Financial Development and Economic Growth: Case of Liberia

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ABSTRACT

This study investigates the nexus between financial development and economic growth in Liberia, with a focus on post-civil war reforms and their implications. Using quarterly data from 2000 to 2023, the research employs the Vector Error Correction model and Granger causality tests to analyze the effects of various financial development indicators—specifically M2 (both including and excluding currency outside the banking system), domestic credit to the private sector, and mobile money—on real GDP growth. The results reveal a long-run equilibrium relationship between financial development and economic growth, with domestic credit to the private sector and the proportion of M2 within the formal banking system positively impacting growth. However, M2 inclusive of currency outside the banking system and mobile money adoption show negative long-term effects, potentially due to inefficiencies in financial intermediation and challenges in mobile money implementation. Short-run dynamics indicate that financial development does not have immediate significant effects on growth, and Liberia's economy adjusts slowly to financial shocks. Based on these findings, this study recommended enhancing financial inclusion, encouraging savings mobilization, and addressing the challenges associated with mobile money adoption.

Keywords: Financial development, Economic Growth, Liberia, Vector Error Correction Model, Granger causality

INTRODUCTION

The increasing demand for financial services has made the financial sector the focal point of economic activities in many economies. For the economy to grow sustainably, a developed financial system is paramount. That is, a robust financial system facilitates the flow of resources from savings to investments, hence, expand the economy sustainably. In the early days, many prominent growth models did not directly acknowledge the financial sector importance to growth. The exogenous growth model, as described by Solow (1956), identified capital accumulation, the labor force, and land as critical drivers of growth, while the endogenous growth model, as proposed by Romer (1990), emphasized the importance of technological advancements in enhancing productivity and driving economic growth. However, over some decades now, the significance of a robust and adequate financial system has also been acknowledged as a fundamental catalyst for economic growth (King & Levine, 1993; Khan & Senhadji, 2000; Khan et al., 2005). This recognition is based on the premise that an improved financial system offers enhanced financial services, thereby stimulating the economy to improve its productivity.

While Solow (1956) and Romer (1990) did not directly acknowledged the pivotal role of the financial sectors and implicitly indicated it important to economic growth. That is, the exogenous growth model recognizes the importance of savings to economic growth, indicating that savings are equivalent to investment, which leads to capital accumulation. This means capital accumulation, a significant component of the Solow (1956) growth model, relies on savings. Also, the endogenous growth model underscores the role of financial sector services in capital accumulation and technological innovation for growth. These services include mobilizing savings, acquiring and allocating investment information, exerting corporate control, and mitigating risk.

The intermediating role of the financial sector to economic growth has been extensively explored in many studies. Theoretically, this nexus dates back to Schumpeter (1911) and was later advanced by McKinnon (1973)

and Shaw (1973). McKinnon and Shaw contended that government-imposed financial repression, including interest rate ceilings and directed credit to preferential, non-productive sectors, hinders financial development. They believed that financial liberation is pivotal to fostering economic growth. However, Robinson (1952) and Kuznets (1955) argued that the growth of the financial system is contingent on the growth of the economy. This perspective contrasts with the views of McKinnon, Shaw, and endogenous growth theorists, indicating that if there is a causation, it is unidirectional from economic growth to financial development.

In view of this theoretically dilemma, King and Levine (1993) and Hassan et al. (2010) empirically analyzed the impact of financial development on growth using longitudinal analysis. These studies, however, provided only pooled estimates and did not account for the dynamic nature of the relationship between countries. Additionally, in their findings, they mainly indicated that a significant coefficient for financial development in growth regressions does not necessarily indicate causality from finance to growth or vice versa. In lieu of this finding, many studies have pursued more dynamic time series analysis to clarify the causal relationship, with Granger causality tests becoming a principal tool. Studies of selected countries by Adusei (2013), Wolde- Rufael (2009), and Luintel and Khan (1999), Menyah et al. (2014) have shown that the pattern of causality differs significantly among countries and generally weak evidence for a unidirectional connection from financial development to economic growth. These findings indicated that understanding the causal relationship between financial development and economic growth requires studies on individual countries using diverse financial factors.

This study follows this approach to the financial system's impacts on growth in Liberia. Like many Sub-Saharan African countries, Liberia was encouraged to reform its financial systems in the 1980s to stabilize the macroeconomy and boost economic growth. In the mid-1980s, the government of Liberia through the National Bank of Liberia implemented several progressive reforms: eliminating subsidies to priority sectors, reducing reserve requirements for a market- based refinancing allocation, updating stock market legislation, transferring the management board to the association of brokerage houses, enacting a new banking law to increase the National Bank's financial autonomy, and opening the banking sector to foreign participation to boost competition. These reforms enhanced the financial system, but the fourteen years of civil war impeded its impact on growth.

Since the establishment of the Central Bank of Liberia (CBL) in 1999 and the end of civil unrest in 2003, the Liberian government, with the support of the international community, has implemented several strategic initiatives to improve the financial sector. Initially, efforts were focused on restructuring the sector, which was in disarray. This included introducing stricter banking supervision and regulatory frameworks to ensure financial stability (Bartholomew, 2007). The CBL also established the Monetary Policy Committee (MPC) to guide policy decisions based on comprehensive economic assessments. The national payment system was also overhauled with a real-time gross settlement system and an automated clearing house to enhance the efficiency and security of financial transactions within Liberia. Furthermore, the CBL has launched several initiatives to promote financial inclusion, aiming to increase access to banking services for the unbanked population through microfinance programs and support for mobile banking services in rural areas. These reforms have boosted investment confidence and expanded the provision of financial services across the country.

