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Banking Sector Depth and Economic Growth: Empirical Evidence from Vietnam

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Abstract

The Vietnamese economy is a developing country that has brought many opportunities and challenges for the banking system. Commercial banks have developed strongly from quality to quantity, which plays a vital role in developing the economy. They play an important role in capital formation, which is essential for the economic development of a country. They provide financial services to the general public and businesses, ensuring economic and social stability and sustainable growth of the economy. Therefore, the relationship between bank depth and economic growth is of importance in research. This paper used a VAR (Vector Autoregressive Models) estimator for time series data models. The data is collected quarterly from the first quarter of the year 2000 to 2020. The study uses the VAR model to examine the causal relationships of economic growth, growth in money supply expansion, private sector capital requirement, and banks' domestic credit. The results indicate a general short-run relationship between banking sector depth and economic growth with a positive connection, but in the long term, the relationship between these variables can be reversed because of other macro factors. The findings show the two-way causal relationship between GDP growth and banking depth factors. This research contributes to policy-making by underlining the banking sector depth determinants when setting regulations and policies to develop the banking sector.

1. Introduction

Today, world financial markets are highly integrated, and transactions have become increasingly complex. Financial markets help to efficiently direct the flow of savings and investment in the economy in ways that facilitate the accumulation of capital and the production of goods and services. Vietnam and other countries have made continual efforts to boost economic growth, control inflation, and stabilize the market through institutional reforms and improving the business environment. The government focuses on the development of the financial sector to ensure a useful function of providing capital to the economy, supporting economic growth, and maintaining macro stability. The trend of globalization requires many conditions that Vietnam has to adapt to satisfy. In the context of integration, Vietnam has held increasing attraction for investors in many fields including that of providing financial services from Vietnamese commercial banks. In the coming period, Vietnam's financial market should focus on depth rather than development in general as in the previous period. Nguyen (2017) concluded that the Vietnamese financial market has an imbalance between the money market and capital markets, in which the commercial banking system still plays a key role. Commercial banks play an important role in capital formation, which is

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essential for the economic development of a country. Throughout the years, the commercial banking system has performed the role of providing capital for the whole economy, and therefore, the banking system has a vital role in the economy.

In terms of the types of services, a bank provides financial services - especially credit, savings, and payment services, and performs many financial functions in the economy. From the increasingly important role of banking services, banking has been considered the core subject of the economy. Also, Pradhan et al. (2017) have shown that banking depth is an essential driver of economic growth, especially in developing countries. Moreover, a banking system has played a vital role in supporting economic growth, promoting capital flow in the financial sector, and ensuring the effective allocation of resources to boost the economy (Nguyen, 2017). Financial depth captures the financial sector relative to the economy. It is the size of banks, other financial institutions, and financial markets in a country, taken together and compared to a measure of economic output. Furthermore, many researchers believe that an increase in the banking sector depth index promotes economic efficiency and higher economic growth, especially developed ones, in recent times of global financial crisis (Arcand et al., 2012; Cecchetti & Kharroubi, 2012). However, others argue that bank credit's overgrowth, especially private credit, can damage the economy. In other words, once the financial sector development exceeds the limit, it will no longer be a driver but become an obstacle to economic growth (Arcand et al., 2012). Although the relationship between banking depth and economic growth is essential for policy design, the findings of developed country studies are challenging to apply to developing countries because the financial sector of developing countries often has a short history and remains at a low development level (Pradhan et al., 2017). Many global studies focused on the relationship between financial development, especially banking depth, and economic growth in developing and developed countries but not in Vietnam.

As a result, the research of the link between the determinants of bank depth and Vietnam's economic situation is essential to boost financial performance. This study will provide an overview of the impact of the banking sector depth on long-term economic growth and also show the role of monetary policy in terms of economic variables. This study aims to test the causal relationship between banking depth and Vietnam's economic growth. This paper is organized as follows, the next section presents a brief review of finance – growth nexus literature, and section 3 elaborates on the methodological framework. The results are shown and discussed in section 4. Finally, section 5 provides the conclusion.

2. Literature Review

Some recent studies discussed the relationship between financial depth development and economic growth, and assesses the banking sector development status, and underlines the policy implications in the light of the banking-growth nexus (Hsueh, 2013; Pham & Doan, 2020). Cecchetti and Kharroubi (2012) and Arcand et al. (2015) argued that the financial sector's rapid growth rate may harm economic growth because it competes for resources with other economic sectors. In contrast, Loayza and Ranciere (2006) found a statistically significant and positive long-term relationship between financial depth development and economic growth. This positive development is also similar to the findings from Bong and Premaratne (2019).

The primary role of financial institutions is to provide liquidity to the economy and permit a higher level of economic activity than would otherwise be possible. Cave et al. (2020) treated the banking sector and stock market developments as two latent indicators of financial development. They found a robust negative relationship between banking sector development and economic growth, whereas the effect of stock market development on economic growth is positive up to a threshold after which the effect becomes negative.

