for governments to place greater emphasis on human capital investment is crucial and necessary to encourage a highly skilled and productive workforce that could enhance the nation's economic growth potential and support multiple industries.

Matsushita, Siddique, & Giles (2006) also suggested focusing on higher enrolment levels in technical training and vocational education, alongside other higher education institutions, as a fundamental component to long term growth. An increase in the number of highly educated labour would effectively increase the labour supply of skilled workers. Ultimately, signifying the importance of the education sector on growth in the economy (Dao, 2012; Bose, Haque, & Osborn, 2007).

Mingat & Tan (1998) argued education as an important factor in a country's social and economic life. In their analysis, they found that lower-income countries typically lagged behind higher-income countries on most measures of educational attainment. The authors attempted to establish a reasoning behind this advantage in education by examining the relationship between gross national product and other indicators for educational development. Utilizing data compiled from 125 developing and developed countries in 1993, their results indicate that ceteris paribus, poorer countries experience twice the amount of resource burden when obtaining equal coverage of primary school education as richer countries. Additionally, the data illustrates that literacy rates in lower-income countries increase with per capita gross nation product, from an

average of 50% to almost universal literacy, by the time per capita gross national product is greater than $10,000. Relative to the figure amount allocated by both groups towards education, the data provides evidence that rich and poor countries allocate nearly the same share of resources to education. Therefore, per capita income can also be considered a major factor pertaining to educational attainment.

Anyanwu & Erhijakpor (2007) conducts a regression analysis using panel data from several different African countries from 1990 to 2002 in order to provide evidence that government expenditure plays an important role in higher education attainment. They claim that policymakers should focus their attentions on the breakdown of expenditures within the education sector. In terms of funding allocation, size, and proficiency, Anyanwu & Erhijakpor (2007) considers these important variables for promoting equity, educational outcomes, and furthering second-generation reforms in education. Expanding educational outcomes are imperative for social welfare improvement and economic growth (Gupta, Clements, & Inchauste, 2004; Yun, 2018). However, in recent years, there has been rising concerns regarding the efficiency of spending towards such efforts. These concerns are related to the ability of certain education systems to maximize student potentials, and whether or not they are capable of providing the necessary resources for students to compete in a competitive market.

Evidence from Odit, Dookhan, & Fauzel (2010) shows that human capital greatly enhances productivity and thus provides an improvement to potential output level. In this study, the impact of education investment in Mauritius from 1990 to 2006 was examined using the Cobb-Douglas production function. Cointegration tests conducted throughout the research supported the argument that public support for educational attainment is indeed a crucial factor in enhancing economic growth. With access to higher levels of schooling, possible through appropriate public

expenditure, productivity rises. Hence, the average level of schooling is considered as a direct variable affecting total factor productivity. The study concludes that human capital accumulation is required for development and for the adoption of new technologies.

2.2 Caribbean

Effective public expenditure on education in the Caribbean is essential as resources in the region are often limited towards education and other sustainable development measures. Swaroop (1996) surveyed a selected group of countries in the Caribbean Group for Cooperation in Economic Development, including The Bahamas, from 1981 until 1995 with the intent of providing information to Caribbean governments on progressive economic reform policies. It deemed educational reformation as an advantageous approach and a form of public sector modernization. Swaroop (1996) found that a more in-depth analysis of government resource allocation between primary and tertiary levels of education was needed to effectively measure attainment benefits. He also noted that the probability of obtaining tertiary education is higher for secondary school graduates coming from high-income families than low-income families and in doing so, identified concerns around income inequality.

Gafar (1998) mentions income inequality as a contributing factor to poverty and unemployment for Caribbean nations. He also argues that concerns around the dimensions and manifestation of poverty can be combatted by investing in education programs. Gafar (1998) claims that providing adequate resources to education enhances economic diversification and growth. Individuals are given the opportunity to properly specialize in different sectors of the economy. Supported by Gupta et al. (2004), government spending on education enhances the attainment of education for the impoverished. Policymakers are recommended to assign

resources in education liberally to people from different social backgrounds and fields to advance human capital accumulation, economic growth, and improve the well-being of the poor.

Bynoe et. al (2012) draws from Griffith (2001) that educational attainment leads to increased efficiency in resource management and utilization, and therefore encourages higher labour productivity and income levels. Bynoe et. al (2012) highlights Griffith (2001) since it recognizes education as a good investment. According to Bynoe et. al (2012), Griffith (2001) utilizes an extended Mincerian approach in a 1999 household survey data of 3,000 individuals to compute the rates of return to investment in education at different education levels in Barbados. The results indicate that secondary education is more highly rewarded than primary education, and that tertiary education is more highly rewarded than both (Bynoe et. al, 2012). The private rate of return for secondary education in Barbados ranged from 4.8 to 8.0 percent, whereas the results for university education suggested that for every dollar of forgone income the return to that level of education is between 12.8 and 20.9 percent (Bynoe et. al, 2012).