These reforms and programs implemented by the CBL in the financial sector have led to significant growth in the banking system. In 2023, total gross assets reached approximately L$319.26 billion (around 40.6% of GDP), compared to just L$4.33 billion in 2003. Credits and advances to all sectors of the economy in 2023 amounted to L$92,841.0 million (12.3% of GDP), reflecting an annual growth rate of 19.6% from L$77,620.5 million (12.8% of GDP) in 2022 and a staggering 4,521.48% increase from L$2,008.9 million in 2003. Deposits surged by about 16,516% from L$1.20 billion (US$26.6 million) in 2003 to L$198.712 billion (US$1,000.1 billion) in 2023. Meanwhile, Liberia's GDP growth was recorded at 4.6% in 2023, a significant improvement from the -31.3% recorded in 2003 and higher than the 3.5% estimated for Sub- Saharan Africa in 2023 (ADB, 2023). Despite the financial sector improvements and accelerated growth since 2003, it remains unclear whether this development directly caused or contributed to the growth of the Liberian economy (CBL, 2003-2023)

A study by Prowd (2018) examined the finance growth in Liberia and knowledged long run nexus using the ARDL model and annual data. However, Due to how well the financial sector has improved and the relatively moderate economic growth the county has experienced since the end of the fourteen years civil war, this study

re-examined the impact of the financial depth on economic growth using other financial factors and quarterly data. While Prowd (2018) used only domestic credit to the private sector as a ratio of GDP as an indicator for financial development and did not consider causality measures, this study measured the impact of financial depth on economic growth using private domestic credit share of GDP, money supply (M2) as a ratio of GDP and M2 less currency in circulation share of GDP. Additionally, this study analyzed the impact of mobile money on growth in Liberia. Also, this study used the VEC model and Granger causality test to determine the direction of causality between financial sector development and economic growth. Incorporating these financial metrics, this study evaluated how financial development impacts economic growth through productivity, capital accumulation, and accessible financial services deliveries. Furthermore, the study used the impulse response function and forecast error variance decomposition to explain impulses from financial sector and growth response and the explanatory power of each financial metrices on economic growth.

The paper proceeds as follows: Section 2 reviews Liberia's economic and financial developments over the past two decades, focusing on the 1999 financial reforms, henceforth. Section 3 describes the variables and data sources used. Section 4 outlines the econometric methodology and the procedures used. Section 5 presents the empirical findings. Finally, Section 6 summarizes the main findings, conclusion, and policy implications.

Financial Development in Liberia

Since 2005, the Liberian government has implemented economic recovery and development programs to expedite growth and improve living standards through easy access to essential services. Among other sectors, the financial sector has seen substantial growth. By 2023, the banking industry's total assets reached approximately LRD$ 319.26 billion, equivalent to about 39.79% of GDP, up from LRD$ 18.59 billion in 2008. Commercial banks' credit increased by 22.5 percent, amounting to LRD$80.53 billion. Demand deposits rose by 40.70 percent, from LRD

135.45 billion in 2022 to LRD 198.71 billion in October 2023. The banks' branches and networks climbed from 11 in 2006 to 90 in 2023. Meanwhile, Liberia recorded a 10 percent GDP growth, surpassing the average for Sub-Saharan Africa during the same period.

The financial sector of Liberia comprises formal and informal components; however, since the end of the civil war, there have been significant improvements in the formal sector. The number of licensed banks increased from 4 in 2003 to 9 in 2023, and bank branches expanded from 11 in 2007 to 90 in 2023, covering 9 out of 15 counties compared to just 2 in 2003. By 2023, registered non-bank credit Microfinance Institutions (MFIs) grew to 21 from 19 in 2022, with 44 branches across nine counties. This sector included two licensed microfinance deposit-taking institutions (MDIs) and 12 Rural Community Finance Institutions (RCFIs). Foreign exchange bureaus rose to 211 in 2023 from 204 in 2022, and licensed Money Remittance Entities increased to 53 from 49 in December 2022.

The CBL reform strategies have significantly bolstered financial institutions. The banking industry's balance sheet indicators show growth through increased intermediation. The industry remained stable; however, key balance sheet indicators improved in 2023 compared to 2022: total assets grew by 42.0% to L$293.71 billion, total loans and advances by 19.6% to L$92.84 billion, total capital by 24.1% to L$39.01 billion, and deposits by 46.6% to L$198.71 billion. The liquidity ratio stood at 44.1%, exceeding the minimum requirement by 29.1 percentage points. Loans and overdrafts increased by 19.6% to L$92.84 billion, with no single sector accounting for more than 50% of total loans. The trade sector, the largest, accounted for 31.54% of total industry loans.