Levine (2005) reviewed, appraised, and critique theoretical and empirical research on the connections between the operation of the financial system and economic growth. While subject to ample qualifications and countervailing views, the preponderance of evidence suggested that both financial intermediaries and markets matter for growth and that reverse causality alone is not driving this relationship. Furthermore, theory and evidence imply that better developed financial systems ease external financing constraints facing firms, which illuminates one mechanism through which financial development influences economic growth. Similarly, Levine (1997) argued that the preponderance of theoretical reasoning and empirical evidence suggested a positive, first-order relationship between financial development and economic growth. The body of work would push even most skeptics toward the belief that the development of financial markets and institutions is a critical and inextricable part of the growth process and away from the view that the financial system is an inconsequential sideshow, responding passively to economic growth. Many gaps remain, however, and the paper highlights areas in acute need of additional research (McKinnon, 1973; Shaw, 1973).

However, Barro and Sala-i-Martin (1995) asserted that this relationship is endogenous because financial markets' development is a regular part of economic growth. Therefore, financial depth can lead to economic growth; economic growth can lead to further improved financial depths. Whether financial depth and economic growth may

be mutually dependent, the view contends that financial depth is necessary for economic growth. This hypothesis argued that financial depth generates economic growth by facilitating resources to increase productivity; Secondly, economic growth affects financial depth.

As an economy matures, additional demands for financial services appear, represented in Kar et al. (2011) investigated the direction of causality between financial development and economic growth in the Middle East and North African (MENA) countries. To capture the different aspects of financial development, six different indicators were used. Empirical results showed that there is no clear consensus on the direction of causality between financial development and economic growth for all measurements of financial development and it is also observed that the findings are country-specific.

Accordingly, when the economy grows, financial depth improves, thereby increasing financial market opportunities Odhiambo (2010) examined the dynamic causal relationship between financial development, investment, and economic growth in South Africa. Their results showed that, on the whole, economic growth has a formidable influence on the financial sector development. The study also found that there is a distinct unidirectional causal flow from economic growth to investment. Moreover, the study also finds that investment, which results from growth, Granger-causes financial development. The study, therefore, recommends that South Africa should intensify its pro-growth policies to bolster investment and financial development. Lee and Chang (2009) explored the directions of causality among FDI, financial development, and economic growth and obtained solid, convincing evidence of a fairly strong long-run relationship. Furthermore, the financial development indicators have a larger effect on economic growth than does FDI. From the panel causality tests, while the evidence of a short-run relationship is weak, that of a long-run relationship among the variables is unequivocal. Overall, the findings underscore the potential gains associated with FDI when coupled with financial development in an increasingly global economy. Wolde-Rufael (2009) re-examined the causal relationship between financial development and economic growth in Kenya for the period 1966–2005. Their results suggest that in three out of the four measures of financial development they found evidence of a two-way causality (1) between domestic credit provided by the banking sector and economic growth; (2) between total domestic credit provided by the banking sector and economic growth, and (3) between liquid liabilities and economic growth. This implied that neither the supply-leading nor the demand-following hypotheses are supported in Kenya and that economic growth and financial development are jointly determined, or they complement each other. A major

implication of their findings is that financial development promotes economic growth in Kenya and that policies at enhancing the development of the financial sector can help to spur economic growth.

The concept of financial depth is quite a broad concept, including banking depth and stock market depth. Financial sector depth is vital in fostering long-run economic growth since it facilitates efficient inter-temporal allocation of resources, capital accumulation, and technological innovation (Levine, 2005). According to Pradhan et al. (2017), banking depth consists of five components: expanded money supply (BMG), requirements for the private sector (CLP), domestic credit for the private sector. (DCP), bank-provided domestic credit (DCB) and banking depth index (BSI). In particular, Pradhan et al. (2017) investigated the linkages between banking sector depth, trade openness, and economic growth using a panel data set covering the ASEAN regional forum countries for the period 1961–2012. The results of this study indicated a general long-run equilibrium relationship among trade openness, banking sector depth, and economic growth as well as a short-run relationship between these variables. Policy recommendations include those that will promote greater banking sector development as well as increased trade openness.

Similarly, Al-Moulani and Constantinos (2017) investigated the relationship between banking sector depth and long-term economic growth in the natural resource-based economies vis-à-vis economies that are not dependent on natural resources. Using different measures of banking sector depth and economic growth, the investigation yielded three key findings. First, the banking–growth relationship is non-linear and positive within certain levels of banking sector depth in both country groups. Second, the time lag between the change in the level of banking sector depth and the effect on economic growth is shorter in the natural resource-based countries than in the other countries. Finally, the total effect of the banking sector deepening on long-term economic growth is weaker in economies with abundant natural resources than in the rest of the world.

