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The Finance-Growth Nexus in Liberia Re-examined: A Causality Test

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Abstract

This paper employs the Granger Causality Test to re-examine the finance-growth nexus in Liberia using secondary annual time series data (2000-2014). Evidence suggests that there is a strong and positive relationship between financial development and economic growth; however, there is no causal relationship between financial deepening and economic growth. The results indicate that financial intermediation proxies and per capita GDP growth do not Granger-cause each other. Findings further revealed that economic openness granger causes private sector credit. However, narrowing the data set to 2006 -2014, economic openness does not granger-cause the proxy for financial intermediation. These results are reflective of the nascent financial sector with no capital market, though there is an emerging money market with limited financial instruments. Thus, the Government focus on economic diversification through value chain production particularly in the agriculture sector would stimulate inclusive growth. This action would be strengthened through innovative finance scheme by lending institutions to advance medium to long term credit to the agricultural sector. This may largely be applicable if the relevant authorities could put in place an incentive-based risk sharing for agriculture lending. This scheme may, to some extent, incentivize commercial banks to lend to actors involve in agricultural value chain production.

JEL Classification: *O1, O4*

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1. Introduction

This paper re-examines the finance-growth relation in Liberia. The focus is to determine the direction of causality between finance and growth in Liberia. To this end, it evaluates the role of economic openness as an influencing factor in the determination of the direction of causality between financial deepening and real sector performance in the country. Economic growth remains a key focus of Development Economics because in large part it is construed as a necessary, though not sufficient condition for social economic development. On the basis of this understanding, a growing body of literature has been devoted on empirical investigation of the main sources of growth in society (Barajas et al., 2013). Beyond the traditional sources of growth, more emphasis in the recent times has been placed on the role of financial sector development in real sector growth.

The average growth rate of the Liberian economy over the last decade is estimated at 6.8 percent compared with 5.4 percent recorded for Sub-Saharan Africa for the same period. Growth was largely driven by the Agriculture, Mining & Panning and Services sectors. An enclave-sector-led primary commodity exporter with little diversification, the economy has remained import driven with implication of attending exchange rate pressure. The average Liberian–US dollar exchange rate depreciated by 51.0 percent to L$82.61/US$1.00 at end-December, 2014, relative to L$54.72/US$1.00 recorded in the same period in 2005 following the post-war democratic general and presidential elections. However, the rate of exchange rate depreciation has been broadly stable due in part to the Central Bank of Liberia (CBL)'s interventions in the market, remittance inflows, and better policy coordination between the fiscal and monetary authorities.

Notwithstanding the exchange rate pressure, Liberia has sustained single digit inflation, averaging at 8.8 percent in large part of the last ten years. The main drivers of the inflationary pressure are largely global food & fuel prices and the state of domestic infrastructure which has remained in deficit. All these macroeconomic developments have had, in tandem, consequential effect on the economic growth trajectory of the country.

There is increasing evidence revealing that a country's financial sector development propels its economic growth (Ozer and Sen, 2009). This view is largely driven by the fact that a vibrant, dynamic, and well-functioning financial sector leads to a host of improved economic outcomes, namely: a) the pools of savings by the financial sector from households who have limited immediate use for their funds to business

entities/or individuals who are driven by entrepreneurial impulse and have immediate productive use of those money; b) allocate resources through leveraging of information on investment projects leading to a selection of most profitable ones and accelerating the flow of capital to its highest value use; c) enhances liquidity management through aggregation, transfer and diversification of risk, and facilitates transparency in financial transactions by the separation of management and ownership (Levine, 1997).

The debate regarding the finance-growth nexus remains mixed. As one group of economists support the demand-following paradigm while a score of other economists, on the other hand, have provided empirical evidence in support of the supply-leading hypothesis. The task of a researcher is to investigate the direction of causality of the finance-growth nexus considering country specific context since a case of a middle way (bidirectional causality) may also be possible. This task is achieved by conducting Granger causality tests between real GDP growth, and two key proxies of financial intermediation as proposed by Granger (1969).

