Journal of Economics and Sustainable Development
ISSN 2222-1700 (Paper) ISSN 2222-2855 (Online)
Vol.9, No.2, 2018

Determinants of Economic Growth and Poverty Minimization in Liberia: An ARDL Approach

Genesis B. Kollie
School of Economics, University of Nairobi, P.O. Box 30197-00100, Nairobi, Kenya
E-mail: kolliegenesisb@gmail.com

Abstract
This paper analyses factors that influenced GDP growth rate in Liberia from 1980 to 2015. To carry out this analysis, we used time series data gathered from the World Development Indicators and the African Development Indicators. Applying the advanced autoregressive distributed lags estimation technique to our model, we found that international trade openness, foreign direct investment inflows, changes in the official exchange rate, and political/economic instability have been the main factors influencing GDP growth rate in Liberia over the period studied. The findings further reveal that a rise in international trade openness and official exchange rate have negative effects on GDP growth rate in the short run, but the effects are positive in the long run respectively. FDI inflows and political/economic instability were separately found to have a negative effect on GDP growth rate in the long run. Policy measures as to how to facilitate GDP growth and how to make that growth serve as a tool for poverty minimization are briefly discussed.
Keywords: GDP Growth rate; trade openness, poverty minimization, Liberia, Open Door Policy.
JEL Classification: O47, F43, C32

1. Introduction

With a population of about 4.5 million people, Liberia is a small country located on the West Coast of Africa. At the same time, she is the oldest independent republic in Africa declaring independence on July 26, 1847. With reference to economic growth, the pattern of economic growth has been fluctuating in the history of Liberia. At some points in time, Gross Domestic Product (GDP) growth rate was recorded as high as 106.28 percent, and at sometimes it was recorded as low as -51.03 percent (World Development Indicators - WDI, 2017). Since independence in 1847, the government of Liberia, at the time, did not have sufficient resources and or have access to foreign loan to fast-track her developmental agenda. Though rich with natural resources, little was done to transform those resources into desired goods and services (Sirleaf, 1989; and Dukuly, 2007).

However, signs of economic prosperity started showing when the United States government established a multimillion dollar investment in Rubber Plantation (referred to as the Firestone Rubber Plantation) in Liberia in 1926. This foreign direct investment (FDI) led to huge improvement in the economy of Liberia; the employment rate of Liberia (mostly unskilled workers) increased; infrastructural developments, like roads and clinics were introduced. The revenue of the government also expanded. Unfortunately, the Great Depression of the 1930s crippled the emerging progress that the Liberian economy was making.

In 1944, when William V.S. Tubman became president of Liberia, he introduced two major policies: the National Unification Policy and the Open Door Policy (ODP). The latter was geared towards unifying the minority Americo-Liberians and the majority Indigenous Liberians. For the former, the Open Door Policy, it was a policy geared towards attracting foreign investors to invest into the Liberian economy. This policy led to tremendous progress in the history of Liberia; with 1950 to 1960 being the peak. During this period, rubber production in Liberia expanded, and iron ore exploitation for export started. Over twelve foreign concession companies were established in Liberia, with aggregate investment totaling to over $500 million United States Dollars (Sirleaf, 1989).

Employment level in the rubber sector rose from 8,200 in 1927 to over 15,000 by 1960. Total export earnings from rubber increased from $4 million USD in 1940 to $42 million USD in 1960. The revenue generated by the Government of Liberia (GoL), just from the rubber industry, increased from 1 percent in the 1930s to 46 percent in the 1950s. The iron ore industry also made huge contribution to the growth pattern of Liberia: export earnings from the iron ore sector rose from $6 million USD in 1953 to $35 million USD in 1960. This led to the contribution of revenue from the iron ore sector increasing from less than 1 percent in previous years to 20 percent in 1960. The service sector of Liberia was also seen as a beneficiary of the ODP, with GDP from the service sector almost doubling from $2.6 million USD to $5 million USD between 1950 and 1960.

Also during this period of tremendous economic growth, Liberia started the operation of its maritime programme with head office situated in the United States of America. The maritime programme consisted of registration of ships under the Liberian flag. With the rapid increase in ship registration under the Liberian flag, the economy recorded an annual nominal growth rate of 15 percent and annual real growth rate of 10 percent from 1954 to 1960. The growth rate of Liberia was so high that it was only Japan that recorded higher growth rate than Liberia (Clower et al., 1966; and Sirleaf, 1989).

Despite the huge growth rate of Liberia's economy between 1950 and 1960, little effort was made by the Liberian Government to diversify the economy. The Government of Liberia forgot to pay keen attention to the fact that the huge growth recorded was concentrated on the exportation of primary commodities (mainly natural rubber and iron ore) and extraction/exportation of those commodities were done by foreign dominated firms whose main objective was to transport

their profit oversea. Sirleaf (1989) argued that the education sector of Liberia was unplanned and unstructured with little attention on its expansion from the stand point of GoL. In the end of the analysis, there was huge growth recorded but it did not commensurate with improvement in the wellbeing of the majority of the Liberian people. As such, Liberia was described by some researchers as "growth without development" (Clower et al., 1966; and Sirleaf, 1989).