Moreover, Abubakar and Gani (2013) re-examined the long-run relationship between financial development indicators and economic growth in Nigeria over the period 1970–2010. Using the Johansen and Juselius (1990) approach to cointegration and Vector Error Correction Modelling (VECM). The findings of the study revealed that in the long-run, liquid liabilities of commercial banks and trade openness exert a significant positive influence on economic growth, conversely, credit to the private sector, interest rate spread, and government expenditure exert a significant negative influence. The findings implied that credit to the private sector is marred by the identified problems and government borrowing and high-interest rates are crowding out investment and growth.

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Tongurai and Vithessonthi (2018) studied the impact of banking sector development on changes in economic structure and growth. They argued that banking sector development has differential effects on industrial sector development and agricultural sector development. They tested whether economic structure and growth foster banking sector development. To test their hypotheses, they constructed a panel sample of all countries in the world during 1960–2016. They found that banking sector development has a negative effect on agricultural sector development but exerts no effect on industrial sector development. The negative effect of banking sector development on agricultural sector development is only observed for countries with high degrees of banking sector development. Their results further showed that agricultural sector development exerts a negative effect on banking sector development while industrial sector development has a positive effect on banking sector development.

Hou and Cheng (2017) provided new evidence on the long- and short-term effects of life insurance, banking, and stock markets on economic growth using the pooled mean group (PMG) technique. The sample consisted of 31 countries and covered the period from 1981 to 2008. The results of the entire sample analyzed using three estimators provided robust evidence that private credit impedes economic growth while the effects of life insurance and the stock market on growth are not robust. Their findings suggested that the effects of financial activities on growth vary with the period, income level, and financial development. That is, countries at different levels of development should engage in different financial activities to ensure sustainable growth.

3. Research Method

3.1. VAR Regression Model

In a regression analysis involving time series data, if the regression model includes present values and past values of variables, it is called a differential model late delivery. If the model's explanatory variables include one or more delay values of the dependent variable, the model is called the autoregressive model. The regression model is considered and selected after testing, especially the stationary test of time series. The author applied the unit root test of Dickey-Fuller (ADF) and Phillips-Perron (PP) to determine the time series's stationarity.

The results show that the data series stops at the order I (1) and I (2). The stationary study's time series differs from the hierarchical order and includes the regression in the VAR time-series quantitative economic models.

The general formula of multi-variable VAR model:

$$A_0 Y_t = A_1 Y_{t-1} + A_2 Y_{t-2} + \dots A_p Y_{t-p} + u_t \tag{1}$$

Or to be rewritten as:

$$
\begin{aligned}
Y_t &= A_0^{-1} * A_1 Y_{t-1} + A_0^{-1} * A_2 Y_{t-2} + \dots A_0^{-1} * A_p Y_{t-p} \\
&\quad + A_0^{-1} u_t \\
Y_t &= B_1 Y_{t-1} + B_2 Y_{t-2} + \dots B_p Y_{t-p} + e_t
\end{aligned} \tag{2}
$$

Therein: $B_s = A_0^{-1} A_s$, $s = 1, 2, \dots, p$ và $e_t = A_0^{-1} u_t$; e_t, u_t are the residuals of equations (1) and (2), respectively.

VAR models are used to integrate the push response function, decompose the variance, and actively analyze the model variables' interaction. The purpose of the model analysis is not to obtain a parameter estimate but to evaluate the correlation between the study's goals.

From the advantages of the VAR model, the study proceeds step by step. These steps include (1) unit root and cointegration tests if the series stops at the same degree of difference, (2) tests and estimates of VAR, and (3) decomposition tests of variance and the impulse response function functions. In addition to providing information on the variables' temporal nature, step (1) requires preliminary analysis of the data series to characterize the VAR in step (2) correctly. Meanwhile, step (3) evaluates the estimated results of the VAR.

3.2. Variable Description

The research object focuses on finding out the relationship between banking depth and Vietnam's GDP growth. This variable is used as the main one, which is the same as the previous research from Kumar and Paramanik (2018). Pradhan et al. (2017) studied four variables: GDP, BMG, CLP, and DCB. GDP is calculated from the percentage of Vietnam's national output gap between years. Bank depth consists of BMG is calculated from the portion of money supply gap between years, demand credit from the private sector (CLP), and total domestic credit provided by the bank (DCB). These variables selected following the theory and empirical models studied, and these variables are characteristic of the banking depth that any country's financial system has a counter.

3.3. Research Data

The study's scope is the relationship between banking depth and Vietnam's economic growth, where data was taken quarterly from Q1 2000 to Q1 2020. Vietnam's national output (GDP) is taken from ADB's international financial statistics. Three-component bank depth is from IMF financial statistics(IFS), including money supply (BMG), demand credit from the private sector (CLP), and total domestic credit provided by the bank (DCB). The study converts these variables to the natural bases' logarithm so that the variables have a distribution close to the normal distribution, meeting the model's input data conditions.

4. Results and Discussion

4.1. Vector Autoregressive (VAR) Models and Causality Tests

4.1.1. Stationary of Time Series Data

A time series Y_t is called stationary if the following three conditions are satisfied: the average of Y_t is constant over time; Y_t's variance does not change over time, and the covariance between two points Y_t and Y_{t-s} only depends on the distance between the two times s, not on time t. Failure of non-stationary time series data can result in fake regression results.