The main contribution of this paper is to inquire the impact of the level of economic openness on the relationship between financial deepening and economic growth in Liberia. Previous studies on Liberia have largely focused on investigating the relationship between finance and growth with noticeable disregard to other important factors that may have an influence on this relationship. The interest in the re-examination of the relationship between finance and growth is driven by the suggestion that the effect of financial development on growth may largely depend on the level of inequality, amongst others, which in itself is measured by the degree of economic openness (Adusei, 2013).

The overarching objective of this paper; therefore, is to re-examine the finance-growth causality in Liberia. In pursuant of this objective, the following specific aims will be achieved:

1) Determine the direction of Causality between financial depth and economic growth;

2) Examine the impact of economic openness on the finance-growth nexus; and

3) On the basis of the findings, suggest policy advice in support of the implementation of the national Agenda for Transformation (AfT)).

The remainder of this paper is organized as follows. Section 2 presents an overview of Liberia's financial sector. Section 3 presents a brief history of Liberia's exchange rate regime. Section 4 consists of the methodological approach. Section 5 presents statistical analysis. Section 6 is the conclusion and section 7 outlines policy recommendations.

2. An Overview of Liberia's Financial Sector

The prolonged civil unrest in Liberia during the 90s and early 2000s had an enormous adverse effect on the overall economic performance with damaging consequence on the financial system. Financial intermediation dampened and the sector became risk averse to extending loans on account of high non-performing loans. The growing cost of bank loan with unfavorable terms of credit left little opportunity for access to finance, especially by small and medium enterprises (SMEs) who find themselves at the bottom of the financial pyramid in the country. This is partly attributed to banks' preference to holding assets of a relatively shorter maturity against holding instruments of long term maturity due in large part to the level of risk aversion in the system.

The financial sector of Liberia is highly dualistic. Existing along with the formal financial system, there is a significant informal financial sector with a large number of credit unions (about 225 at end-2014) and traditional credit clubs ("Susu" clubs and Village Savings and Loan Associations-VSLAs). The current financial industry of Liberia is made up of 9 commercial banks; 20 insurance companies with a number of insurance brokerage firms and agents; 1 development-finance company; 1 deposit-taking microfinance institution; 111 licensed foreign exchange bureaus; and 7 rural community finance institutions (RCFIs), albeit in the pilot phase. Currently, most of the activities of commercial banks are concentrated in Monrovia; however, some commercial banks are providing financial services in urban areas outside of the capital city through branch banking. Notwithstanding the existence of these informal financial services providers, many rural parts of the country are still left without financial services.

The spread between lending and deposit rates in the system is recorded as 12.08 percentage points. This wider spread is a further indication of how nascent is the financial intermediation process. A smaller spread indicates efficiency of the financial intermediaries in any economy (Mohapi and Motelle, 2006).

Credit to the agricultural sector (the mainstay of economic growth) remains at the bottom of the credit ladder. At end-December, 2006, agriculture accounted for only 7.1 percent of total credit in the economy while credit to the services sector constituted about 28.8 percent. Similarly, credit to the agricultural sector at end-December, 2014 was merely 6.8 percent of total credits while services commanded 68.4 percent.

3.0 A Brief History of Liberia's Exchange Rate Regime

The current exchange rate regime of Liberia evolved over the years shifting from fixed exchange rate system to a managed floating regime. Liberia practiced a fixed exchange rate regime with the Liberian dollar and US dollar officially trading on one-to-one parity for 37 years (1962-1999). The period between 1962 and 1982, the parallel market rate and the official rate remained almost the same. However, beyond 1982, the parallel rate deviated from the official rate. The difference widened incrementally as the political crisis escalated with attendant slowdown in economic activities. The CBL's Act of 1999 expunged the one-to-one parity between the Liberian dollar and US dollar. However, it maintained the legal tender status of the US dollar.