Moore (2006) also believed that educational attainment is essential and necessary in improving economic output. His research suggests that an increase in the number of educated household university graduates in Barbados would cause a fall in poverty rates and increase the overall standard of living for Barbadians. Using an estimated production function with quality-adjusted labour inputs, quality-adjusted capital stock and technology as its independent variables, and real gross domestic product as the dependent variable, Moore found that a 1% increase in quality-adjusted labour correlates with an estimated increase of 0.5 percentage points in output growth. A 1% increase in quality-adjusted capital also improves output growth, but by 0.3 percentage points.

2.3 Public Education Expenditure in The Bahamas

In this subsection, an overview of government spending is portrayed, focusing on public education expenditure in the Bahamas[1]. Presented in Figure 1 is a visual representation of the government budgetary allocation for education alongside other major sectors from 2008-2019.

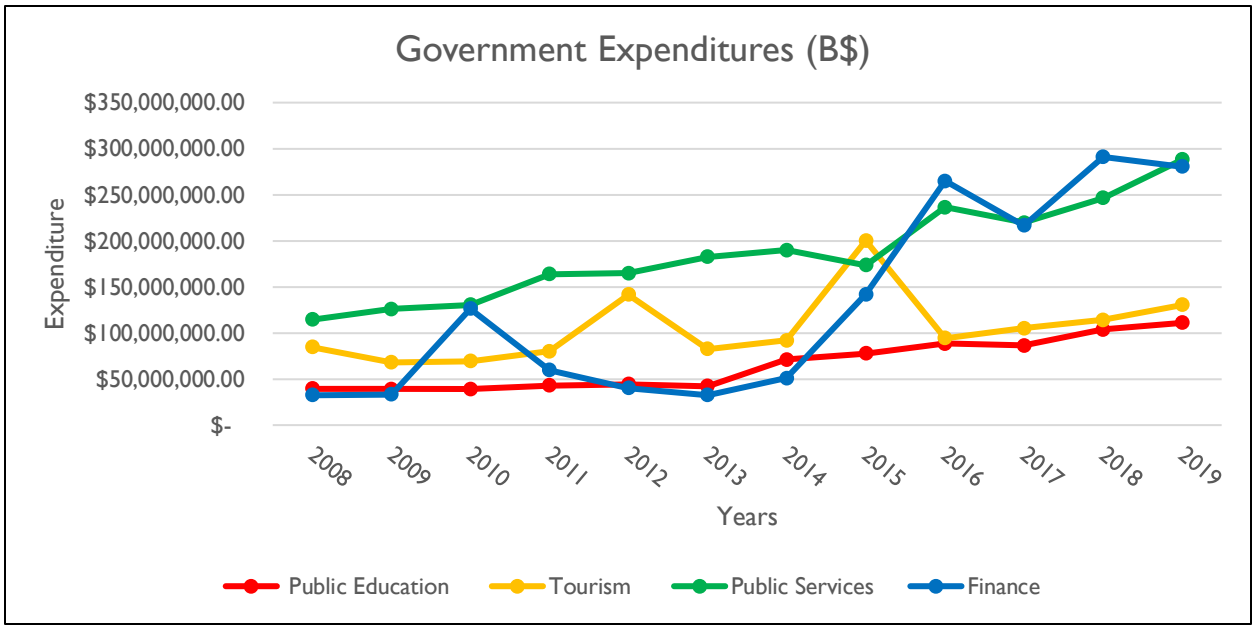

Figure I: Government expenditures for education and other major sectors

Figure I shows that expenditure on education in the Bahamas has remained fairly constant up until 2014. From the years 2008 to 2013, educational expenditure had minimal fluctuations peaking at $BSD 44.25 million in 2012. However, in 2014 public education spending had experienced a substantial increase to its overall allocation. Much of this increase is due to the government providing more funds for the operation of local tertiary institutions, such as the previously named College of the Bahamas and the Bahamas Technical and Vocational Institute (BTVI), as well as a larger allotment of funds towards scholarships and grant awards. Nonetheless,

[1] The following information was collected from The Bahamas' Ministry of Finance Budget Reports dating 2008-2019.

the expenditure trend continued to climb after 2014 to its now highest allocation in 2019 at B$110.96 million. This is due to major educational enhancement initiatives undertaken by the Bahamian government. In 2019, the government of the Bahamas in its annual budget communication committed to investing in education as a measure to "break the cycle of poverty[2]." The 2019 budget provided funds specifically aimed at increasing tuition grant initiatives undertaken in 2017 at the University of the Bahamas in hopes of providing tertiary learning opportunities for more Bahamians – accounting for an addition B$20 million in expenditures. An additional B$9.3 million in expenditure was also reported to enhance BTVI, with emphasis on upgrading infrastructure. Although spending on education has continued to increase in the Bahamas, the amounts pale in comparison to other major sectors.