Testing whether Y_t is stationary means testing whether Y_t is a random step (Random Walk) or not, then test:

H0: $\beta_1 = 1$ *Failure of non-stationary time series data can result in fake regression results.*
H1: $\beta_1 < 1$.

At a significance level α, if it accepts *H0*, then the times series is non-stationary. In contrast, in the case of rejecting Ho then the time series is stationary.

Application of Dickey-Fuller unit root test method to test stationarity for GDP, BMG, LNCLP, LNDCB chains, respectively:

Unit root test results present that with the significance level $\alpha = 0.05\%$, they all reject the Ho hypothesis about the existence of a unified solution, so the chains of GDP, BMG, LNCLP, LNDCB stop at the level of difference of 1 and 2 is

as follows: d (GDP), d (BMG), d (LNCLP, 2), d (LNDCB, 2). Thus, the data series did not stop at the same degree of difference, so there is no need to perform a cointegration test between chains. The VAR model is selected for regression.

4.1.2. Test the Optimal Model Delay

Usually, it is possible to use the PACF chart of BOX - JENKIN method or use the criteria LogL, AIC, SC ... to determine the optimal latency for the model.

In this case, SC and HQ are used to determine the optimal lag model: $p = 1$.

Table 1: Unit Root Test of Time Series Data

Augmented Dickey-Fuller test statistic	*t*-Statistic	Prob.*	s_t difference
Null Hypothesis: GDP has a unit root	−3.365109	0.0153	$d = 1$
Null Hypothesis: BMG has a unit root	−5.727658	0.0000	$d = 1$
Null Hypothesis: LNCLP has a unit root	−4.626180	0.0003	$d = 2$
Null Hypothesis: LNDCB has a unit root	−7.510689	0.0000	$d = 2$

GDP is the percentage of Vietnam's national output gap between years; BMG is the percentage of money supply gap between years; LNCLP is the logarithm of demand credit from the private sector; LNDCB is the logarithm of total domestic credit provided by a bank.

Table 2: Testing the Optimal Lag Selection of Model

VAR Lag Order Selection Criteria
Endogenous variables: D(GDP____) D(BMG____) D(LNCLP,2) D(LNDCB,2)
Exogenous variables: C
Date: August 14, 2020. Time: 20:19
Sample: 2000Q1 2020Q1

Lag	LogL	LR	FPE	AIC	SC	HQ
0	11.08099	NA	9.73e⁻⁰⁶	−0.188826	−0.065227	−0.139475
1	72.24131	114.1659	2.92e⁻⁰⁶	−1.393102	−0.775105	−1.146342
2	121.4209	86.55602	1.21e⁻⁰⁶	−2.277890	−1.165495	−1.833723
3	161.1011	65.60469	6.50e⁻⁰⁷	−2.909363	−1.302571*	−2.267789*
4	183.5456	34.71412*	5.57e⁻⁰⁷*	−3.081216*	−0.980027	−2.242234

*indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion
GDP is the percentage of Vietnam's national output gap between years; BMG is the percentage of money supply gap between years; LNCLP is the logarithm of demand credit from the private sector; LNDCB is the logarithm of total domestic credit provided by the bank.

4.1.3. Granger Causality Test

The Granger test determines whether the model variables are endogenous or exogenous and are necessary for inclusion in the model. Variables in the model include d (GDP), d (BMG), d (LNCLP, 2), d (LNDCB, 2) when conducting the Granger test:

The results represent that at the significance level $\alpha = 0.05$, LNCLP has an impact on BMG, BMG has an effect on BMG, BMG has an effect on LNDP, and LNCLP has an impact on GDP. The Granger Causality test shows that the variables might interact with each other. Thus, the above results show that the variables included in the model are necessary for the model.

4.1.4. Testing for White Noise Residuals

The VAR model's residue must be white noise for the VAR model to be used for prediction. The results show that p-value $< \alpha$ ($\alpha = 0.05$) at lag 3. There should be auto-correlation at lag 3. So a suitable model delays $p = 3$, then the remainder of the model is white noise. The VAR model is suitable for regression.

4.1.5. Check the Stability Condition of VAR

To test the VAR model's stability using the AR root test to consider whether the test or the eigenvalues are less than 1 or are in the unit circle, the VAR model must achieve stability.

The results show that the solutions with $K \times P = 4 \times 3 = 12$ solutions are all less than 1 or are in the unit circle, so the VAR model is stable.

Thus, the tests indicate that the series is stationary at different degrees of differences, then there is no evidence of cointegration between series, which ensures a proper VAR model selection. With the appropriate delay chosen of 3 and does not make the residual correlation phenomenon occur, the VAR model is guaranteed to be stable, suitable for regression. From there, the author analyzed variance decomposition and pulse response functions as the basis for the conclusions.