3.1 Supply Leading View

Financial sector development is conceptually defined as the improvement in the quantity (depth), quality and efficiency of financial intermediary services (Calderon and Liu, 2002). The debate on the relationship between growth and financial sector development is an old one. This growing debate today was pioneered by Walter Bagehot (1873) when he acknowledged the critical role of the financial system in stimulating industrial growth in England by facilitating the mobilization of capital. The pivotal role of financial intermediation in steering the industrial growth process of Great Britain is also supported by John Hicks (1966). In the context of this argument, Joseph Schumpeter (1911) agreed that a flourishing banking system spurs technological innovation by identifying and financing dynamic entrepreneurs in profitable businesses.

Enisan and Olufisayo (2009) examined the finance-growth nexus in Nigeria and asserted that there was a weak evidence of demand-following hypotheses using market size as indicator of stock market development. However, a study by Ndako (2010) in Nigeria reported that there was a unidirectional causality running from financial development to economic growth (supporting Supply-leading hypotheses) when bank credit to the private sector was used as a measure of financial development. Ndako (2010) also found that there was a bi-directional relationship between financial development and economic growth when domestic credit to the private sector and bank deposit liabilities are used to proxy for financial development.

Additional theoretical argument in support of the Supply-Leading Hypothesis is found in the seminal papers by Gurley and Shaw (1955), Goldsmith (1969) and McKinnon (1973). They all have hypothesized

that financial development has a strong causal effect on economic growth. The theoretical foundation for linking economic growth with financial development is that a well-developed and functional financial system enhances the efficiency of financial intermediation by reducing transaction and information costs and also minimize risks. Furthermore, Shen and Lee (2006) suggested that a more developed financial sector provides a fertile ground for the allocation of resources, fewer information asymmetries, better monitoring, and economic growth.

In Latin America, Bittencourt (2012) reveals that financial sector development leads to economic growth and emphases the importance of a more open, competitive financial sector in transmitting financial resources to entrepreneurs as well as the relevance of macroeconomic stability (in terms of low inflation rates) and all the institutional frameworks that it encompasses (central bank independence and fiscal responsibility laws), as a necessary prerequisite for financial sector development and consequently for continued growth and prosperity in Latin America.

Consensus in the literature supporting finance-growth nexus is that financial institutions serve as conduit through which funds are channeled from households, firms and government who have surpluses, but have less immediate productive use for them, to those innovative entrepreneurs who have shortage of funds, but wish to expand their investment portfolios. Increased investment invariably widens tax base for increased government revenue, provides employment opportunities, increased income and consumption, increased expenditure; hence, economic growth.

Esso (2010) also examines the finance-growth relation focusing on Burkina Faso, Cape Verde, Cote d'Ivoire, Ghana, Liberia and Sierra Leone and establishes a long-run relationship between the two variables. The study reveals that financial development influences economic growth in Mali and Ghana while growth leads finance in Burkina Faso, Sierra Leone and Cote d'Ivoire. In the case of Cape Verde and Liberia, bi-directional causality runs between finance and growth (i.e., finance and growth cause each other).

3.2 Demand-following paradigm

However, score of economists have argued in favor of economic growth which they believe serves as bastion for financial sector development. Robinson (1962) and Stiglitz (1994), argue that financial sector growth is driven by increased productive activities in the real sector. In other words, economic growth creates additional demand for financial services. This 'demand-following's view asserts that causality runs

from growth to finance because as the real sector develops, it induces demand for various new financial innovative services. However, new evidence from Southeast Europe emanating from an empirical study results confirms that improved quality of the financial sector and dynamic financial services environment has favorable bearing on growth more than financial deepening. Mehl et al. (2005) discovered that macroeconomic stability together with better creditor right protection, and increasing foreign bank penetration, have a positive and significant impact on growth in that region.