Also visible in Figure I, expenditure for education in the Bahamas has consistently remained lower than that of other sectors, such as tourism, public services, and finance. From 2009 to 2013, tourism expenditure experienced a period of exponential growth at an overall rate of 31.30% compared to just 4.13% for education. In 2009, the Bahamian government began to divert much of its resources towards the tourism sector, particularly in advertising and marketing and promotions expenditures, in efforts to encourage the inflow of travelers to the Bahamas following the global 2008 financial crisis. This is apparent given a slight decrease in education expenditure from B$39.37 million to B$39.29 in 2008 and 2009, respectively. Yet, one of the greatest gaps in expenditures exists between education and finance. Between 2014 and 2016, the finance sector grew at an overall 107.49% while education only at 30.24%. Finance, as the second most important industry in the Bahamas after tourism, has continued to maintain priority over

[2] Turnquest, K. (2019). Budget communication. The Bahamas Ministry of Finance, Nassau, NP, May 29. http://www.bahamas.gov.bs/

most sectors due to it constituting more than 15% of annual GDP. In 2019, educational expenditure was B$110.96 million representing a 6.78% increase from 2018, whereas tourism expenditure increased 14.29% to B$130.38 million. Public spending as a percentage of total government expenditure on education has continued to increase, but at a reduced rate when compared to more predominate industries. This is partially due to the potential for economic growth based on effective education expenditure not being realized.

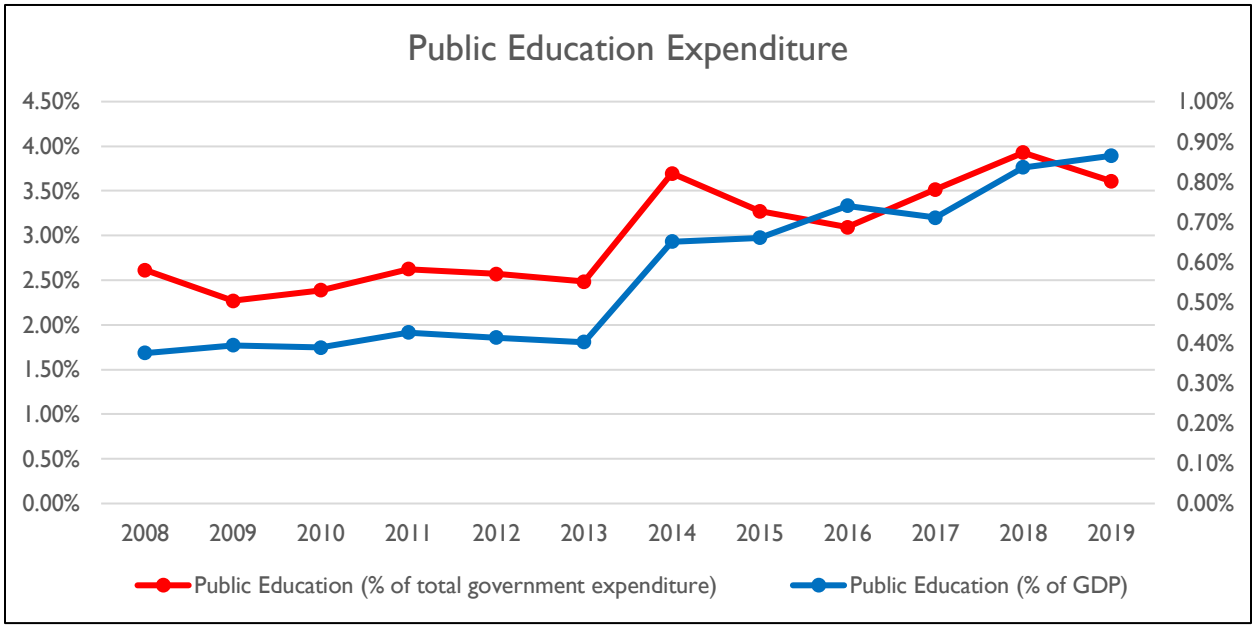

Figure II: Public education expenditure as a percentage of total expenditure and GDP

Figure II illustrates public education expenditure as a percentage of total government expenditure (left axis) and GDP (right axis) from 2008-2019. Education funding declined from 2.61% in 2008 to 2.27% in 2009 due to shifts in government resource allocation, as mentioned before, however, from 2009 to 2011 it exhibited an increasing trend. A steep increase in public education expenditure can be observed between 2013 and 2014. This increase stems from a B$30 million pledge by the government in 2013 that was primarily directed towards building new special education facilities and the transition of the then College of the Bahamas to University

status. Also, in the 2013 budget was a $5.5 billion allocation to the Ministry of Education for the construction of new primary schools in Inagua, San Salvador, Gregory Town, and Lowe Sound. Up until 2014, 3.7% was the highest reported amount of education expenditure as a percentage of total government expenditure in the Bahamas. In 2014, the regional average for education expenditure in Latin American and Caribbean countries was 17.51% (The World Bank, 2020b). There has not been a recent update in statistics since then, although, for the same year The Bahamas had an average of 3.7% which is more than a 13% gap. In 2019, the percentage of education expenditure to total public expenditure dropped following an overall increase in government spending on other departments, such as disaster and relief aid after Hurricane Dorian.