Microfinance institutions saw a 28% increase in clients to 98,455 in 2023, with active borrowers rising by 38.0% to 90,731. Outstanding loans grew to L$3.48 billion from L$3.01 billion in 2022, and total capital increased to L$1.70 billion from L$1.36 billion. RCFI deposits surged by 96.0% to L$681.07 million, with loans and advances rising by 28.0% to L$345.71 million. The Liberia Enterprise Development Finance Company (LEDFC) invested US$40.0 million in over 700 SMEs, providing technical support and enhancing financial management skills. LEDFC's total assets grew to L$6.11 billion, and its loan portfolio increased to L$2.93 billion in 2023. MDI's total assets rose 30% to L$1.58 billion and deposits 33% to L$932.2 million, with total loans and advances at L$889.6 million in 2023.

The mobile money network continues to expand, with rising numbers of registered institutions, agents, and subscribers. Transaction volumes and values have increased, reflecting growing adoption and confidence in mobile money. Registered subscribers rose to 9,329,179 in 2023 from 9,248,817 in 2022, and active subscribers to 2,599,162 in 2023 from 2,531,871 in 2022. Registered institutions increased by 80.9% to 1,511 in 2023. The volume of US dollar transactions grew by 72.4% to US$36.83 million, and Liberia dollar transactions by 16.0% to L$549.13 million in 2023. The value of US dollar transactions rose by 57.3% to US$3,475.64 million, and Liberian dollar transactions by 50.0% to L$421,969.09 million.

Variable Measurement and data sources

The financial sector development generally enhances financial intermediary services' quantity, quality, and efficiency. This multifaceted process involves numerous activities and institutions, making it difficult to understand its impact with a single measure. In this study, four widely recognized financial development measures backed by empirical studies were used to investigate the impact of the financial sector on economic growth in Liberia.

The first measure, M2Y, denotes the ratio of the M2 to GDP. M2Y has been utilized as a standard indicator of financial development in various studies (Calderon & Liu, 2003; King & Levine, 1993). The second indicator, M2CY, is the ratio of quasi-liquid assets to GDP. This measure has been arguably considered in many studies (Gelb, 1989; Neal, 1988). In developing countries like Liberia, a significant portion of M2 is liquid, mostly in the hands of individuals rather than the banking sector. This means that an M2 to GDP ratio increase may indicate more significant currency usage rather than increased bank deposits, making this measure less reflective of financial intermediation since currency in circulation does not indicate financial development. Based on this ideology, this study incorporated Neal (1988) ideology: using the ratio of M2 less currency outside the bank to GDP as a financial measure.

The third indicator, DC/Y, is the ratio of commercial bank credit to the private sector to GDP. This indicator measures the allocation of financial assets beyond what M2C/Y can provide. Although higher M2C/Y ratios can result from increased private savings, high reserve requirements may limit credit to the private sector, which is crucial for investment and economic growth. While an increase in DC/Y does not certainly indicate productive investments, it is an indication of the quantity and efficiency of investment due to commercial banks' stringent screening measures on loans through which they identify entrepreneurs with higher chances of efficiency usage, that is, better allocation of funds and possibilities to diversify risk which increase return on capital. This measure is extensively used in literature (Prowd, 2018; Bader & Abu-Qarn, 2008).

The fourth indicator, DBM is a dummy variable to account for the introduction of mobile money in 2010, with a value of zero before 2010 and one afterward. This study used real GDP to measure economic growth. The sample spans from quarter one of 2000 to quarter four of 2023; this timeframe was chosen due to the lack of access to data beyond 2000 in Liberia.

METHODOLOGY

Cointegration methodology has been instrumental in establishing linear combination of the series for cointegration for long run (Granger, 1988). The Johnasen (1988) procedures for assessing the system for cointegrating equations was used to test for long run relationship. The number of cointegrating equations in the system was determined using the maximum likelihood from the maximum eigenvalue statistics introduced by Johansen and Juselius (1990) as follow:

$$\boldsymbol{\lambda_{max}^{(r0)} = -n\, log(1 - \lambda_{r\ +1})_0}$$

If the presence of cointegration exist, the VEC mode is use, otherwise the VAR is used. The VEC approach identifies the direction of causality among variables and distinguishes between short- and long-run causality. Long-run causality is tested by evaluating whether the coefficients of the ECT are significantly different from

zero. In contrast, the VAR model tests short-run causality using standard F-tests on lagged variables. The VAR model can be explicitly represented as:

$$\Delta X1t = \theta 1 + \sum_{k=1}^{p-1} \varphi 11,k\Delta X1,t-k + \sum_{k=1}^{p-1} \varphi 12,k\Delta X2,t-k + \sum_{k=1}^{p-1} \varphi 13,k\Delta X3,t-k + \sum_{h=1}^{m} \lambda 1,h\mathrm{ECT}h,t-1 + \mu 1t$$

$$\Delta X2t = \theta 2 + \sum_{k=1}^{p-1} \varphi 21,k\Delta X1,t-k + \sum_{k=1}^{p-1} \varphi 22,k\Delta \mathrm{X}2,t-k + \sum_{k=1}^{p-1} \varphi 23,k\Delta \mathrm{X}3,t-k + \sum_{h=1}^{m} \lambda 2,h\mathrm{ECT}h,t-1 + \mu 2t$$

$$\Delta X3t = \theta 3 + \sum_{k=1}^{p-1} \varphi 31,k\Delta X1,t-k + \sum_{k=1}^{p-1} \varphi 32,k\Delta X2,t-k + \sum_{k=1}^{p-1} \varphi 33,k\Delta X3,t-k + \sum_{h=1}^{m} \lambda 3,h\mathrm{ECT}h,t-1 + \mu 3t$$

The ECT (error-correction term) captures the long-term equilibrium relationship. At the same time, φ_(ij,k) represents the impact of the kth lagged value of variable j on the current value of variable i, for i, j = Y1 to Y4.