A study on Nigeria by Chukwu and Agu (2009) adopted multivariate vector error correction model (VECM) to investigate the direction of causality between financial depth and economic growth, from 1971 –2008. Their result revealed a strong and stable long-run relationship between financial depth and economic growth when private sector credit and real broad money supply were used as proxy for financial depth. In that case, causality ran from growth to finance. However, when loan deposit ratio and bank deposit liabilities were employed as proxy for financial depth, causality ran from financial depth to economic growth. A key lesson from these results is that the direction of causality between finance and growth largely depends on the nature and characteristics of the variables used in the model. Evidence emerging from Northern Cyprus indicates that there exists causal relationship between finance and growth and it runs from economic growth to financial deepening with feedback effect (Guryay et al., 2007).

3.3 Mixed Research Findings

However, there are also growing studies on the finance-growth nexus which have produced inconclusive results with evidence skew towards the developed world. For instance, evidence from Africa is sparse and also conflicting. This has created a knowledge gap as to the kind of relationship that exists between finance and growth in Africa, Adusei (2013). Several studies ranging from ordinary least squares (OLS) regressions of time series data, cross-sectional data, panel regressions and causality tests using different econometric techniques have produced mixed results. A study examining the finance-growth nexus in Lesotho, Mohapi and Motelle (2006) employed co-integration technique on time series data and found out that there is no co-integration and no causality between the growth rate and several proxies for financial intermediation in that country. The implication is that the finance-growth nexus did not exist in the Lesotho economy at least before and during the period of their study.

Using co-integration tests proposed by Johansen and Juselius *(1990*) and causality tests based on error-correction model, Agbetsiafa (2004) conducted a cross-country study in Sub-Saharan Africa (SSA). The

empirical results revealed the existence of strong link between financial development and economic growth and unidirectional causality runs from finance to growth in Ghana, Nigeria, Senegal, South Africa, Togo, and Zambia while growth to finance in Ivory Coast and Kenya.

Jalil and Ma (2008) employed bound testing-autoregressive distributed lag (ARDL) approach to co-integration with deposit liability ratio (DLR) and credit to private sector (CPS) as proxies for financial development to examine the relationship between financial development and economic growth. Their report revealed that both DLR and CPS had significant impact on economic growth in Pakistan, but not in China. This conclusion from Jalil and Ma (2008) support the argument that finance-growth relation may also depend on the size and structure of the economy.

4.0 Methodological Approach

Observations from the vast literature devoted on the inquiry into the finance-growth relation show that several approaches including co-integration and error correction methods have been employed using country case time series data, panel data and cross-sectional data. However, this study is confined to unit root, correlation and causality tests. Hence, standard procedure of testing for causality, Granger Causality Test, is employed to establish relations between real GDP per capita growth (LOGpcgdp), economic openness ((export + imports)/GDP), a proxy for the degree of monetization (M2 as a ratio of GDP) and another proxy for financial intermediation (credit to the private sector as a ratio of GDP).

The proposed specification for causality test following Granger (1988) is expressed as:

$$y_t = \propto_1 + \gamma_1(F)\, X_{t-i} + \beta_1(F) y_{t-1} + \varepsilon_{1t} \quad (1)$$

$$x_t = \propto_2 + \gamma_2(F) x_{t-i} + \beta_2(F) y_{t-i} + \varepsilon_{2t} \quad (2)$$

In this system of equation, if $\gamma_1(F)$ is statistically not equal to zero, then x_t granger causes y_t or there is unidirectional causality, from x_t to y_t. similarly, if $\beta_2(F)$ is statistically not equal to zero, then y_t granger causes x_t or there is unidirectional causality, from y_t to x_t. If both scenarios hold true, then there exists bilateral causality or feedback between x_t and y_t. Finally, independence is suspected if the two coefficients are statistically significant. EViews 8.1 econometric package was used to conduct the various statistical tests in this paper.