4.2. Discussion

4.2.1. Impulse Response Functions

According to Figure 4.1, the impulse response functions indicate that the BMG expansionary money supply growth with volatility shocks leads to initial positive response to real, significant GDP from period 1–6. The reason explains that Vietnam is a developing country. When the economy is enhanced with a quantity of capital that promotes the production, it positively supports economic growth.

Table 3: Causality Test of GDP, BMG, LNCLP, LNDCB

Pairwise Granger Causality Tests Date: August 14, 2020. Time: 20:24 Sample: 2000Q1 2020Q1				
Lags: 3	Granger Cause	BMG	783.83061	0.0133
BMG	Granger Cause	LNCLP	787.52123	0.0002
LNDCB	Granger Cause	BMG78	4.17971	0.0088
BMG	Granger Cause	LNDCB	788.00131	0.0001
LNCLP	Granger Cause	GDP78	4.24861	0.0081
LNDCB	Granger Cause	GDP78	5.03073	0.0032

GDP is the percentage of Vietnam's national output gap between years; BMG is the percentage of money supply gap between years; LNCLP is the logarithm of demand credit from the private sector; LNDCB is the logarithm of total domestic credit provided by the bank.

Table 4: Check the Stability Condition of VAR

Roots of Characteristic Polynomial Endogenous variables Lag specification: 1 3 Date: August 14, 2020. Time: 20:34	
Root	**Modulus**
−0.032946 −0.931222i	0.931805
−0.032946 +0.931222i	0.931805
−0.928979	0.928979
−0.764732	0.764732
0.380143 − 0.583071i	0.696046
0.380143 + 0.583071i	0.696046
−0.181932 − 0.646340i	0.671457
−0.181932 + 0.646340i	0.671457
0.208997 − 0.623546i	0.657639
0.208997 + 0.623546i	0.657639
0.295382	0.295382
−0.259911	0.259911
No root lies outside the unit circle. VAR satisfies the stability condition.	

Source: from author's calculations. GDP is the percentage of Vietnam's national output gap between years; BMG is the percentage of money supply gap between years; LNCLP is the logarithm of demand credit from the private sector; LNDCB is the logarithm of total domestic credit provided by the bank.
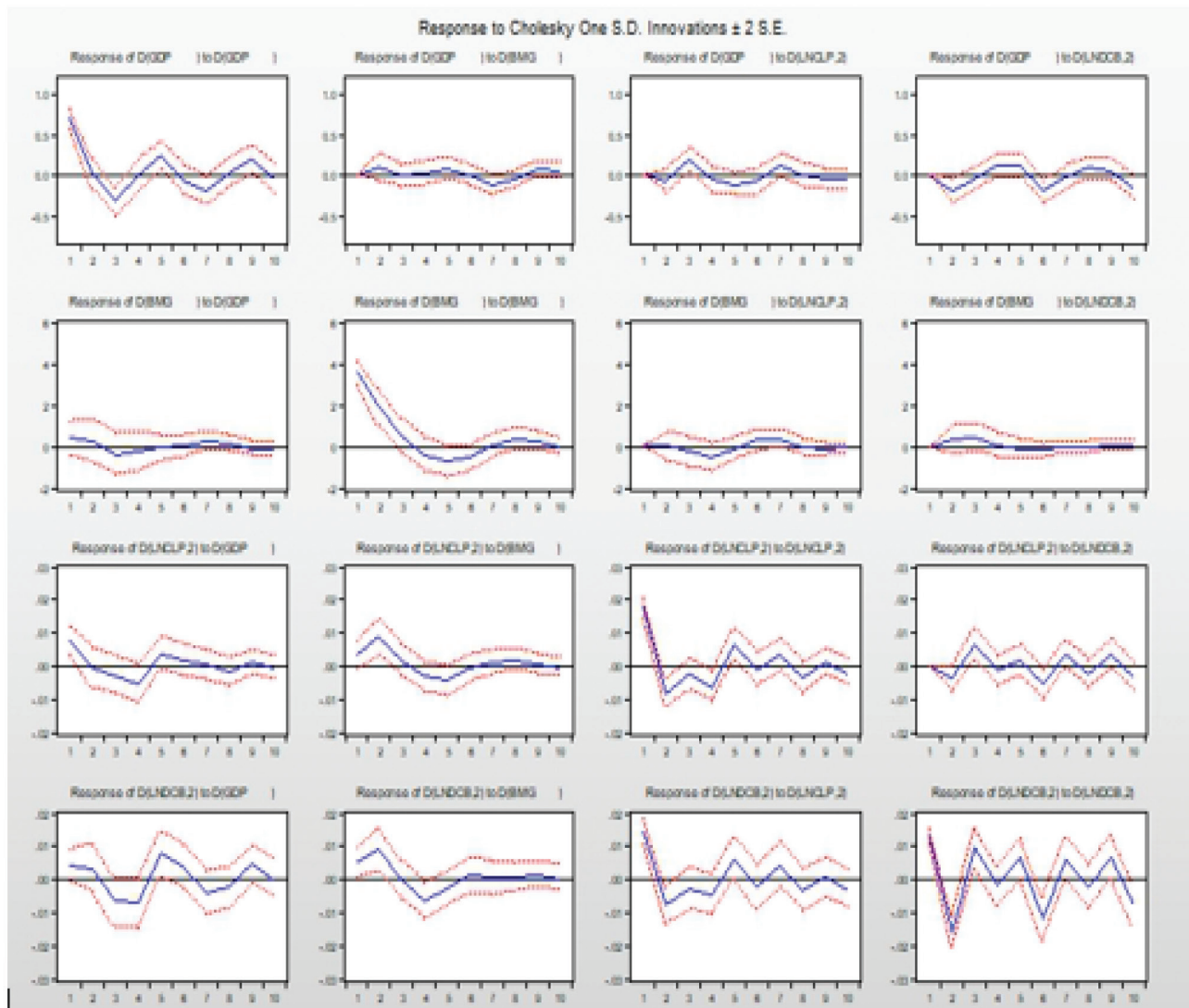
Figure 1: Impulse Response Functions
of GDP, BMG, LNCLP, LNDCB