The VEC model identifies the direction of causality among variables and differentiates between short- and long-run causality. Given cointegration, Long-run causality from variable Yi to Yj is tested by examining the null hypothesis that λj,h = 0 for h = 1, ..., m. Using the standard F-test, the short-run causality is assessed by testing the null hypothesis that φij,1 = ... = φij, P-1 = 0. Rejection of the null hypothesis indicates that variable Yi Granger

causes variable Yj.

Due to the inclusion of many lags in the VEC model, the study used the Impulse Response Function (IRF) and Forecast Error Variance Decomposition (FEVD) to explain financial development impacts on economic growth in Liberia. Both IRFs and FEVDs computations are useful in analyzing how shocks to these financial factors reverberate through the system on output. The IRFs show the effects of shocks on the adjustment path of the variables in the model. The VAR equation above which is used to trace the impulse response is regarded as the Vector Moving Average model. The IRFs can be determined by differentiating the VAR equation with respect to each of the shocks and written in a more compact form as follow:

$$x_t = \bar{x_t} + \sum_{i=1}^{\infty} \Xi_i w_i$$

$$x_t = \bar{x} + w_0\varepsilon_t + +w_1\varepsilon_{t-1} + w_2\varepsilon_{t-2}+..$$

FEVD measures the contribution of each shock to the forecast error variance. It shows a change in a variable is endogenously and exogenously. It is noted that, in the short run, most of the variation is independently determined, however, as the lagged variables' effect manifest, the percentage of the effect of exogenous variables impact increases over time. From the IRF equation, n-period forecast error of x_t can bet written as follow:

$$E_t x_{t+1} = \bar{x} + w_0\varepsilon_t + +w_1\varepsilon_{t-1}+..$$

1-period forecast error: $x_{t+1} - E_t x_{t+1} = w_0\varepsilon_{t+1}$

2-period forecast error: $x_{t+2} - E_t x_{t+2} = w_1\varepsilon_{t+2} + w_2\varepsilon_{t+1}$

n-period forecast error: $x_{t+n} - E_t x_{t+n} = w_0\varepsilon_{t+n} + w_1\varepsilon_{t+n-1} + w_2\varepsilon_{t+n-2} + \cdots + w_{n-1}\varepsilon_{t+1}$

Following the VEC estimation, a series of residual post-tests were conducted to validate the model's reliability and stability. These examinations verified the credibility of estimated and findings. The tests included the model stability, autocorrelation and normality.

Empirical Results

This section analyzed and explained the findings of this study. It is laid out in the manner that consist of pre-estimations, estimations, robust analysis and post-estimations.

Table 1 provides the summary statistics and correction metrics. The table indicates the means, standard deviations and corrections among the variables.

Table 1: Descriptive and Correlation Statistics

	Mean	**Std. Dev.**	**LogGDP**	**DC/GDP**	**M2C/GDP**	**M2/GDP**	**DBM**
LogGDP	2.956	0.358	1.000				
DC/GDP	0.164	0.171	0.056	1.000			
M2C/GDP	0.346	0.262	0.088	0.570	1.000		
M2/GDP	0.422	0.301	0.134	0.681	0.697	1.000	
DBM	0.546	0.500	0.738	0.550	0.459	0.418	1.000

The results in Table 1 indicate that the mean for LogGDP is 2.956 and deviation from the mean is 0.358. This means that the quarterly change in outputs has been relatively low since the 2000. However, for DC/GDP the average is 16.4% and the deviation from this average is 17%, indicating that credit to the private sector in Libera has been changing significantly every quarter in Liberia. Also, for M2C/GDP and M2/GDP the average values

are 34.6% and 42.2% and their deviations are 26.2% and 30.1% respectively, these show a moderately low quarterly change in these indicators since the 2000 in Liberia. Additionally, the correlations among the exogenous variables are all below 70%. Therefore, this indicates that multicollinearity is not an issue in this study.

A necessary but not sufficient condition for cointegration is that each of the variables is integrated of the same order one. Contingent on this, this study first determined the degree of integration of each variable using Augmented Dickey Fuller test (ADF). The results of the ADF test are presented in Table 2.

Table 2: Augmented Dickey Fuller Test Results

	Test Stat	**1%**	**5%**	**10%**	**P-value**
LogGDP	-0.895	-3.517	-2.894	-2.582	0.78970
ΔLogGDP	-7.195	-3.518	2.895	-2.582	0.00000
M2C/GDP	-2.695	-3.517	-2.894	-2.582	0.07490
ΔM2C/GDP	-9.273	-3.518	-2.895	-2.582	0.00000
DBM	-1.09	-3.518	-2.895	-2.582	0.71900
ΔDBM	-6.856	-3.518	-2.895	-2.582	0.00000
DC/GDP	-2.806	-3.517	-2.894	-2.582	0.05750
ΔDC/GDP	-9.477	-3.517	-2.894	-2.582	0.00000
M2/GDP	-2.804	-3.517	-2.894	-2.582	0.05770
ΔM2/GDP	-9.434	-3.517	-2.894	-2.582	0.00000

Note: Δ indicates first difference

From Table 2, the study fails to reject the null hypothesis for LogGDP, M2C/GDP, DC/GDP, DBM and M2/GDP variables at level for unit root at the 5 percent significant level, however, the study rejects the null hypothesis for these variables at first difference at all level of significance. This indicates that all the variables were stationary at first difference which is appropriate for using the VEC model.