By 1980, the economy of Liberia experienced downward trend in its growth pattern. This was mainly attributed to the fall in prices of Liberia's major export commodities. Sadly for Liberia, in 1980 the economy came to ruin with the introduction of a military revolution led by Samuel K. Doe. GDP growth rate was recorded at -4.1 percent in 1980 down from 3.1 percent in 1979 (WDI, 2017 and Dukuly, 2007). From 1980 to 1995, Liberia recorded negative GDP growth rates; with the worst recorded as -51.03 percent in 1990. With this, GDP per capita fell from $1,571.3 USD in 1979 to $115.44 USD in 1995. However, after the elections of 1997, history of economic growth began to favor Liberia again. Liberia recorded her highest GDP growth rate as 106.28 percent in 1997. And from 1996 up to 2002, positive GDP growth rates were recorded although they were fluctuating (WDI, 2017).

With the election of Madam Ellen Johnson-Sirleaf, Liberia's/Africa's first female president, in 2005, the Liberian economy experienced a positive growth trend from 2006 up to 2013. However, in 2014, the economy was highly hit by twin crises: the Ebola Virus Disease (EVD) and the fall in prices of Liberia's major export commodities on the world market (Jackson, 2015). As a result, Liberia recorded a GDP growth rate of 0.7 percent and 0.0 percent in 2014 and 2015 respectively. However; the Government of the Republic of Liberia, through her development partners, is keen on the improvement of growth in Liberia. This is evidenced by the Government of Liberia long term developmental agenda, otherwise known as "Vision 2030" (GoL, 2008 & 2012).

Despite the tremendous growth Liberia has experienced in history, little has been done to improve the wellbeing of the citizens of Liberia. Liberia still remains one of the poorest countries on Earth, with poverty taking an upward trend on a yearly basis. For example, poverty in Liberia stood at 63.8 percent and 81.86 percent in 2007 and 2015 respectively (Building Markets, 2016; and UNDP HD Report, 2015). In terms of overall happiness, the country was ranked 8th amongst the least happy countries in the world (Helliwell, Layard & Sachs, 2017). Without policy relevant research to serve as a guide for informed public policy/decision making, the situation of Liberia will continue to worsen. As such, the citizens will be exposed to abject poverty in the midst of abundant natural resources, sicknesses and diseases (i.e. the recent Ebola Virus Disease), unhappiness, low human capacity, amongst others.

With the above understanding, this study seeks to provide answers to the following questions: (i) why has Liberia been unable to benefit from its tremendous growth as recorded in history? (ii) Who have been the major actors of the growth accumulation process in Liberia? (iii) What is the relationship between economic growth and poverty minimization? (iv) Which policy (ies) can be implemented in order to reduce poverty through economic growth?

This study contributes to the existing body of knowledge in the Economic literature by assessing the causes of high poverty level in Liberia even though there has been tremendous economic growth. It also proffers policy recommendations that can be used as a basis for informed policy decision making with regards to economic growth. Moreover, the study will serve as a basis for other researchers to conduct similar research.

We have organized the rest of our study in the following sections: Section two discusses various literature reviewed. Section three presents the methodology adopted for the study, the empirical models, sources of data, descriptions and definitions of variables, alongside estimation procedures. Section four analyzes the empirical results and provides interpretations. Finally, section five presents the summary, policy implications, and conclusions of this paper.

2. Literature Review

Even though, an increase in a country's GDP (economic growth) is not a perfect guarantee for improvement in the standard of living of the people of that country, GDP growth can serve as a conduit for ensuring improvement in living standards. In order words, GDP growth can be regarded as a necessary condition for improving lives within a nation.

Several arguments have erupted concerning economic growth. Some came as a result of Liberia's ironical growth records in the history of economics, others came as a result of research conducted to inform policy decision in terms of increasing a country's GDP.

Sirleaf (1989) is one of first Liberian researchers to comment on the growth pattern of Liberia that erupted between the 1950s and 1960s. In the 1950s and 1960s, Liberia experienced tremendous economic growth rates in the world at large. Ironically, the growth figures were not transformed into economic development for Liberia. The country remains amongst the poorest in the world. Sirleaf (1989) argued that GDP growth rate was of no significance to improving wellbeing due to the fact that it was not Liberians themselves that were involved in the growth generation process. Instead, foreign companies and or nationals were the ones involved. Though on paper, Liberia recorded huge growth rates, the actual profits/gains were repatriated by those foreign firms to their home countries. Also, the Liberian Government, at the time, made little efforts to diversify the economy that would lead to perpetual growth. With that, major concentration was on the exportation of primary products (mainly rubber and iron ore). Public sector activities were not properly planned, and the debt burden of Liberia rose significantly as it was one of few means of financing public activities.