However, in the long run, the response of GDP fluctuates insignificantly. When capital increases exceed the required production level, it has a negative impact on the real output growth of GDP since period 6. BMG's expansionary money supply shocks do not have a significant effect on Vietnam's real output. The volatile shocks requiring LNCLP private credit and the domestic credit provided by banks substantially impact GDP growth. The increase in the requirement for personal credit, LNCLP, and domestic credit provided by banks affects GDP that continuously changes over time with relatively large amplitude and reverses in the following periods there. This is entirely consistent with the actual situation of Vietnam. The positive or negative

response to GDP's economic growth depends on credit provision's efficiency, not on the level and amount of bank credit granted to the economy.

In contrast, the shocks of GDP growth also explain fluctuations of the bank depth factors. GDP does not have a significant effect on BMG's expansion in the money supply. However, GDP growth shocks have caused relatively large fluctuations in demand for private credit, LNCLP, and domestic credit. Usually, the GDP has immediate positive effects on bank credit factors. After that, GDP reversed the response from period 1.5–2. In the long term, the impact of GDP on banking depth indices is long-lasting and does not decline.

4.2.2. Decomposition of Variance

The variance decomposition results are consistent with the impulse response function results and determine the importance of the bank depth factors to the actual domestic output value. The fluctuations in the money supply's BMG expansion are about 4% maintained over the next period and continuously cause the GDP forecast error. There is no sign of diminishing. The volatility of LNCLP private credit requirements is recorded to be over 8% concerning GDP volatility. In particular, the results show that the domestic credit volatility shocks provided by banks that offer credit affect real output in all cases and extend to more extended periods. The effect is more pronounced for GDP is over 14%.

The fluctuations of GDP growth in the opposite direction have statistical significance for explaining the instability of factors representing banking depth. The variable rate of BMG expansion in money supply due to fluctuations in GDP is over 3%. The economic growth rate also explains that the volatility of the requirement for private credit for LNCLP is around 13%. The volatility of domestic credit provided by banks for LNDP is over 15%. The impact of GDP on credit factors is relatively large and clear. These currencies were recorded last in the following cycles, and there was no sign of decline.

These analyses conclude the effect of banking depth factors on Vietnam's macroeconomy volatility through the recorded and prolonged GDP output value. This means that, in support of the leading research objective, the important role of bank depth fluctuations in explaining Vietnam's economic efficiency is quite intense for the research model.

Table 5: Variance Decomposition

Period	S.E.	D(GDP____)	D(BMG____)	D(LNCLP,2)	D(LNDCB,2)
			Variance Decomposition of D(GDP____):		
1	0.701010	100.0000	0.000000	0.000000	0.000000
2	0.737001	90.57188	2.025908	0.776584	6.625628
3	0.826550	86.56542	1.612437	6.403614	5.418533
4	0.837987	84.22691	1.732125	6.492679	7.548284
5	0.894690	81.70070	2.562964	7.022568	8.713766
6	0.920414	77.63001	2.442629	7.212843	12.71452
7	0.956524	75.98565	3.615522	8.601480	11.79735
8	0.962983	75.15030	3.780899	8.494869	12.57393
9	0.988572	75.16528	4.246253	8.239083	12.34939
10	1.004392	73.06620	4.323009	8.205589	14.40520
			Variance Decomposition of D(BMG____):		
1	3.568189	1.389450	98.61055	0.000000	0.000000
2	4.077542	1.372406	98.11089	0.002240	0.514468
3	4.166818	2.229814	95.65528	0.467601	1.647304
4	4.228473	2.454525	93.70046	2.244400	1.600612
5	4.297962	2.396868	93.72435	2.271373	1.607414
6	4.348149	2.343627	93.14757	2.785506	1.723295
7	4.369515	2.635274	92.23979	3.412100	1.712834
8	4.387958	2.745736	92.15909	3.394851	1.700329
9	4.400869	2.827561	91.94239	3.506060	1.723985
10	4.406028	3.000057	91.73064	3.544270	1.725029