The relative amount of education expenditure to GDP has followed an increasing trend throughout the reported time period. From 2008 to 2013, much of public education spending remained unchanged. However, after a small period of decline ending in 2013, there was a considerable increase in education expenditure as a percentage of GDP. In 2014, due to the government of The Bahamas providing B$30 million for the construction of special education facilities and $B5.5 billion for new primary schools in the family islands, this ultimately led to an increase in employment opportunities and growth in the construction and manufacturing industries, thereby influencing GDP growth. Education expenditure in relation to GDP was at its highest percentage value (0.87) in 2019 following a prominent era of growth. However, regional averages of over 15% for education spending places the Bahamas on the lower end of the spectrum for countries invested in educational development (The World Bank, 2020b).

3. Model Specification and Data

3.1 Model

The regression is modeled below:

$$l\_GDPpercapita_i = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \varepsilon$$

Indicators	Description
$GDPpercapita$	logarithm dependent variable for i observation and the determinant for economic growth.
X_1	accessibility indicator measuring urban population as a percent of total population
X_2	quality variable proxied by primary and secondary pupil-teacher ratios
X_3	proportion of trained teachers in primary and secondary education
X_4	asset variable pertaining to foreign direct investment net inflows
X_5	income per capita
X_6	proportion of school-aged children 0-14 years
X_7	public expenditure on education as a percent of total government expenditure

The original regression model consisted of fifteen unique independent variables. Some of the variables not listed include literacy rates, gross capital formation, grants to public institutions, net official development assistance, and education attainment rates at different level, however, we were not able to utilize all of these variables due to some being statistically insignificant and others not having enough data to be included in the model. For example, literacy rates and test scores would have been great indicators for analyzing education attainment ratios, but consistent information was not available for all of the observed countries. Some of the variables were redundant, such as health expenditure and infant mortality rates, whereas others did not provide

much useful information or added significant value to this model. In the end, seven of the original fifteen variables were implemented in running the regression, since these where the only variables with adequate time series data available.

The purpose of this model is to test the null hypothesis that there is no relationship between per capita economic growth and government expenditure on public education against the alternative hypothesis that there is a relationship.

3.2 Data

The data used in the regression model comprises of annual observations from 18 Caribbean countries over the period of 1960-2018. Countries included in this empirical analysis are as follows: The Bahamas, Antigua and Barbuda, Barbados, Haiti, Dominica, Grenada, Guyana, Jamaica, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, Suriname, Trinidad and Tobago, Cuba, Turks and Caicos, Belize, Dominican Republic, and Puerto Rico. This information was collected from multiple sources, including the World Bank, The United Nations Educational, Scientific and Cultural Organization (UNESCO) database, the International Monetary Fund and the Bahamas Fiscal Strategy Report and Budget Communication 2008-2020.[4]

GDP per capita refers to an assessment of the economic output for a country with respects to its total population. In this model, real GDP, not nominal, is used for the calculation of GDP per capita to curve the effects of inflation and to aid in conducting comparisons across different years. Urban population refers to the people living in urban areas as defined by national

[4] Other sources include the International Financial Statistics and Balance of Payments databases, International Debt Statistics, Organization for Economic Co-operation and Development GDP estimates, the Caribbean Development Bank Social and Economic Indicators Report 1996-2006, International Comparison Program, and the Economic Commission for Latin America and the Caribbean (ECLAC).

statistical offices (The World Bank, 2020a). It is calculated using World Bank population estimates and urban rates from the United Nations World Urbanization Prospects.

Pupil-teacher ratio is a combination of pupil-teacher ratios for primary levels and secondary levels of education. It is measured as the average number of pupils per teacher in primary and secondary schools. Primary school education provides children with basic reading, writing, and mathematics skills alongside some elementary understanding of subjects such as history, geography, natural science, social science, art, and music (Bynoe et al., 2012). Secondary education strengthens the basic education qualities that began at the primary level, while aiming to lay the foundations for extended learning and development. Trained teachers are the percentage of primary and secondary school teachers that have received the minimum organized teacher training (pre-service or in-service) required for teaching in a given country.