The integration of all variables at their first differences indicates a long-run relationship. To further ascertain this long-run relationship, the study used the Johansen trace statistics for cointegration (λtrace). The selection of lag length was based on the Akaike Information Criterion (AIC), which indicated an optimal lag length of four for the model (see Appendix 1). The results of the Johansen cointegration test are presented in Table 3.

Table 3: Johansen Test for Cointegration Results

Rank	Params	LL	Eigenvalue	Tr. Stat	CV_5%
0	80	825.9473	.	81.2767	68.52
1	89	847.7182	0.37387	37.7347*	47.21
2	96	855.8111	0.15974	21.5489	29.68
3	101	862.1834	0.12806	8.8044	15.41
4	104	866.2755	0.08424	0.6201	3.76
5	105	866.5856	0.00665		

Note: * indicates cointegration at the 5%. *L**.

From the results in Table 3, at rank zero, 81.2767 > 68.52, the study rejects the null hypothesis of no cointegrating relationships. This suggests that there is at least one cointegrating relationship among the variables. At rank one, 37.7347 < 47.21, therefore, the study fails to reject the null hypothesis that there is at most one cointegrating relationship. This means that one cointegrating relationship is likely present. Moreover, for rank two, three and four, in each case, the trace statistic is less than the corresponding critical value, indicating the failure to reject the null hypothesis of at most two, three, or four cointegrating relationships.

Therefore, the test indicates that there is one cointegrating relationship among the variables in this study, as indicated by the selected rank of 1. This means that the variables share a long-term equilibrium relationship.

To further understand this long run relationship, the study estimated the VEC model.

Table 4: Long Run Estimates Results

	Coefficient	Stnd. Er.	V	Prob.	[95% conf. Int.]
DCGDP	1.9096**	1.0329	1.85	0.064	-20.51038 -3.03705
M2CGDP	37.4237*	8.5439	4.38	0.000	-212.435 -88.90298
M2GDP	-30.7926*	7.4619	-4.13	0.000	78.322311 -87.8053
DBM	-2.1351*	0.3442	-6.20	0.000	2.426237 - 7.310358
Constant	-1.9656				

Note: *, ** & *** indicates significant at the 1%, 5% and 10% respectively

Table 4 provides the long run estimates. From the results, DC/GDP coefficient is positive- statistically significant. This positive coefficient means that a 1 percent increase in credit to the private sector relative to GDP is associated with a 0.019 unit increase in growth, ceteris paribus. This result highlights the critical role of financial intermediation in Liberia's economic development, where increased access to credit for economic agents stimulates investment, consumption, and hence growth.

M2C/GDP coefficient is positive-statistically significant. This positive impact indicates that a 1 percent increase in broad money that is controlled by commercial banks is associated with a 0.37 unit increase in growth. This indicates that a higher proportion of money held within the banking system significantly boosts economic output. This could be due to increase savings and investments facilitated by the banking sector for productive uses, hence productivity and growth.

M2/GDP is negative-statistically significant. The negative-significant indicates that a 1 percent increase in the M2, inclusive of currency in circulation, is associated with a 0.31 percent decrease in economic growth. This inverse nexus indicates that a large share of currency held outside the banking system may undermine the effectiveness of financial development. According to the McKinnon-Shaw hypothesis (1973), if M2 includes a significant portion of cash outside the formal banking sector, it signals inefficiencies in the financial system's ability to mobilize savings and allocate capital toward productive investments. Additionally, low interest rates on deposits (see Appendix 2) reduce incentives for saving, resulting in inefficient capital allocation. In such cases, an increase in the M2 does not contribute to productive investments but instead fuels inflation or speculative activities, which can dampen economic growth.

DBM coefficient is negative-statistically significant. The negative impact means that the introduction of mobile money in 2011 in Liberia has deepen economy overtime. While mobile money is generally seen as a tool for enhancing financial inclusion and promoting economic growth, the negative coefficient in this study suggests that the implementation of the service in Liberia may have faced a variety of challenges, from slow adoption and infrastructure limitations to regulatory hurdles and unintended economic consequences. These factors may have hindered its potential to drive economic activity in the long run, leading to the observed negative impact on economic growth.