Barro & Lee (1994) attempted to explain the reasons for differing growth experiences using panel data comprising of 116 countries. The result of their study showed, among other things, that higher investment rates increase GDP growth; while political instability and high fiscal imbalances are inimical to economic growth

Petrakos & Arvanitidis (2008) argued that economic growth of a nation is contigent upon several factors; including political and institutional factors; level of past development, amongst others. They also pointed out investment, improvement in human capital, political stability, macroeconomic and institutional frameworks, trade openness, foreign direct investment, population, geographical conditions, amongst others as key factors influencing economic growth (Chen & Feng, 2000). This is also in line with Alesina, Ozler, Roubini & Swagel (1996) who pointed out that political instability has a downward trend on economic growth since it poses policy uncertainty amongst economic actors.

International trade is a key driver to increasing the growth pattern of a developing country. Trade serves as a vent of surplus and creates potential markets (Madeley, 1996; Singh & Nyandemo, 2003; and Chen, 1997). Trade liberalization/facilitation leads to the transfer of new knowledge, technology and equipment that can be used to further augment the productive capacity of a developing country. This in turn increases export, and export leads to foreign earnings, which later translate into economic growth (Madeley, 1996; and Singh & Nyandemo, 2003). When these growths are well managed, they can lead to poverty minimization.

From the Literature reviewed, we conclude that economic growth is influenced by Foreign Direct Investment that is enhanced through international trade openness, high rates of human capital, size of population, stable macroeconomic environment, geographical condition, political stability, amongst others. With these in mind, we establish a conceptual framework so as to achieve the object of this study, thereby leading to informed policy decisions.

3. Conceptual Framework

Since GDP is a measure of the monetary value of final goods and services produced within an economy within a year, we maintain that productivity increases as a result of improvement in labour input and technological progress. As such, the economy's production function is represented by the following Neo-Classical production function:

$$Y = AF(K, L) \dots \dots \dots \dots (1)$$

Where Y is total output; A is technological efficiency; K is physical capital input; and L is labour input.

Following this Neo-Classical production function with Hicks neutral technological progress, we assume that the inputs have positive marginal products. With this, we can transform equation (1) into a specific relationship between input and output growth. If there is a change in capital, labour, or technical progress, total output will also change. This change is expressed as:

$$\Delta Y = MP_K \cdot \Delta \mathrm{K} + MP_L \cdot \Delta \mathrm{L} + \mathrm{F(K, L)} \cdot \Delta \mathrm{A} \dots \dots \dots \dots (2)$$

Where MP_K and MP_L are marginal products of capital and labour, respectively.

We transform equations (1) and (2) into the growth accounting equation as follows:

$$(\Delta Y)/Y = \beta \cdot (\Delta K)/K + \alpha \cdot (\Delta L)/L + (\Delta A)/A \dots \dots \dots \dots (3)$$

Equation (3) expresses that output growth is equal to the share of capital multiplied by capital growth; the share of labour multiplied by labour growth; and the growth of total factor productivity.

For the purpose of this study, we argue that foreign direct investment is the main source of technological progress (Borensztein, De Gregorio, & Lee, 1998). And this FDI can be enhanced through international trade and a suitable political/economic environment.

Equation (3) can be re-written in the following manner:

$$g_y = \beta \cdot g_k + \alpha \cdot g_L + g_\lambda \dots \dots \dots \dots (4)$$

Where g_y is output growth; g_k is capital growth; g_L is labour growth (which consists of working population with higher level of education); and g_λ is growth of technical progress.

In the literature of economic growth, economic growth is not determined by capital, labour, and technological progress alone. Other factors like political/economic stability, trade openness, population, research and development, etc. play major roles in the determination of GDP growth (Chen, 1997; and Chen & Feng, 2000). We close our framework by incorporating those other factors:

$$g_y = \beta \cdot g_k + \alpha \cdot g_L + g_\lambda + \Sigma \gamma_i \rho_i \dots \dots \dots \dots (5)$$

Where the term, $\Sigma \gamma_i \rho_i$, is a vector of other variables that influence economic growth, but are not captured by the Neo-

Classical production function.

To measure the empirical effects of our independent variables (growth determining factors) on our dependent variable (economic growth), we employ the following econometric model:

$$GDP_g = \beta_0 + \beta_1 TOI + \beta_2 FDI + \beta_3 EXCR + \beta_4 INFL + \beta_5 INSTAB + \epsilon_t \dots\dots\dots\dots\dots (6)$$

Where:
GDP_g = output growth rate (GDP growth rate);
TOI= international trade openness;
FDI = Foreign direct investment inflows;
$EXCR$ = Official exchange rate;
$INFL$= Inflation rate per year;
$INSTAB$ = political/economic instability;
β_0 = the intercept;
$\beta_1 \dots \dots \dots \beta_5$ = estimation parameters;
ϵ_t = the error term.