Foreign direct investment (FDI) is the investment by governments to acquire a lasting management interest (10% or more of voting stock) in an enterprise operating in an economy other than that of the investor (The World Bank, 2020a). It is the sum of equity capital, reinvestment of earnings, short-term capital, and other long-term capital as shown in the balance of payments. It also includes net inflows, which are new investment inflows minus disinvestment in the reporting economy from foreign investors, and then divided by GDP. Income per capita measures the average income per person in a given country for a specified year. It is derived by dividing a country's national income by its population. The proportion of school-aged children is defined as youths between the ages of 0-14 and is listed as a percentage of the total population.

Public expenditure on education consists of current and capital expenditures, as well as government spending on learning institutions regardless of the level. It also includes education

administration costs, subsides to private and public corporations, allowances, and scholarships and grants. Expenditure on public education is expressed as a percentage of total government expenditure, including local, regional, and central governments.

3.3 Variables

In terms of partial derivatives, the amount of money that governments allocate towards education spending (school construction, teacher provisions, educational training, scholarships, grants, etc.) should have a positive effect on educational attainment and labour productivity, therefore, influencing economic growth. As income per capita rises, the relative cost of enrolling children into school decreases (McEwan, 1999). As a result, increased incomes should expand school enrollment by lessening the financial constraints associated with parents sending their children to school. Parents generally incur direct and indirect cost when fostering their child's education, including but not limited to purchasing uniforms and school supplies, transportation costs, and the potential forgone income of the child's work in the labour market (McEwan, 1999).

Additionally, the demand for education augments when education is considered a normal good at higher income levels (Gupta, Verhoeven & Tiongson, 2002). Net inflows from foreign direct investment factors into fiscal funding decisions for expenditures. Countries that have made clear initiatives to improve their educational systems benefit from reinvesting capital into the education sector (Psacharopoulos & Patrinos, 2002). Those less interested in education and reliant on other sectors often divert capital towards other means, and in doing so, will benefit less from the economic growth education presents.

In most cases, living in urban areas provide better access to education because transportation costs can be lowered. Enrollment numbers and student ratios are expected to be

higher in urban areas. However, there are adverse effects, later to be discussed, for some countries where most of the population resides within urban boundaries. In regard to pupil-teacher ratios, the lower the pupil-teacher ratio the more attention each child can receive. Greater access to classroom facilities lowers the number of students assigned to a single teacher and thus, increases overall teaching effectiveness. If households believe that the pupil-teacher ratio is too high and therefore ineffective for educating, then they may pursue other options, including private school education, home-schooling, or making their children enter the workforce instead. A decrease in pupil-student ratios would require an increase in public education expenditure.

A similar principle applies towards improving the ratio of quantity of trained teachers. It is imperative that educators are provided resources to be regularly trained on new and innovative teaching strategies and trends in education. Outdated curriculums, for example, present negative effects on education quality and effectiveness. Hence, it is a public duty to ensure that teachers are properly qualified and equipped to educate on primary, secondary, and tertiary levels. Gupta et al. (2002) claims that a high proportion of young school-aged individuals would have a negative a priori coefficient for educational attainment, given the circumstance in which governments do not have adequate resources to support their education.

The descriptive summary statistics for the dependent and independent variables are given in Table AI.

Table AI: Descriptive Summary Statistics

Variables	Median	Mean	Standard Deviation	Minimum	Maximum
Urban population (% of total population)	45.69	48.45	19.05	15.59	94.39
Public expenditure (% of total government expenditure)	14.24	15.58	6.877	2.270	42.79
Foreign direct investment, net inflows (% of GDP)	3.510	4.732	6.599	-55.23	39.25
Pupil-teacher ratio, primary (pupils per teacher)	22.19	23.25	9.051	8.740	63.22
Pupil-teacher ratio, secondary (pupils per teacher)	16.55	18.03	9.088	7.920	71.26
Trained teachers in primary education (in percent)	70.07	71.47	19.04	30.88	100.0
Trained teachers in secondary education (in percent)	58.08	62.67	23.47	18.70	100.0
Population aged 0-14 (% of total population)	35.72	35.10	8.671	16.21	50.49
Income per capita (current US$)	3006	5566	6808	68.76	32218

Nearly half of the Caribbean's population lives in urban areas. With 48.45% of the region populous living in urbanized communities, more people continue to venture from rural areas to cities in pursuit of better employment and education opportunities. Countries with the highest urban population include the Bahamas, Turks and Caicos, and Puerto Rico while St. Lucia has the lowest rate at 18.68%. Public expenditure on education is relatively high for the region. As mentioned earlier, education spending in the Caribbean is on par with those of high income and upper-middle income states, even though most territories in the Caribbean are considered low to low-middle income. The regional average between 1960 and 2018 is 15.58% with Cuba, Barbados, and Jamaica as the forerunners. The Bahamas remained one of the countries in the region to spend the least amount on education. The population of school-aged children aged 0-14 years followed a declining trend over time. It appears to be correlated with coupled declines in birth and mortality rates (The United Nations, 2020). Throughout this period, pupil-teacher

ratios remained fairly high with an average of twenty seven students to one teacher in primary school and eighteen students to one teacher in secondary school. FDI flows into the Caribbean were among the highest in the world. Less stringent financial regulations appear to have been a beneficial factor in attracting foreign direct investment into the Caribbean (Kolstad & Villanger, 2008). Income per capita rose from 1960 to 2018, although at faster rates for some countries. The average income per capita during this time period in current USD was $5,566, whereas the Bahamas had the highest per capita amount for the region. The number of trained teachers in primary and secondary education continued to increase but at a disproportionate rate to tertiary educators.