Table 5: Short Run Estimates Results

	Coefficient	Stnd. Er.	V	Prob.	[95% conf. Int.]
ECT	-0.050**	0.008	-0.630	0.057	-0.02033-0.0104
DC/GDP	0.124	0.295	0.420	0.675	-0.45444-0.7022
M2C/GDP	1.414	1.323	1.070	0.285	-1.1789 - 4.0078
M2/GDP	-1.390	1.122	-1.240	0.215	-3.5893 - 0.8093
DBM	0.011	0.106	0.100	0.918	-0.1966- 0.2184
Constant	0.009	0.012	0.800	0.426	-0.0137- 0.0326

The results show that the ECT is negative, indicating that deviation from the previous period is corrected for in the current period at a speed of 5 percent. However, the p-value is 0.057 is slightly above the conventional

threshold of 0.05, indicates that it is weakly significant, implying a moderate speed of adjustment towards equilibrium, that is, the adjustment speed indicates that an unanticipated changes in credit availability, M2, or financial innovation—economic growth in Liberia would take a longer time to return to its long-run growth path. That is, the Liberian economy may experience prolonged periods of suboptimal growth following financial disturbances, ceteris paribus. Moreover, none of the financial development indicators show a statistically significant short-run impact on economic growth.

To further understand the short run impact, the study conducted the granger causality test as indicated in Table 6.

Table 6: Granger Causality Results

	Chi-Squared (χ^2)	P-Value	Conclusion
DC/GDP	2.2462	0.134	No Granger causality
M2C/GDP	0.05138	0.821	No Granger causality
M2/GDP	0.01893	0.891	No Granger causality
BM	0.85169	0.356	No Granger causality
ALL	20.427*	0.000	Granger causality

Note: * means causality

From Table 6, none of the financial indicators Granger-cause economic growth independently. However, when all these indicators are considered together, they collectively have a significant impact on economic growth. This means that while no single financial development indicator can predict economic growth in the short run, the combined influence of these indicators is substantial.

The study further analyzed the responsiveness of economic growth to shock from the financial sector. The results are display in Figure 1.