3.1 Data type, estimation technique, and variable descriptions

We use time series data gathered from the World Bank-World Development Indicators (WDI, 2017) and the African Development Indicators (ADI, 2017) for our analysis. The period under review for our study is thirty-six (36) years, spanning from 1980 to 2015. The data were estimated using an advanced Autoregressive Distributed Lags (ARDL) estimation technique to establish the short run, long run and error correction coefficients. For inferences about cointegration, we employed the Pesaran, Shin & Smith (2001) ARDL-Bound test for cointegration. Researchers have pointed out several advantages that are associated with this advanced ARDL-Bound test procedure. The Bound test has improved power in testing for cointegration even in smaller samples. With the advanced ARDL-Bound test, the pre-testing problems of standard cointegration approaches are avoided since it incorporates variables that have different order of integration (Kalu, Mgbemena, & Ewurum, 2015; and Pesaran et al, 2001). Whereas other cointegration approaches suffer from the problem of endogeneity, the ARDL does not suffer from endogeneity since it distinguishes between dependent and independent variables. Appropriate lags in the ARDL model correct for both residual correlation and endogeneity (Pesaran & Shin, 1999).

Following Kalu, et al (2015), we express the general ARDL model as follows:

$$\emptyset(L,P)y_t = \sum \beta_i\,(L,q_i)X_{it} + \delta W_t + \mu_t \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (7)$$

Where $\emptyset(L,P) = 1 - \emptyset_1 L - \emptyset_2 L^2 - \cdots - \emptyset_p L^p$
And $\beta_i(L,q_i) = 1 - \beta_{i1} L - \beta_{i2} L^2 - \cdots - \beta_{iqi} L^{qi}$, $\quad i = 1,2,3,\dots k$

where y_t is the dependent variable (in our case GDP growth rate); X_{it} consists of the vector of independent variables (TOI, FDI, EXCR, INFL); L is the lag operator, and W_t is an $(S\ x\ I)$ vector of deterministic variables including dummy variables (in our case INSTAB).

Given the general form of the ARDL model in equation (7), we present the Unrestricted Error Correction Model as follows:

$$\Delta y_t = \lambda_0 + \sum_{i=1}^{n} \beta_i\, \Delta \hat{Y}_{t-i} + \sum_{i=0}^{n} \alpha_i\, \Delta X_{t-i} + \delta_1 y_{t-1} + \delta_2 x_{t-1} + \mu_t \dots\dots\dots\dots\dots\dots\dots\dots (8)$$

Where Δy_t is the differenced value of the dependent variable (i.e. GDPg); ΔX_t is the differenced value of the vector of independent variables (i.e. TOI, FDI, EXCR, INFL and INSTAB); β_i and α_i are the short run coefficients; and δ_1 and δ_2 are the long run coefficients.

To better define the properties of the variables used in our study, we employed descriptive statistics such as mean, minimum, maximum, etc. to describe the characteristics of our time series variables. Several pre and post estimation tests were also conducted to ascertain the validity of our estimation results. To improve our analysis over previous studies done, we test for unit root in the presence of structural breaks using the CLEMAO unit root test developed by Clemente, Montanes & Reyes (1998). Where structural breaks were found, we created dummy variable to accommodate those break points. The variables used in this study are described in table 1.

4: Data Analysis and Discussion of Results

Table 2 gives the characteristics of the variables employed in this study. It reveals that GDP growth rate has a mean value of 1.136 percent and a standard deviation of 24.74. The table further shows that the lowest and highest GDP growth rates recorded in Liberia are -51.03 percent and 106.28 percent, respectively. On average, trade openness is recorded as 2 percent

with 0.61 percent and 9.87 percent as minimum and maximum values respectively. The inflation rate is recorded as 4.42 percent on average. It has a minimum and maximum value of -10.01 percent and 29.05 percent respectively.

Table 1: Definition and Description of Variables

Variables	Denotation	Description and Measurement	Expected sign***
GDP Growth Rate	**GDPg**	Monetary value of domestic production in Liberia (measured in percentage).	N/A
Trade Openness Index	**TOI**	The values of export plus import, all divided by GDP (measured in percentage).	positive
FDI inflows	**FDI**	Net inflows of investment activities into an economy other than that of the investor's. It is measured in millions of United States Dollar.	positive
Official Exchange Rate	**EXCR**	The rate determined by the monetary authority of a country. It is the price of a foreign currency in terms of the domestic currency. It is measured as the ratio of the Liberian Dollar to the United States Dollar (L$/US$).	positive
Inflation rate	**INFL**	It is the rate at which the general price level of an economy rises within a year. It is measured in percentage.	negative
Political/Economic instability	**INSTAB**	The presence of distortion in political/ economic activities (dummy variable by 1= presence of instability, 0= otherwise).	negative

Note: These expected signs are for the long run relationships only; they are not for the short run.
Source: Author's computation

Table 2: Summary statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
GDP Growth Rate	36	1.135502	24.73718	-51.03086	106.2798
Trade Openness Index	36	1.998459	2.118116	.6058361	9.866468
FDI Inflows	36	2.20e+08	3.04e+08	-1.32e+08	1.31e+09
Official Exchange Rate	36	31.65572	32.53415	1	86.18837
Inflation	36	4.419471	7.073096	-10.00882	29.05327
Political/Economic instability	36	.4166667	.5	0	1

Source: Author's computation.