3.3.1 The Bahamas

Urban population (% of total population) in the Bahamas was 83.03% as of 2018. Its highest value during the study period of 1960-2018 was 83.03% in 2018 while its lowest was 59.71% in 1960. Public expenditure (% of total government expenditure) was 3.93% as of 2018. Data on public education expenditure is limited to 2008 and after; the highest value between 2008 and 2018 was 3.93 %. The population ages 0-14 (% of total population) was 22.48 % as of 2018. Its highest value throughout the study period was 42.28% in 1965, and its lowest was 22.48 % in 2018. Foreign direct investment, net inflows (% of GDP) was 7.59% in 2018. Its highest value of the past 42 years was 8.64% in 2010, while its lowest was -1.30% in 1985.

The pupil-teacher ratio for primary school education in the Bahamas was 19.03 as of 2016, and 11.76 for secondary school education. The highest value over the past 45 years for primary school education was 45.46 in 1971, and its lowest value was 12.99 in 2009. The highest value over the past 45 years for secondary school education was 33.42 in 1971, while its lowest value

was 11.09 in 2001.Trained teachers in primary education (% of total teachers) in the Bahamas was 90.07% as of 2016, and 84.84% for secondary educators. The highest value over the past 17 years for primary school educators was 95.12 in 2002, and its lowest value was 58.44 in 1999. The highest value over the past 14 years for secondary educators was 98.74 in 2002, while its lowest was 79.86 in 2013. The latest value for income per capita (current US$) in the Bahamas was $32,218 as of 2018. Over the past 58 years, the value for this indicator has fluctuated between $1,550 in 1960 and $32,218 in 2018.

4. Results & Limitations

4.1 Results

The econometric software program used for this research was *gretl*. The regression model was estimated using a panel OLS analysis for 18 different cross-sections. For the purpose of this paper, the significance level is set at 10%.

Table AII: Regression Analysis Output

Dependent Variable: Log of GDP per capita (*economic growth*)

Variables	Coefficient	Standard Error	t-ratio	p-value
Constant	-0.366193	2.50463 (1.78456)	-0.1462	0.8854
Urban population (% of total population)	-0.0294474	0.0166777 (0.0156229)	-1.766	0.0944*
Public expenditure (% of total government expenditure)	0.0896028	0.0457919 (0.027537)	1.957	0.0661*
Foreign direct investment, net inflows (% of GDP)	-0.0363587	0.0519173 (0.0560255)	-0.7003	0.4927
Total pupil-teacher ratio, primary and secondary (pupils per teacher)	0.00117056	0.00268086 (0.00359204)	4.366	0.0004***

Total trained teachers in primary and secondary education (in percent)	-0.000377104	0.000134916 (0.000146735)	-2.795	0.0120**
Population aged 0-14 (% of total population)	-0.0820150	0.0758261 (0.0735846)	-1.082	0.2937
Income per capita (current US$)	0.000112842	6.09063e-05 (4.85817e-05)	1.853	0.0804*

Notes: Robust standard errors reported in parenthesis. *, **, *** statistically significant at the 10%, 5% and 1% levels, respectively.

Table AIII: Statistical References

Mean dependent variable	0.432576	Standard deviation dependent variable	1.460073
Sum squared residual	16.77010	Standard error of regression	0.965232
R-squared	0.685336	Adjusted R-squared	0.562967
F (7, 18)	5.600562	P-value (F)	0.001497

This analysis was conducted by regressing the independent variables – urban population rate, public expenditure on education, school-aged population, FDI net inflows, teacher-pupil ratios for primary and secondary education, number of trained teachers in primary and secondary education, and income per capita onto the dependent variable GDP per capita. In doing so, I generate a F-statistics of 5.6 and corresponding p-value of 0.001497.[6] Based on this information, I am able to conclude the overall significance of my regression model, whereby I firmly reject the null hypothesis that my control variables have no effect on determining per capita economic growth at a 1% significance level.

Interestingly, the adjusted R^2 for this model is calculated at 0.562, meaning that the proportion of variance for the dependent variable explained by the control variables is almost

[6] Refer to Table AIII for statistical references.