4.1 Working Variables

In this study, growth is measured by log of GDP per capita as suggested by several studies of finance-growth relation and employed by Mohapi and Motelle (2006) in their work, "The Finance-Growth Nexus in Lesotho: Causality Revelations from Alternative Proxies." Of the several indexes generally recommended for measuring the extent of financial intermediation, the ratio of private sector credit to GDP as well as the degree of monetization, the ratio of broad money (M2) to GDP is employed. The first indicator is a measure of the level of confidence in the financial system and the degree of financial deepening. The basic assumption is that credit advanced to the private sector proved to be more productive in terms of returns on investment vis-a-vis credit directed to public sector. It establishes the relative role of money in the economy or the size of the financial sector with regard to payments system and the level of influence it has on other sectors. Similarly, the ratio of M2 to GDP measures the degree of monetization of the economy or the "transfer of financial resources from the non-financial sector to the financial sector in terms of a monetary aggregate" (Mehl et al., 2005).

Following Adusei (2013), economic openness, defined as export plus import divided by GDP is also employed in the conduct of this study. Economic openness serves as key incentive to boost trade among nations. Increase trade intensifies competitive environment and by extension reduces prices of basic consumer goods benefiting the poor more than the rich. The implication is that economic openness leads to reduction in income inequality which enhances both financial sector development and real sector growth (Adusei, 2013).

5.0 Statistical Analysis

5.1 Unit-Root

The statistical analysis begins with the determination of the stationary condition of the working variables. This is important because non-stationary variable reduces the validity of the Granger test (Granger, 1988). This is why it is recommended that if time series data turns out to contain unit-root, which is most often the case; stationarity must be first restored by differencing the variables. If all the variables thereafter are integrated at the same order I(1), then the Granger Causality test is recommended to be conducted. The Augmented Dickey Fuller (ADF) unit-root test was used to investigate the time series characteristics regarding stationarity.

The unit-root test reveals that the variables are non-stationary because the ADF Test Statistics for all of the financial intermediation proxies, the growth rate and the control variable were integrated in level I(0) or were less than the critical values at all level of significance.

Table 1: Results of unit-root test of variables in levels

		Mackinnon Critical Value for Rejection of a Unit Root		
Variables in Level	**ADF Test Statistic**	1%	5%	10%
Pcgdp	0.95	2.75	1.97	1.6
Rmgdp	1.46	2.75	1.97	1.6
Rpscgdp	0.09	4	3.09	2.69
Eop	1.5	2.79	1.97	1.6

Source: Author's manipulation

After first differencing, all the non-stationary series became free of unit root. This is necessary because diagnostic tests done on non-stationary time series data usually produce spurious results leading to wrong inferences.

Table 2: Results of unit-root tests of variables in first differences

		Mackinnon Critical Values for Rejection of a Unit Root		
Variables in Difference	**ADF Test Statistic**	1%	5%	10%
Pcgdp	3.38	2.75	1.97	1.60
Rmgdp	1.74	2.75	1.97	1.60
Rpscgdp	3.11	2.81	1.98	1.60
Eop	8.37	2.79	1.97	1.60

Source: Author's manipulation.

5.2 Causality Test

The unit root test was followed by the causality test. The test results indicate that there is no causality between growth rate and the ratio of private sector credit to GDP. Similarly, there exists no Granger causality between the per-capital GDP growth rate and the degree of monetization (the ratio of broad money to GDP[2]) as well as the proxy of economic openness (exports plus imports divided by GDP).

[2] 5% critical value is considered for justification of influence.