This study applies the Augmented Dickey-Fuller (ADF) test to test for non-stationarity among our variables. The null hypothesis of the ADF test is that there is at least a unit root in a specified variable. Selecting the lag value of one for all of our variables (based on the Akaike Information Criterion), our results are contained in table 3.

Table 3: Augmented Dickey-Fuller Test Results

Variable	Test Statistic	1% Critical Value	5% Critical Value	10% Critical Value	Status
LGDPg	-2.546	-3.689	-2.975	-2.619	I(1)
ΔLGDPg	-5.016***	-3.696	-2.978	-2.620	I(0)
LTOI	-1.959	-3.689	-2.975	-2.619	I(1)
ΔLTOI	-4.206***	-3.696	-2.978	-2.620	I(0)
Ln_FDI	-1.857	-3.750	-3.000	-2.630	I(1)
ΔLn_FDI	-3.450**	-3.750	-3.000	-2.630	I(0)
LEXCR	0.085	-3.689	-2.975	-2.619	I(1)
ΔLEXCR	-4.584***	-3.696	-2.978	-2.620	I(0)
LINFL	-2.649	-3.689	-2.975	-2.619	I(1)
ΔLINFL	-5.120***	-3.696	-2.978	-2.620	I(0)

Note: Δ means first difference. ** and *** indicate rejection of the null hypothesis of non-stationarity at 5 and 1 percent respectively. L represents the lagged value on a variable.

From the analysis given in table 3, all of our variables are non-stationary at levels but they become stationary after first

differencing. For this reason, we fail to reject the null hypothesis at level. However, we reject the null hypothesis after first differencing. We therefore argue that there is an evidence of cointegration in our model. As such, we test for cointegration using the Pesaran, Shin & Smith (2001) bound test.

Even though the ADF test is more powerful in testing for unit root as compared to the standard Dickey-Fuller test, its predictive power becomes useless when there is a presence of structural breaks. As such, we employ the CLEMAO test developed by Clemente, Montanes & Reyes (1998). This test examines unit root in the presence of two structural breaks. Table 4 presents the CLEMAO test results using two outliers; the Additive Outliers (AO) and the Innovative Outliers (IO). The AO is used to capture sudden change in the mean of a series; whereas the IO captures gradual shift in the mean of a series (Conteh, 2010; Mlilo & Netshikulwe, 2017; and Clemente et al., 1998).

Table 4: Clemao AO and IO test for structural breaks

VARIABLES	ADDITIVE OUTLIERS (AO)		INNOVATIVE OUTLIERS (IO)	
	Test Statistics	Optimal Breakpoints	Test Statistics	Optimal Breakpoints
LGDPg	-5.902**	1988 & 1995	-6.059**	1995 & 1999
LTOI	-3.552	1991 & 1998	-7.445**	1990 & 1994
Ln_FDI	-5.296	2000 & 2004	-5.663**	2001 & 2009
LEXCR	0.056	1995 & 1999	-11.548**	1996 & 2007
LINFL	-6.117**	1994 & 2002	-6.482**	1995 & 2001

Note: Critical value at 5 percent significance level is -5.490. We trimmed our estimation at 0.10; maximal lag was selected at 4. L represents the lagged value on a variable.

Using the Innovative Outliers to interpret the CLEMAO unit root test results, there was a gradual change in our variables under the period studied. However, the Additive Outlier points out that GDP growth rate and Inflation rate exhibited sudden change during the period studied. The optimal breakpoints identified can be attributed to the protracted civil war fought in Liberia from 1989 to 2003. Other factors such as the Global Financial Crisis of 2008/2009 can also be attributed to the structural breaks in our variables. We therefore create a dummy variable called 'Political/Economic Instability' to capture the structural breaks.

To present a well-structured model for our analysis, we conducted a cointegration test to ascertain as to whether there exists a long run relationship among our variables or not. We employed the Pesaran et al (2001) Bound test for our analysis. To make our judgment, we compare the F-statistics of the Bound test with the critical values. If the F-statistics is higher than the upper bound critical value, we reject the null hypothesis of no cointegration. We will fail to reject the null hypothesis if our F-statistics is lower than the lower bound critical value (Kalu et al., 2015).

Results contained in table 5 reveal that our F-statistics (4.637) is higher than the upper bound critical value (3.79) and the lower bound critical value (2.62) at 5 percent level of significance. This means that we reject the null hypothesis of no cointegration amongst our variables. This further means that there is a long run relationship amongst our variables. We, therefore, estimate a long run relationship using the ARDL estimation technique.

Table 5: Pesaran/Shin/Smith Bound Test for Cointegration

	10 percent level of significance	5 percent level of significance
Lower Bound I(0)	2.26	2.62**
Upper Bound I(1)	3.35	3.79**

F-Statistics = 4.637 **Number of regressors = 5** **Lag order = (1 1 1 1 1 1)**

Note: ** means that we reject the null hypothesis at 5 percent levels

4.1 ARDL Estimation Results

Using an ARDL estimation technique with lag order of (1 1 1 1 1 1), we obtain the results of the short run, long run and error correction term of our estimation. Table 6 presents our results in three columns.