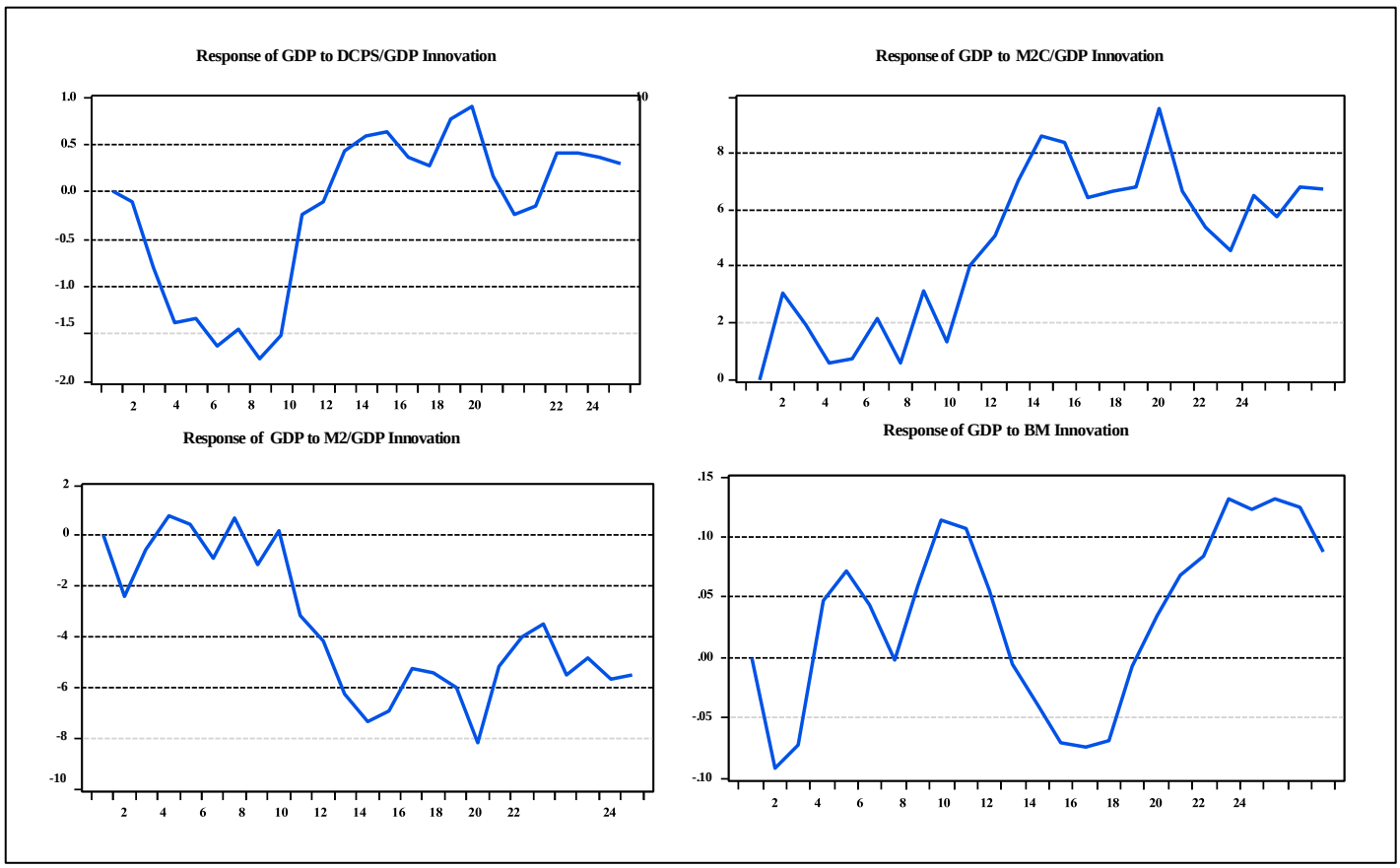

Figure 1: Response to Non-factorized One Unit Innovations

From Figure 1, a one standard deviation shock to DC/GDP negatively affects GDP from quarter 1 to quarter 8. However, this impact turns relatively positive from quarter 9 to quarter 18, with a return to a negative effect between quarters 18 and 20. Following this, the impact becomes positive again until quarter 22, after which it remains relatively insignificant up to quarter 25. Similarly, a one standard deviation shock to M2C/GDP shows a generally positive impact from quarter 1 to quarter 25, despite high fluctuations, with an overall upward trend. A comparable trend is observed for BM, although with lower fluctuations. Conversely, a one standard deviation shock to M2/GDP has a generally negative impact from quarter 1 to quarter 25, with fluctuations trending downward. To quantify the effects of the shock, the study used a Cholesky one standard deviation forecast to analyze the contribution of financial development indicators to economic growth. Although the forecast covered 25 quarters, Table 6 provides results at five-quarter intervals (see Appendix 3).

Table 7: Cholesky One Standard Deviation Shock Forecasts

Quarter	S. E	LogGDP	DC/GDP	M2C/GDP	M2/GDP	DBM
1	0.07418	100.00000	0.00000	0.00000	0.00000	0.00000
5	0.13782	57.36324	2.17443	37.09889	1.80648	1.55690
10	0.20880	46.05772	6.27897	43.95046	2.07925	1.63360
15	0.24199	38.56236	5.47445	37.90716	16.47584	1.58019
20	0.27028	31.47455	5.66474	36.97558	24.27889	1.60625
25	0.29022	28.06221	5.69163	35.82776	27.81730	2.60110

From Table 7, in the first quarter, GDP is determined independently, with no contribution from the financial indicators. However, as the forecast horizon extends, the contribution of financial development indicators to explaining the variance in economic growth gradually increases. By the fifth quarter, the explanatory power of GDP decreases to 57.36 percent, while M2C/GDP becomes more significant, accounting for approximately 37.1 percent of the variance compared to other indicators. Over time, the contribution of M2/GDP also rises substantially, explaining 27.82% of the variance by the 25th quarter, though M2C/GDP remains the more influential indicator in explaining economic growth. This means that in the long run, financial development indicators play an increasingly important role in explaining variations in economic growth, particularly M2C/GDP and M2/GDP. The results demonstrate that, over time, economic growth becomes endogenously determined by these financial variables.

Post Analysis

To study the robustness of the findings, the study performed tests for heteroscedasticity, autocorrelation, normality, and the stability of the residuals. The results indicate that the analysis is devoid of serial correlation and heteroscedasticity, the residuals follow a normal distribution, and the model exhibits stability (see Appendix 4).

SUMMARY OF THE FINDINGS

This study analyzed the impacts of financial development on economic growth in Liberia. The ADF test indicated that all variables were stationary at first difference, justifying the use of the VEC model. The Johansen's cointegration test confirmed the presence of a long-run equilibrium relationship between economic growth and financial development.

The long-run estimates showed that increased credit to the private sector statistically impact growth and a higher proportion of M2 within the banking system have positive impacts on economic growth, signifying the importance of financial intermediation and savings mobilization to the long run growth path of Liberia. Conversely, an increase in M2 inclusive of currency outside the banking system, negatively affect growth. This supports the McKinnon-Shaw hypothesis, suggesting that inefficiencies in the financial system and financial repression undermine the ability of financial development to spur growth. The introduction of mobile money also showed a negative long-term impact, potentially due to adoption challenges and structural inefficiencies in Liberia. In the short run, none of the financial development indicators showed significant effects on economic growth. The ECT indicated a moderate speed of adjustment towards long-run equilibrium,

hence, Liberia's economy takes longer time to recover from financial shocks. Granger causality tests confirmed that financial development indicators collectively influence economic growth, though no individual indicator Granger-causes growth. The impulse response analysis showed that shocks to financial development variables affect GDP growth in a fluctuating manner, with M2C/GDP showing sustained positive impacts over time.

CONCLUSION

The findings of this study indicate that the impact of financial development on economic growth is dependent on the specific financial indicator used. M2, when adjusted to exclude currency outside the banking system, emerges as a more effective measure of financial development in promoting growth compared to M2 inclusive of currency in circulation. Additionally, the results showed that domestic credit to the private sector positively influences economic growth but this impact is not statistically valid. However, the introduction of mobile money does not appear to have a significant impact on growth in Liberia. Furthermore, while financial development significantly contributes to long-term economic growth, its impact on growth is not evident in the short term.

RECOMMENDATIONS

Given the significant impact of private sector credit on economic growth, it is imperative that the CBL keenly work with financial institutions to expand access to credit. Policymaking efforts aimed at promoting financial inclusion, particularly for SMEs, hold the potential to stimulate investment and drive higher economic growth. Strengthening the capacity of banks to extend credit, alongside improvements in credit infrastructure, could further bolster financial development and contribute significantly to sustain economic growth.