Table 5: (continued)

Period	S.E.	D(GDP____)	D(BMG____)	D(LNCLP,2)	D(LNDCB,2)
Variance Decomposition of D(LNCLP,2):
1	0.019645	15.71142	3.454817	80.83376	0.000000
2	0.023368	11.21749	16.73702	69.30310	2.742380
3	0.024598	11.36678	15.65470	63.45111	9.527405
4	0.026302	14.45594	15.27412	61.63049	8.639445
5	0.027787	14.79416	16.30539	60.76565	8.134794
6	0.028404	14.46286	15.64417	58.28910	11.60387
7	0.028870	14.02292	15.30243	57.78021	12.89444
8	0.029296	14.01424	15.23250	57.61981	13.13345
9	0.029581	13.84044	14.96625	56.73008	14.46323
10	0.029897	13.59590	14.67241	56.08959	15.64209
Variance Decomposition of D(LNDCB,2):
1	0.020791	3.960736	6.204070	49.43493	40.40027
2	0.029110	3.298139	12.83094	32.35463	51.51629
3	0.031458	7.355703	10.98705	28.39903	53.25822
4	0.033319	11.28904	13.63318	27.25319	47.82459
5	0.035478	14.67050	12.62155	27.16260	45.54536
6	0.037674	13.91839	11.30151	24.47545	50.30465
7	0.038616	14.41700	10.78009	24.54294	50.25997
8	0.038908	14.64230	10.63181	24.87605	49.84984
9	0.039761	15.35215	10.31866	23.86709	50.46210
10	0.040651	14.69431	9.873591	23.48651	51.94559
Cholesky Ordering: D(GDP____) D(BMG____) D(LNCLP,2) D(LNDCB,2)

GDP is the percentage of Vietnam's national output gap between years; BMG is the percentage of money supply gap between years; LNCLP is the logarithm of demand credit from the private sector; LNDCB is the logarithm of total domestic credit provided by the bank.

5. Conclusion

The study used VAR model tests to examine causality and determine a general equilibrium relationship between banking depth and economic growth. The causal relationship gives different results when using various bank depth measures but with long-lasting effects and no diminishing signs. On the other hand, using the VAR model that does not distinguish between the independent and dependent variables allows feedback interactions between the variables, limiting the causal effect of economic growth to the bank depth. The results show that an increase in fluctuating GDP growth may cause an immediate positive impact on banking depth factors. However, in the long-term, the reaction direction may be reversed because banking depth factors also depend on other factors such as the state of production and capital use efficiency. The research model shows statistical significance for the two-way causal relationship between GDP growth and banking depth factors.

The volatility of banking depth factors affects Vietnam's macroeconomic efficiency through three channels, including the money supply to the economy, credit requirements for the private sector, and bank credit. On the policy side, policymakers in developing countries like Vietnam that encourage long-term economic growth should seek to improve their banking sectors and promote better financial policies and bank virtually.

The banking sector's development makes the banking sector more appreciated and helps ensure the banking sector's financial stability, and promotes production development and a growing economy. This is because banks are intermediaries in the economy's capital flows, affecting production efficiency and real output growth.

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The research results are consistent with previous studies, and bank credit does not always positively impact the economy's real output. Excessive bank credit, especially private credit, can hurt the economy. In other words, the growth of the financial sector once it exceeds the limit will no longer be a driver but become an obstacle to development. The paper results are essential for policymakers in finding the optimal conditions for the financial depth to ensure the highest benefit to the economy and financial sector. Besides, the policymakers should find ways to scale finance to deliver optimal growth for the economy and limit financial growth. The government and state banks need to focus on quality in implementing credit and financial policies rather than increasing size and quantity.

References

Abubakar, A., & Gani, I. M. (2013). Impact of banking sector development on economic growth: Another look at the evidence from Nigeria. *Journal of Business Management & Social Sciences Research*, *2*(4), 47–57. https://doi.org/10.1.1.403.9523

Al-Moulani, A., & Constantinos, A. (2017). Banking sector and depth and economic growth nexus: A comparative study between natural resources-based and rest of the world economies. *International Review of Applied Economics, 31*(5), 625–650. https://doi.org/10.1080/02692171.2017.1299115

Arcand, J. L., Berkes, E., & Panizza, U. (2015). Too much finance? *Journal of Economic Growth*, *20*(2), 105–148. https://doi.org/10.1007/s10887-015-9115-2.

Barro, R. J., & Sala-i-Martin, X. (1995). Public finance in models of economic growth. *Journal of Economic Dynamics and Control, 2*, 21–29. https://doi.org/10.1016/S0165-1889(97)00007-9.