Table 6: Short-Run, Long-Run, and ECM Coefficients of the ARDL estimation
Dependent variable: GDPg

	(1)	(2)	(3)
Variables	**Short Run Coefficients**	**Long Run Coefficients**	**ECT Coefficients**
TOI(-1)		11.60**	
		(5.162)	
Ln-FDI(-1)		-7.192*	
		(4.029)	
EXCR(-1)		0.489**	
		(0.174)	
INFL(-1)		0.0494	
		(0.981)	
INSTAB(-1)		-36.23**	
		(13.13)	
L.GDPg / ECT(-1)			-0.480***
			(0.158)
TOI(-1)	-8.882**		
	(3.527)		
Ln-FDI(-1)	-2.133		
	(1.615)		
EXCR(-1)	-1.108**		
	(0.390)		
INFL(-1)	-0.325		
	(0.310)		
INSTAB(-1)	6.124		
	(5.196)		
CONSTANT	54.72*		
	(29.54)		

Observations	27	F-Statistics	12.20
R-squared	0.899	Prob(F-statistics)	0.0000
Adj R-squared	0.826	Durbin-Watson statistics	2.673

Note: standard errors are in parentheses. *, **, and *** indicate estimates are statistically significant at 10, 5, and 1 percent levels respectively.

4.1.1 Interpretation and discussion of the results

From our empirical results contained in table 6, two of the explanatory variables; trade openness index and official exchange rate were found to be statistically significant in explaining changes in GDP growth rate in Liberia from 1980 to 2015 in the short run; whereas four of our explanatory variables (trade openness index, foreign direct investment, official exchange rate,

and instability) were statistically significant in explaining GDP growth rate in the long run. An R-squared of 0.899 was obtained. This means that 89.9 percent of variations in GDP growth rate is explained by variations in the independent variables. As such, 10.1 percent of variation in GDP growth rate is explained by other variables that were not captured in our model.

Additionally, the results show that with respect to trade openness index, the coefficient on the variable is negative in the short run but positive in the long run. This means that, holding other variables constant, a 1 percent increase in trade openness decreases GDP growth rate by 8.882 percent in the short run, but it increases GDP growth rate by 11.6 percent in the long run. Part of the reasons for this result is that when a developing country like Liberia opens to international trade, there will be some level of loss from the onset. This is due to the fact that there will be limited amount of trained trade policy makers to make good trade policies. However; with the passage of time, the number of trained trade policy makers significantly increases thus resulting into gain in the long run. Our finding is consistent with the works carried out by Madeley (1996); Singh & Nyandemo (2003); and Chen (1997) who have pointed out that international trade is one of the surest ways for an economy to grow in the long run. Policy makers should therefore consider improving our trade relations with the rest of the world (i.e. trade liberalization) in order to increase economic growth.

Foreign direct investment inflows was found to have a negative and statistically significant effect on GDP growth rate in the long run. This finding is in contrast to economic theory. It suggests that an increase in FDI by one million United States Dollar reduces GDP growth rate by 7.2 percent in the host country in the long run. Several studies have pointed out that FDI inflows is a source of technological transfer thereby leading to economic growth in the host country (Tu et al, 2011; Ali & Hussain, 2017; Lee & Tcha, 2004; and Borensztein et al., 1998). However, Melnyk, Kubatko & Pysarenko (2014) in a study argue that in an instance where FDI is not accompanied by research and development, it would result to negative impact on the growth of the host economy. Issues such as repatriation of profit will ensue thereby degenerating growth in the long run (Sirleaf, 1989). Similar view is shared by Tu et al (2011); Buckley et al. (2006); and De Mello (1999), where they argue that FDI will benefit a host economy depending on the economic, social and environmental qualities of that host country. Qualities such as savings and financial development, trade openness, human capital development and technological development of the host country are key in that regards. In the absence of these, FDI renders negative impact on the host economy.

The effect of the official exchange rate is similar to that of the trade openness index. It shows a negative and positive effect on GDP growth rate in the short run and long run respectively. An increase in the official exchange rate by 1 percent leads to a decrease in GDP growth rate by 1.11 percent in the short run, and an increase in GDP growth rate by 0.49 percent in the long run. This finding reveals that currency devaluation is a helpful tool to increase GDP in the long run. However, measures such as increasing the productive capacity of Liberia should be put in place to encourage export in the long run, otherwise inflationary pressure will ensue. Our finding is in conformity with the Marshall-Lerner Condition, which maintains that exchange rate depreciation will worsen the balance of trade in the short run but will improve it in the long run.

Like foreign direct investment, the coefficient on political/economic instability has a negative sign and statistically significant at 5 percent levels. This means that in the presence of political/economic instability, GDP growth rate reduces by 36.23 percent in the long run. Again, this result is in line with the works of Barro & Lee (1994); Chen (1997); Chen & Feng (2000); and Petrakos & Arvanitidis (2008), who argue that political instability has an adverse effect on economic growth. Stability in an economy gives rise to meaningful economic activities: investors are encouraged to invest, and other economic agents are also free to participate in economic happenings. But these activities are not possible in the presence of instability (Alesina et al., 1996). Policy makers should, therefore, build on the current democratic gains so as to bolster economic growth in Liberia.