60%. This is important to note given that the higher the R^2 value, the better the model fits the data (Wooldridge, 2016). More specifically, the model should have explanatory power in describing any captured relationship between per capita economic growth and the listed variables.

The parameter estimate for my variable of interest, public expenditure on education, is recorded at 0.0896.[7] This value for β_7 translates to, holding all other variables constant, public expenditure on education as a percent of total government expenditure possesses on average an 8.96% amount gain on per capita economic growth. It is worthy to note that out of all the controlled variables, public expenditure on education had the greatest impact on per capita economic growth. The corresponding p-value of 0.0661 is borderline significant at the 5% level and significant at the 10% level, indicating moderate evidence to reject the null hypothesis that per capita economic growth is not influence by public education expenditures at a 10% significance level in favor of the alternative. Even more so, this variable is statistically significant, therefore a relationship is unlikely due to chance. Urban population as a percent of total population, pupil-teacher ratios, the total number of trained teachers, and income per capita are also statistically significant.

The parameter value β_1 for urban population is negative, meaning that countries with higher urban populations are in an adverse position for increasing potential economic growth. With a coefficient value of -0.029 a unit increase in urban population would lead to a decreased 2.9% value in GDP per capita. The coefficient is contrary to the a priori belief of a positive relationship existing due to the advantages of being in an urban environment. However, in actuality, those outside of the urban realm can suffer more from an increased deprivation of

[7] Refer to Table AII for regression output

resources and minimal public attention, leading to further gaps in educational attainment over time (Marré, 2017). This is particularly relevant to the Bahamas given that more than 80% of the population resides within a select few cities – Nassau, Freeport, and West End. It is more common for resources to be under devoted in lesser populated outer island communities due to the Bahamas' archipelagic geography.

The total number of trained teachers in primary and secondary education also had a negative β_3 coefficient value at -0.0003. This decreased effect may have resulted from a disproportionate amount of resources made available to tertiary educators when compared to that of primary and secondary educators (Baldacci et al., 2003). Although most teachers in the Caribbean are properly trained in their respective areas, focusing on teachers in higher levels of education could have possibly elicited a greater, positive response. This disproportionate effect is also identifiable in the Bahamas, given that more resources are provided to primary and secondary school educators than any other education group. Another possible rationale behind this negative relationship is reflected in the level of skills taught in primary and secondary education. The skills required at these levels of education are less conducive to labour productivity than skills required from tertiary education, therefore, do not attribute to growth in the same manner.

The proportion of pupil-teacher ratios for primary and secondary education had the lowest level of significance with a p-value of 0.0004, being statistically significant at a 1% significance level. Income per capita β_5 coefficient is positive, as expected, which means that higher access to income does encourage the attainment of education, and therefore human capital development. The Bahamas has the highest level of income per capita in the Caribbean, so the potential to increase labour productivity by capitalizing on human capital growth is immense.

However, the effect in this model is less pronounced whereas a unit increase in income per capita would only result in a 0.011% increase in economic growth. The population of school-aged children 0-14 and FDI net inflows were both statistically insignificant. Each coefficient value exhibited a negative relationship towards per capita economic growth. Hence, the coefficient for the school-aged population meets the established a priori belief that larger populations can potentially overcrowd school systems and cause limited accessibility to shared resources. The population of children aged 0-14 as a percent of the total population has continued to decrease in the Bahamas year after year.

FDI net inflows coefficient value is -0.036, therefore, a unit increase would lower per capita economic growth by 3.6%. This is most likely due to governments not seeing education as an important sector requiring consistent resource funding. Inflow of capital from overseas investments can be diverted to other sectors instead of education, such as in improving competitiveness with tourism industries – a common component in fiscal spending for Caribbean governments.

4.2 Limitations

A major goal of this paper was to extend the research of Bynoe et. al (2012), whereas instead of using school enrolment numbers as the primary indicator for effective government expenditure on education, this paper sought to use education expenditure as a variable that influences economic growth. Yet, some limitations were encountered. These included attempting to use as many variables as possible in the model to account for unbiasedness, however, due to the limited nature of data collection in the Caribbean some of the data variables had several gaps in time periods. As a result, the number of total observations over which the regression was

estimated became limited. The period for this research concluded in 2018 since information pass this point was either inaccessible or not recorded as public knowledge. Some variables had complete data sets, but was unable to gather the same for the majority of other countries. Therefore, due to a lack of complete time series data, most of the original controlled variables were removed. Fiscal budgetary information on The Bahamas was also limited to certain time periods and unconglomerated. Much of the information provided in the budget communications did not always provide a clear reasoning behind proposed increases and decreases in expenditure.

5. Conclusion & Policy Implications

The consensus of similar papers in the past is that public expenditure on education is necessary to attain human capital development and to encourage other benefits such as economic growth. Ultimately, the most important public goal for governments should be to ensure that expenditures are allocated efficiently to reduce social inequalities and promote an enabling environment where private sectors can become an engine of growth – possible through education (Swaroop, 1996). The model of discussion evaluates such measures while attempting to produce quality interpretations that could be applied to the Bahamian economy.