Table 3: Granger Causality Test Results

	Pairs of Growth Rate, Financial Intermediation Proxies and a control variable	**Causality**
i	$\Delta rmgdp$ and $\Delta\ pcgdp$	Independence/ no Granger Causality in either direction
ii	$\Delta pcgdp$ and $\Delta rpscgdp$	Independence/ no Granger Causality in either direction
iii	ΔEop and $\Delta pcgdp$	Independence/ no Granger Causality in either direction
iv	Δeop and $\Delta\ rmgd$p	Independence/ no Granger Causality in either direction
v	Δr$pscgdp$ and $\Delta rmgdp$	Independence/ no Granger Causality in either direction
vi	Δeop and $\Delta\ rpscgdp$	Unidirectional causality from $\Delta\ eop$ to $\Delta\ rpscgdp$

Source: Author's Manipulation.

However, the study reveals a unidirectional causality between economic openness and the ratio of private sector credit to GDP. Causality runs from the former to the latter (Table 3).

6.0 Conclusions

Findings from the correlation test (Table 6, see Appendix) revealed that there exists strong correlation between growth represented by log of per capita GDP and proxies for financial deepening on one hand and the degree of monetization on the other hand. This result is in confirmative with Esso (2010). Similarly, there is positive correlation between growth and economic openness. However, the result shows that there is no causality between growth rate and financial deepening in Liberia and no Granger causality between the growth rate and the degree of monetization proxy as well as that of economic openness. There exists a unidirectional causality between the proxies for economic openness and private sector credit. This component of the results runs counter to Esso (2010), whose findings indicated bi-directional causality between finance and growth in Liberia. There is likelihood that Esso's result was largely influenced by political risk which he did not take into account.

The lack of causality between financial deepening and real sector growth may largely be due to the low level of credit expansion in the system as banks' activities mainly focus on services with high potential of generating fees and commissions at the expense of adequately investing in long term credit instruments especially to the agricultural sector, the mainstay of economic growth.

These results represent the characteristics of a nascent financial sector with limited capacities to fully meet the medium-to-long term credit needs of emerging entrepreneurial class in the country. Major concession companies in Liberia largely rely on the inflow of foreign capital for either fresh investment or expansion of existing ones because of the lack of adequate capital market in the country. Findings suggest that growth in the real sector has not strongly been driven by growth in the domestic financial industry. The policy implication is that real sector growth in Liberia can largely be induced by improved macroeconomic, legal, and policy environments.

Furthermore, the implication of this result is that for financial sector developments to have positive impact on growth, there must be sustained improvement in the quality and depth of financial intermediation and creates an enabling environment for better business. This highlights the need for the authority to formulate market driven policy that encompasses the necessary legal frameworks that promote increased private sector credit, especially those directed to the agricultural sector for financing agro-value chain production process.

Commercial banks in the industry seem to be risk averse; hence, they are reluctant to advance adequate loans to nascent private micro and medium-sized enterprises that are considered fragile with limited borrowing track-record. This situation may continue to dampen the effort toward increased private sector credit.

Considering the data set covering 2000 -2014, the causality test shows that, except economic openness and the proxy for financial intermediation in which unidirectional causality exists, all the other variables do not granger cause each other. However, the causality test result from 2006 – 2014 data set (a period of relative political stability in the country) shows that there are no granger causality between the various variables (table 5 in appendix). These results reveals that a stable political and social environment also has influence on causal relations between key monetary variables in a society with less developed financial sector.

7.0 Recommendations

Findings from the study highlight the need for integrated policy interventions that promote economic diversification through value chain production and at the same time provide incentives to lending institutions to advance medium to long term credit to the agricultural sector so as to stimulate real sector activities. To this end, relevant authorities should put in place an incentive-based risk sharing for agriculture lending. This scheme may, to some extent, incentivize commercial banks to lend to actors involve in agricultural value chain production.

The reopening of the Free Zone in an ideal location with basic infrastructure, such as low-cost electricity and sustained water supplies for industrial use will attract foreign direct investment (FDI), especially in the area of value chain production in support of the Government's economic diversification agenda. This will provide additional incentives for wealth holders to invest in critical sectors such as agriculture, manufacturing and trade which account for little sectorial share of private sector credit.