Finally, we use the Error Correction Term (ECT) to measure how fast it will take for equilibrium to be restored in the dynamic model. Theoretically, the ECT is expected to have a negative and statistically significant coefficient. In terms of magnitude, the larger the coefficient of the ECT, the quicker the speed of adjustment to restore equilibrium, and vice versa. Given our results in table 6, the coefficient on the ECT is -0.480 and it is statistically significant at 1 percent level. This means that 48 percent of the deviation between the short run and the long run dynamics is corrected within the next period. This further reveals that the speed of adjust to long run equilibrium is not very slow.

4. 2 Diagnostic tests

The estimation of both the short and long run relationships is validated by several post estimation tests conducted in this study. As presented in table 7, our model does not suffer from serial correlation as evidenced by the Durbin-Watson Statistics. The Ramsey RESET test proves that there is no omitted variable, an indication that our model is well specified. The ARCH LM test and the Breusch-Pagan/Cook-Weisberg (Hettest) confirm that there is no heteroskedasticity. The normality of the error term was also established using the Jarque-Bera (JB) normality test.

Table 7: Post estimation tests results

Post estimation tests	Statistical values
D-Watson	2.672669
RESET	0.6859
ARCH LM test	0.3550
Hettest	0.5316
JB	0.6804

5. Conclusion and Policy Recommendations

The study examines major determinants of economic growth rate in Liberia from 1980 to 2015. During this period, Liberia is on record for having the lowest and highest GDP growth rates ever (i.e. -51.03 percent in 1990 and 106.28 percent in 1997). Using macroeconomic variables to investigate factors that influence economic growth rate in Liberia with the understanding of minimizing poverty, the study has established that international trade openness, Foreign direct investment, changes in the official exchange rate, and political/economic instability have been the main factors influencing GDP growth rate in Liberia over the period studied. A rise in international trade openness and official exchange rate have negative effects on GDP growth rate in the short run, but the effects are positive in the long run respectively. FDI inflows and political/economic instability were found to have negative effect on GDP growth rate in the long run.

Given the findings from our empirical estimation, we recommend the following policy implications to the Government of the Republic of Liberia:

(i) That the Government might wish to reduce trade barriers through creating a more competitive and conducive business environment, reduce bureaucracies and bolster legal reforms. This move is expected to not only increase the volume of trade in goods and services but will also lead to the facilitation of technology transfer and exchange of new ideas. Encouraging international trade will lead to increase in export, which is later translated into increase in GDP. Even though, GDP is not a sufficient condition for minimizing poverty (improving wellbeing of citizens), it is a necessary condition for poverty minimization;

(ii) The government might also consider building on the current political gains by strengthening the rule of law, enhancing and regulating political pluralism as well as maintaining cordial relations with the rest of the world;

(iii) The Government of Liberia, through her monetary authority, might wish to pay keen attention to the exchange rate management. While it is true that devaluation encourages export thus leading to economic growth, the productive capacity should be strengthened to produce more exportables. This will make the devaluation to follow the prediction of the Marshall-Lerner Condition in the long run.

(iv) Lastly, we recommend that the growth generation process of Liberia be dominated by Liberians themselves. This is a sure way of poverty reduction. As we saw from the growth records of the 1950s and 1960s, Liberia's GDP growth rate was the second highest in the world, yet majority of the Liberian people remain in abject poverty. Part of the reasons for this is that the growth generation process was squarely in the hands of foreign investors who later transferred their income to their various home countries (Sirleaf, 1989). Government can involve majority of Liberians in the growth generating process by investing more in human capital development, such as health and education, amongst others.

Acknowledgement

We remain grateful to the Almighty God for His grace bestowed upon us to come to the completion of this work. Many thanks to all resource supply centers/institutions for making available the data used in this study. This paper benefited from the comments of Mr. Saidu Bah and Dr. Owen Nyangoro from the School of Economics - University of Nairobi, and Dr. Chris U. Kalu from the Department of Economics - Nnamdi Azikiwe University, Nigeria.

References

Alesina, A., Ozler, S., Roubini, N. & Swagel, P. (1996). Political Instability and Economic Growth. *Journal of Economic Growth*, 1(2), pp.189-211.

Ali, N. & Hussain, H. (2017). Impact of Foreign Direct Investment on the Economic Growth of Pakistan. *American Journal of Economics*, 7(4), pp.163-170.

Barro, R.J. & Lee, J.W. (1994): "Sources of Economic Growth", *Carnegie-Rochester Conference Series on Public Policy*, North-Holland.

Borensztein, E., De Gregorio, J. & Lee, J.W. (1998). How does foreign direct investment affect economic growth?. *Journal of International Economics*, 45, pp.115–135.

Buckley, P.J., Clegg, J. & Wang, C. (2006). Inward FDI and Host Country Productivity: Evidence from China's Electronics Industry. *Transnational Corporations*, 15(1), pp.13-37.