Bojanic, A. N. (2012). The impact of financial development and trade on the economic growth of Bolivia. *Journal of Applied Economics*, *15*(1), 51–70. https://doi.org/10.1016/S1514-0326(12)60003-8.

Bong, A., & Premaratne, G. (2019). The impact of financial integration on economic growth in Southeast Asia. *The Journal of Asian Finance, Economics, and Business*, *6*(1), 107–119. https://doi.org/10.13106/jafeb.2019.vol6.no1.107.

Cave, J., Chaudhuri, K., & Kumbhakar, S. C. (2020). Do the banking sector and stock market development matter for economic growth? *Empirical Economics*, *59*(4), 1513–1535. https://doi.org/10.1007/s00181-019-01692-7.

Cecchetti, S. G., & Karroubi, E. (2012). *Reassessing the impact of finance on growth* (BIS Working Paper, No. 381). Bank for International Settlement. https://www.bis.org/publ/work381.pdf.

Chaiechi, T. (2012). Financial development shocks and contemporaneous feedback effect on key macroeconomic indicators: A post-Keynesian time series analysis. *Economic Modelling*, *29*(2), 487–501. https://doi.org/10.1016/j.econmod.2011.12.008.

Craigwell, R., Downes, D., & Howard, M. (2001). The finance-growth nexus: A multivariate VAR analysis of a small open economy. *Savings and development*, *25*(2), 2009–223. https://www.jstor.org/stable/25830760

Hou, H., & Cheng, S. Y. (2017). The dynamic effects of banking, life insurance, and stock markets on economic growth. *Japan and the World Economy*, *41*, 87–98. https://doi.org/10.1016/j.japwor.2017.02.001.

Hsueh, S. J., Hu, Y. H., & Tu, C. H. (2013). Economic growth and financial development in Asian countries: A bootstrap panel Granger causality analysis. *Economic Modelling*, *32*, 294–301. https://doi.org/10.1016/j.econmod.2013.02.027.

Kar, M., Nazlıoğlu, Ş., & Ağır, H. (2011). Financial development and economic growth nexus in the MENA countries: Bootstrap panel granger causality analysis. *Economic Modeling*, *28*(1–2), 685–693. https://doi.org/10.1016/j.econmod.2010.05.015.

Kumar, K., & Paramanik, R. N. (2020). Nexus between Indian economic growth and financial development: A non-linear ARDL approach. *The Journal of Asian Finance, Economics, and Business*, *7*(6), 109–116. https://doi.org/10.13106/jafeb.2020.vol7.no6.109.

Lee, C. C., & Chang, C. P. (2009). FDI, financial development, and economic growth: International evidence. *Journal of Applied Economics*, *12*(2), 249–271. https://doi.org/10.1016/S1514-0326(09)60015-5.

Levine, R. (1997). Financial development and economic growth: Views and agenda. *Journal of Economic Literature, 35*(20), 688–726. https://www.jstor.org/stable/2729790

Levine, R. (2005). Finance and growth: Theory and evidence. *Handbook of economic growth*, *1*, 865–934. https://doi.org/10.3386/w10766

Loayza, N. V., Ranciere, R., Servén, L., & Ventura, J. (2007). Macroeconomic volatility and welfare in developing countries: An introduction. *The World Bank Economic Review*, *21*(3), 343–357. https://doi.org/10.1093/wber/lhm017

McKinnon, R.I., 1973. *Money and capital in economic development.* Washington, DC: Brookings, Institutions.

Nguyen, C. T. (2017). Open policies for foreign banks to enter Vietnam. *Vietnam Journal of Social Science*, *12*(1), 12–20.

Odhiambo, N. M. (2010). Finance-investment-growth nexus in South Africa: an ARDL-bounds testing procedure. *Economic Change and Restructuring*, *43*(3), 205–219. https://doi.org/10.1007/s10644-010-9085-5.

Pham, M. H., & Doan, T. P. L. (2020). The impact of financial inclusion on financial stability in Asian countries. *The Journal of Asian Finance, Economics, and Business*, *7*(6), 47–59. https://doi.org/10.13106/jafeb.2020.vol7.no6.047

Pradhan, R. P., Arvin, M. B., Hall, J. H., & Norman, N. R. (2017). ASEAN economic growth, trade openness and banking-sector

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depth: The nexus. *Economia*, *18*(3), 359–379. https://doi.org/10.1016/j.econ.2017.05.002

Shaw, E. S. (1973). *Financial deepening in economic development.* New York: Oxford University Press.

Tongurai, J., & Vithessonthi, C. (2018). The impact of the banking sector on economic structure and growth. *International Review of Financial Analysis*, *56*, 193–207. https://doi.org/10.1016/j.irfa.2018.01.002.

Wolde-Rufael, Y. (2009). Re-examining the financial development and economic growth nexus in Kenya. *Economic Modelling*, *26*(6), 1140–1146. https://doi.org/10.1016/j.econmod.2009.05.002.Maxim quatus, sit, si sit enimus eossin