The positive impact of M2 when adjusted to exclude currency outside banking system on growth underscores the importance of funds being held within the formal banking system. The CBL should encourage commercial banks to give high interest on deposit coupled with awareness to incentivize savings and deposit mobilization. This could encourage saving and enhance financial intermediation, hence channel more resources toward productive investments. Additionally, financial literacy programs can raise awareness about the benefits of using banking services especially in the hinterlands of Liberia. Also, the CBL should continue to implement policies aimed at reducing cash dependency and encouraging electronic transactions. Enhancing mobile banking services and ensuring proper regulation can improve financial inclusion and economic stability.

While mobile money has the potential to promote financial inclusion, its negative impact on growth observed in this study suggests that there are significant challenges in its implementation. Therefore, the CBL should collaborate with telecommunications companies to invest more in nationwide infrastructure and develop a more accessible, efficient, user-friendly transaction platform. Ensuring mobile money services, such as purchasing goods and paying bills are cost- free, coupled with instant payment notifications, could boost user confidence and encourage broader adoption. Furthermore, a target should be set to integrate mobile money into all economic activities, supported by continuous awareness campaigns to encourage businesses to prioritize mobile payments. In addition, the CBL should also enhance regulatory frameworks to facilitate the expansion and effective utilization of mobile money. Together with other strategic initiatives, these measures would promote wider adoption and strengthen mobile money's positive contribution to economic growth.

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APPENDIX

Appendix 1

Lag Order Selection

Lag	LL	LR	Df	P	FPE	AIC	HQIC	SBIC
0	341.20				0.00	-7.55	-7.50	-7.42
1	708.68	734.97	25.00	0.00	0.00	-15.25	-14.91*	-14.41*
2	730.66	43.96	25.00	0.01	0.00	-15.18	-14.56	-13.65
3	768.24	75.15	25.00	0.00	0.00	-15.47	-14.56	-13.23
4	820.53	104.57	25.00	0.00	0.00	-16.08	-14.90	-13.14
5	836.12	31.20	25.00	0.18	0.00	-15.87	-14.40	-12.23
6	870.07	67.90	25.00	0.00	0.00	-16.07	-14.32	-11.73
7	893.28	46.41	25.00	0.01	0.00	-16.03	-14.00	-11.00
8	938.96	91.36*	25.00	0.00	6.9e-1*	-16.49*	-14.18	-10.76

Appendix 3

Period	S.E.	LogGDP	DCPS/GDP	M2C/GDP	M2/GDP	DBM
1	0.074181	100.0000	0.000000	0.000000	0.000000	0.000000
2	0.092420	91.15313	0.235529	3.925697	3.292127	1.393519
3	0.110541	74.76312	0.197569	21.01395	2.434992	1.590370
4	0.128207	64.13646	0.939154	31.55126	2.002934	1.370193
5	0.137822	57.36324	2.174426	37.09889	1.806475	1.556964
6	0.150360	50.78445	7.387406	38.73395	1.668351	1.425849
7	0.164125	48.89041	7.470545	40.95643	1.485738	1.196874
8	0.185414	44.65672	7.272272	45.66214	1.329801	1.079060
9	0.199209	43.32584	6.826461	47.29390	1.161084	1.392724
10	0.208796	46.05772	6.278969	43.95046	2.079246	1.633600
11	0.215700	46.73486	5.965875	42.02641	3.649809	1.623051
12	0.221416	45.46239	5.667903	40.13756	7.190674	1.541478
13	0.229218	42.86151	5.436275	38.71286	11.50974	1.479612
14	0.237096	40.06055	5.535706	38.04612	14.85089	1.506731
15	0.241986	38.56236	5.474449	37.90716	16.47584	1.580185
16	0.246746	37.19507	5.308631	37.71137	18.15810	1.626825
17	0.251104	36.13901	5.405936	36.69652	20.18659	1.571944
18	0.260142	33.90710	5.784501	35.46859	23.35006	1.489751
19	0.265764	32.49668	5.826960	36.04001	24.11571	1.520644
20	0.270281	31.47455	5.664736	36.97558	24.27889	1.606248
21	0.273752	30.99060	5.555682	37.20227	24.36561	1.885838
22	0.277803	30.18993	5.587447	36.72897	25.38953	2.104120
23	0.281284	29.51974	5.710047	36.35999	26.05414	2.356077
24	0.285816	28.71572	5.727872	36.01117	26.99615	2.549097
25	0.290217	28.06221	5.691631	35.82776	27.81730	2.601099
Choles ky One S.D. (d.f. adjus ted) Choles ky ordering: LogGDP DCPS/GDP M2C/GDP M2/GDP DBM						

Appendix 4

LM Test for Residual Serial Correlation

LRE* stat	df	Prob.	Rao F-stat	df	Prob.
17.81532	25	0.8501	0.6998694	(25, 139.0)	0.8515
30.10989	25	0.2202	1.231454	(25, 139.0)	0.2229
32.84841	25	0.1349	1.3456168	(25, 139.0)	0.137

Residual Heteroskedasticity

Chi-sq	Df	Prob.
1176.332	1110	0.0815

Jarque-Bera Residual Normality

Equation	chi2	df	Prob > chi2
D_LoGDP	154.335	2	0.176
D_DCPSGDP	36.875	2	0.776
D_M2CGDP	3.586	2	0.125
D_M2GDP	14.245	2	0.0008
D_BM	3334.218	2	0.180
ALL	3543.259	10	0.251