Several policy implications can be deduced from this research. The statistical significance of public expenditure on education should urge governments to invest adequately into their education sectors. In the Bahamas, public spending on education has remained consistently low, especially when compared to the total percentage of government expenditure. As a developing nation, it is imperative that the government of The Bahamas enlists sustainable fiscal measures to ensure the productivity and durability of the economy. This is obtainable through investing in

education. Although public resources are readily available to the education sector in the Bahamas, the quality of education becomes another factor of importance. Low test scores and inadequate national averages present a major public concern around the effects of an undereducated Bahamian workforce (Anonymous, 2018). Bynoe et. al (2012) discovered in their research that to improve the educational system, governments should allocate resources in a manner that benefits each level of education equitably. Most education systems are set up in a hierarchical structure with primary education at the bottom, secondary education in the middle, and tertiary education at the apex. Because of such structure, studies have suggested that more investments be made at the tertiary level as the greatest returns to society can be sought at this level. Furthermore, with a proper educational base starting at the primary level, students are more likely to be successful when furthering their education.

Public spending on education should also be equitable throughout different regions in a country. Education expenditure for communities outside of New Providence and Grand Bahama are significantly less than their urban counterparts. Access to other public goods are likewise limited. Such inequalities may explain why the level of development in rural, outer islands is drastically lower than that of the northern region of the Bahamas. Sizeable income disparities and the inability to access public goods often reduces the effectiveness of government spending (Bynoe et al., 2012). To ensure the effectiveness of public spending on education, clear guidelines need to be established in order to guarantee accessible education to those who cannot afford it. Most primary school education in the Caribbean is free, including the Bahamas, but many low-income households in the region still cannot afford to send their children to school because of the direct and indirect cost associated with school enrolment. Even though this occurs to a lesser extent in the Bahamas, the government should make more of an effort to subsize education

materials, such as books, uniforms, school supplies, etc., to account for present income inequalities. The government can also subsidize private education for households that can afford to bare some of the costs.

Alongside improving access to education, the Bahamas government can increase labour productivity for educators by directly investing into their human capital, mainly through regular sponsored trainings. Funds should be properly outlined in the education budget for training teachers to ensure high educational standards. This includes training on new teaching methods, updating curriculums, competitive salaries, and providing resources for teachers interested in higher education. As shown earlier in Figure 1, expenditure for education is less than that of other major sectors. Due to the immense amount of funding elsewhere, I recommended that the government allocate a small portion of expenditure from other sectors, such as tourism and finance, to the education sector in order to examine the effects of increase education expenditure. Recognizing that it is sometime difficult for governments for raise revenue to support new expenses, this is a cost effective way to examine such theory. Resources should also be reserved for research and development initiatives to improve education quality.

In 2017, the Ministry of Education in The Bahamas enacted a research and planning division with the mandate of collecting and analyzing information on educational trends and offering suggestions for improvement. The department's main goals include analyzing education policies and providing recommendation for their revisions, conducting research activities for the Ministry, as well as developing plans to ensure the successful implementation of education policies. This was a great initiative taken by the Ministry of Education to better understand the education system in the Bahamas. However, the amount of funds received by this section is minute to total education expenditures. In 2018, total expenditure for education was recorded at B$103.9

million, yet the research and planning section only received an allocation of B$144. More resources and funds should be allocated to similar departments in order to further educational innovation.

Public intervention through increased education expenditure influences economic growth, improves future income for individuals, reduces poverty rates, and promotes equitable distribution of income to the society as a whole (Yun, 2018). As noted in similar comparative studies, there is evidence of a strong correlation between investments in the education sector and positive outcomes in economic and social development. The analysis of past educational trends in the Caribbean shows that the Bahamas has much room for improvement in efficiently reallocating resource towards the education sector. Over the past decade, goals for education in the Caribbean have shifted in response to the successful enactment of universal education. However, a broader understanding of economic growth, besides that of tied dependency on tourism and financial services, and a general understanding of the development of human capital is needed to propel the Caribbean region further forward.

Bynoe et. al (2012) confirms the importance of education for regional development, in which this research follows the same principle. Hence, it is important for Caribbean nations to invest in long-term sustainable measures that will positively influence economic growth – education being key. As a leading nation on almost all human development indices for the Caribbean, the Bahamas must become a forerunner in leading education reform. To do so, there has to be an urge for continuing similar research on what improves educational capabilities and how best we can take advantage of a well-educated population. The government ought to adopt fiscal policies that will recognize the importance of education and its effect on economic growth.

If not so, the reputation and economic stability of The Bahamas that present-day Bahamians benefit from may not exist for younger generations.

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