Building Markets (2016): "Liberia Businesses: The Engines of Economic Recovery and Growth", *A Market Overview Report*, Monrovia.

Chen, B. & Feng, Y. (2000): Determinants of Economic Growth in China: Private Enterprise, Education, and Openness. *China Economic Review*, 11, pp.1-15.

Chen, E.K. (1997): The Total Factor Productivity Debate: Determinants of Economic Growth in East Asia. *Asian-Pacific Economic Literature*, 11, pp.18-38.

Clemente, J., Montanes, A. & Reyes, M. (1998). Testing for a Unit Root in Variables with a Double Change in the Mean. *Economics Letters*, 59(2), pp.175-182.

Clower, R.W. et al. (1966): *Growth without Development: An Economic Survey of Liberia*. Evanston: Northwestern University Press.

Conteh, B.S. (2010). "*Relative Effects of Monetary and Fiscal Policy on Output: The case of Liberia"*. University of Nairobi Library: An Unpublished Master of Arts in Economics Thesis.

De Mello, L.R. (1999). Foreign Direct Investment-led growth: Evidence from Time Series and Panel Data. *Oxford Economic Papers*, 51(1), pp.133-151.

Dickey, D.A. & Fuller, W.A. (1979). Distribution of the Estimators for Autoregressive Time Series with a Unit Root. *Journal of the American Statistical Association*, 74(366), pp.427-431.

Dukuly, M. (2007): "*An Assessment of Urban Poverty in Post-War Liberia: A Case Study"*. University of Nairobi Library, An Unpublished Master of Arts in Economics Thesis.

Government of Liberia (2008): "Agenda for Transformation: Steps toward Liberia rising 2030". Monrovia: Government Press.

_____ (2012): "National Vision 2030". Monrovia: Government Press.

Helliwell, J., Layard, R. & Sachs, J. (2017): "*World Happiness Report 2017*". New York: Sustainable Development Solutions Network.

International Monetary Fund. (2007). "Liberia: Interim Poverty Reduction Strategy Paper", *IMF Country Report No. 07/60*.

Jackson, S.P. (2015, November 12): "Liberia: Challenges to Economic Growth, Sustainable Development". Front Page Africa (Monrovia). (Available at: http://allafrica.com/stories/201511121319.html)

Kalu, CU., Mgbemena, O.O. & Ewurum, N.C. (2015). Trade- GDP Nexus in Nigeria: An Application of Autoregressive Distributed Lag (ARDL) Model. *Journal of Economics and Sustainable Development*, 6(4), pp.127-134.

Katz, L. (1986): "Efficiency Wage Theories: A Partial Evaluation", in Stanley Fischer, (ed.), *NBER Macroeconomics Annual*. Cambridge: MIT Press, pp. 235-276.

Lee, M. & Tcha, M. (2004). The color of money: The Effects of Foreign Direct Investment on Economic Growth in Transition Economies. *Review of World Economics*, 140(2), pp.211-229.

Madeley, J. (1996): *Trade and the Poor: The Impact of International Trade on Developing Countries.* London: Intermediate Technology Publications Ltd.

Melnyk, L., Kubatko, O. & Pysarenko, S. (2014). The Impact of Foreign Direct Investment on Economic Growth: Case of Post Communism Transition Economies. *Problems and Perspectives in Management (open-access)*, 12(1), pp.17-24.

Mlilo, M. & Netshikulwe, M. (2017). Re-testing Wagner's Law: Structural breaks and disaggregated data for South Africa . *Journal of Economics and Behavioral studies*, 9(4), pp.49-61.

Pesaran, M.H. & Shin, Y. (1999). An Autoregressive Distributed Lag Modelling Approach to Cointegration Analysis, in Strom, S. (Ed.): *Econometrics and Economic Theory in the 20th Century: The Ragnar Frisch Centennial Symposium.* Cambridge, UK: Cambridge University Press.

Pesaran, M.H., Shin, Y. & Smith, R.J. (2001). Bounds Testing Approaches to the Analysis of Level Relationship. .*Journal of Applied Econometrics*, 16(3), pp.289-326.

Petrakos, G. & Arvanitidis, P. (2008): "Determinants of Economic Growth". *Economic Alternative*, 1, pp.11-30.

Singh, K.D. & Nyandemo, S.M. (2003): *Economics of Development & Planning*. Dehra Dun: Bishen Singh Mahendra Pal Singh.

Sirleaf, E.J. (1989): The Liberian Economy on April 1980: Some Reflections. *Liberian Studies Journal*, XIV (2), pp.1-22.

Tu, Y., Yu, N. & Tan, X. (2011). Technology Spillovers from FDI: The Case of ASEAN . (Available at SSRN: http://ssrn.com/abstract=1970015)

UNDP HD Report. (2015). Briefing Note for Countries on the 2015 Human Development Report-Liberia

World Bank. (2017). *Africa Development Indicators 2017*. Washington, D.C: World Bank

_____ (2017). *World Development Indicators 2017*. Washington, D.C: World Bank