There is a need for intervention on the side of relevant authorities both in the public and private sectors (preferably through public-private partnership framework) by designing programs that will enhance the skills of micro-entrepreneurs in small business management, financial record keeping, business plan development skills, etc. These are key interventions that may help to underpin productivity in the microenterprise sub-sector geared towards mitigating the rate of default in loan repayment; thus, re-assuring lenders' confidence in the system. Combined, these interventions will help to promote access to financial services and boost business activities with sustained economic growth effect.

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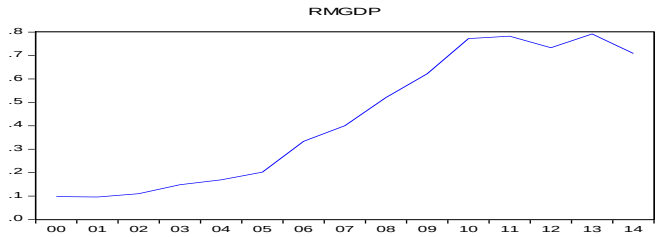
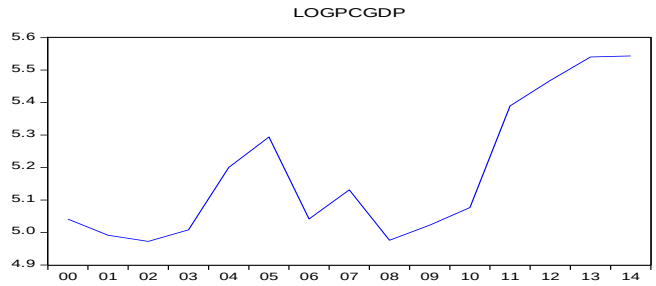
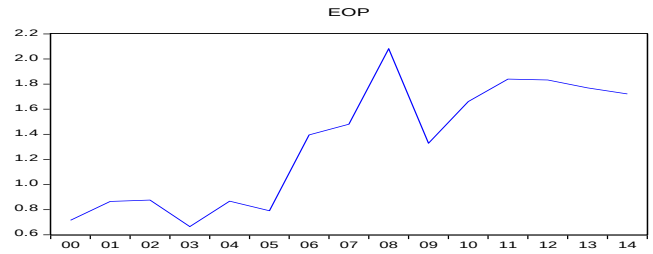
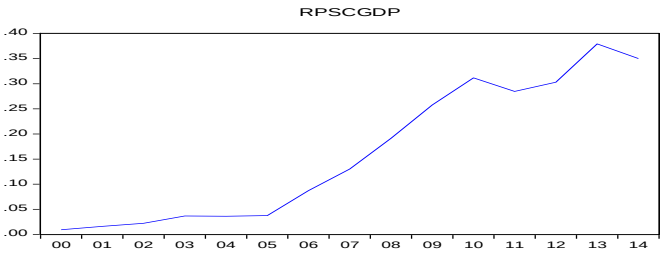
Appendix

Graphs of Working Variables

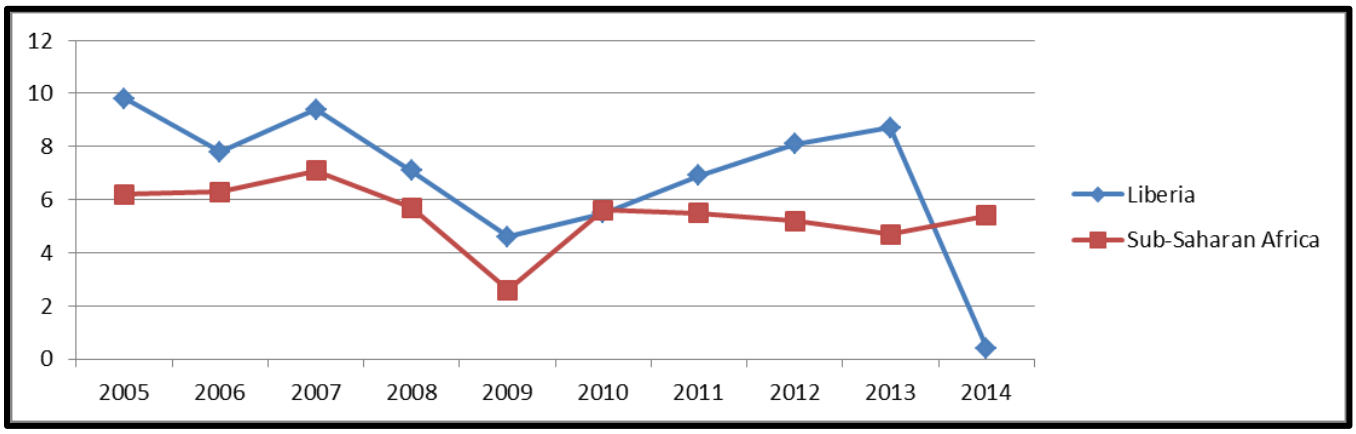








Liberia & Sub-Saharan Africa Economic Growth Rates (2005 – 2014)



Appendix B: Pairwise Causality Results

Table 4: Granger Causality Test Results with Variables in First Differences

Pairwise Granger Causality Tests
Date: 10/01/15 Time: 11:25
Sample: 2000 2014
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
DRMGDP does not Granger Cause DLOGPCGDP	11	0.52963	0.6140
DLOGPCGDP does not Granger Cause DRMGDP		0.56536	0.5957
DEOP does not Granger Cause DLOGPCGDP	11	3.12520	0.1175
DLOGPCGDP does not Granger Cause DEOP		0.20079	0.8234
DRPSCGDP does not Granger Cause DLOGPCGDP	11	0.39329	0.6910
DLOGPCGDP does not Granger Cause DRPSCGDP		0.09487	0.9108
DEOP does not Granger Cause DRMGDP	11	4.66999	0.0598
DRMGDP does not Granger Cause DEOP		0.16481	0.8518
DRPSCGDP does not Granger Cause DRMGDP	11	2.03060	0.2121
DRMGDP does not Granger Cause DRPSCGDP		3.26164	0.1100
DRPSCGDP does not Granger Cause DEOP	11	0.01421	0.9859
DEOP does not Granger Cause DRPSCGDP		11.5365	0.0088

Table 5: Granger Causality Test Results with Variables in First Differences

Pairwise Granger Causality Tests

Date: 12/14/16 Time: 09:46
Sample: 2006 2014
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
DEOP does not Granger Cause LPCGDP	7	0.08041	0.9256
DLPCGDP does not Granger Cause EOP		10.2439	0.0889
DRMGDP does not Granger Cause LPCGDP	7	8.24139	0.1082
DLPCGDP does not Granger Cause RMGDP		2.32590	0.3007
DRPSCGDP does not Granger Cause LPCGDP	7	7.08737	0.1236
DLPCGDP does not Granger Cause RPSCGDP		0.48087	0.6753
DRMGDP does not Granger Cause EOP	7	11.7119	0.0787
DEOP does not Granger Cause RMGDP		0.42901	0.6998
DRPSCGDP does not Granger Cause EOP	7	1.20096	0.4543
DEOP does not Granger Cause RPSCGDP		2.10459	0.3221
DRPSCGDP does not Granger Cause RMGDP	7	1.53266	0.3948
DRMGDP does not Granger Cause RPSCGDP		3.60351	0.2172

Table 6: Correlation Matrix

	LOGRMGDP	EOP	PCGDP	RPSCGDP
LOGRMGDP	1.000000	0.904009	0.575809	0.941022
EOP	0.904009	1.000000	0.470852	0.848264
PCGDP	0.575809	0.470852	1.000000	0.677431
RPSCGDP	0.941022	0.848264	0.677431	1.000000