

The macroeconomy and financial depth: Evidence from Vietnam



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ARTICLE INFO

Article history:

Received 19 October 2019

Received in revised form

11 January 2020

Accepted 13 January 2020

Keywords:

Economic growth

Inflation

Financial depth

ARDL

Vietnam

ABSTRACT

The paper investigates the correlation between the macroeconomy and financial depth in Vietnam. Despite its attractiveness, this topic has not been commonly analyzed in much empirical research, especially those in developing countries. Consequently, its results are meaningful to Vietnam as well as developing countries. By employing the Autoregressive Distributed Lag (ARDL) approach to estimate the research model, the author confirms the bidirectional nexus between the macroeconomy (economic growth and inflation) and financial depth which is measured by the size of the banking sector to the economy, a difference between Vietnam and other developing nations. The results are also essential for consideration by the authorities in managing macroeconomic policies for the sustainable development of the financial system.

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1. Introduction

The nexus between the macroeconomy and financial depth is an interesting topic that has been considered in many empirical studies since the early 1900s (Odhiambo, 2008). While the macroeconomy is frequently measured by economic growth and inflation, financial depth captures the size of the financial system relative to the economy (Klein and Olivei, 2008). Accordingly, financial wisdom can reflect the capital supply ability of the financial sector to the economy. Also, financial depth can boost economic growth and in turn, economic growth exerts a significant impact on financial depth (Bencivenga and Smith, 1998). Regarding inflation, this macroeconomic index is closely correlated to financial depth (Boyd et al., 2001).

In other words, there may be a bidirectional correlation between the macroeconomy (economic growth and inflation) and financial depth. However, empirical studies on this matter are mostly conducted among developed countries, not in developing ones. Notably, there have been many contradictory views on the link between the macroeconomy and financial depth (Odhiambo, 2008) which are divided into three following mainstreams: (1) The first view states that financial

depth significantly influences the macroeconomy (Schumpeter, 1912; McKinnon, 1973; Shaw, 1973; King and Levine, 1993); (2) Some scholars believe that the macroeconomy significantly influences financial depth (Robinson, 1952); (3) The third group of researchers assert that there is a two-way relation between the macroeconomy and financial intensity (Patrick, 1966; Bencivenga and Smith, 1998; Boyd et al., 2001). Alternatively, earlier studies have mostly adopted data from various countries for the analysis, so some significant limitations are inevitable when the country-specific impact cannot be examined. Also, there exists the inhomogeneity among different countries, which may lead to invalidity in results (Quah, 1993; Casselli et al., 1996; Ghirmay, 2004).


In developing countries, the correlation between the macroeconomy and financial depth has not been mostly considered though it is necessary to find empirical evidence on this relationship for the different specific characteristics of financial depth as compared to developed ones. For instance, financial system in developed nations performs efficiently with concurrent development of the banking sector and stock market. Meanwhile, in developing countries, their stock market is small and nascent (Bui, 2019a), so the banking sector plays a crucial role in supplying capital, which indirectly increases the imperfection of the financial sector (Lim, 2018; Bui, 2019b). Therefore, their financial depth is mainly measured by the size of the banking sector relative to the economy.

Generally speaking, there is a research gap on the correlation between the macroeconomy and financial depth to be filled, especially in developing

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<https://doi.org/10.21833/ijaas.2020.04.002>

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economies. By this paper, the author examines the nexus between the macroeconomy and financial depth in Vietnam, thereby contributing valuable results to developing nations as well.

The remaining parts consist of a literature review and research hypothesis, data, and methodology, results and discussion, conclusion.

2. Literature review and research hypothesis

In this sector, the author summarizes the relevant literature reviews and develops the research hypothesis. About macroeconomic factors, economic growth and inflation are selectively analyzed.

2.1. Economic growth and financial depth

Schumpeter (1912) is one of the first scholars stating that financial depth is essential in boosting economic growth. Then, Robinson (1952) opposed him by reporting that economic growth significantly influences financial depth. Until 1966, Patrick (1966) represented a compromise by indicating the two-way correlation between financial depth and economic growth. However, until now, there have been different views on this correlation. In specific, the improvement in the financial system, which is measured by the increase in financial depth, is able to facilitate investment allocation (Diamond, 1984; Boyd and Prescott, 1986; Williamson, 1986; Greenwood and Jovanovic, 1990), and eventually evolves the economy. More than that, the improved size of the financial sector can lead to the expansion of financial services accompanied that considerably contributes to economic growth (Rousseau and Yilmazkuday, 2009). The positive impact of financial depth on economic growth is also affirmed by Klein and Olivei (2008) and Odhiambo (2008). Nevertheless, some scholars e.g., Guerra (2017), have reported that financial depth negatively influences economic growth. Accordingly, domestic credit to the private sector, percent of GDP is a typical indicator of financial extent. An excessive increase in credit can exert a negative impact on economic growth, in which the United States subprime mortgage crisis is a typical example. In respect of the influence of economic growth on financial depth, it is stated that healthy economic growth facilitates the expansion of the financial system, or the growth of alternatively (Guerra, 2017).

In general, earlier scholars affirm that the nexus between economic growth and financial depth is bidirectional, which is mainly positive. Therefore, the following hypotheses are proposed:

H_{1a}: Economic growth has a positive impact on financial depth.

H₂: Financial depth has a positive impact on economic growth.

2.2. Inflation and financial depth

The increase in inflation may exert a negative influence on financial depth chính (Rousseau and Yilmazkuday, 2009). It is because this increase may noticeably affect the ability for debt payment and then lead to low performance of credit allocation (Boyd et al., 2001). On the other hand, this increase can reduce savings, so credits become scarcer (Moore, 1986; Azariadis and Smith, 1996). The negative impact of inflation on financial depth is also found in empirical studies of của Boyd et al. (2001), Bittencourt et al. (2014). In return, the improvement in the size of the financial system can raise the amount of money in the economy, which is a chief reason for a highly increased inflation in many marketplaces. Accordingly, Boyd et al. (2001) affirmed the two-way correlation between inflation and financial depth.

In summary, it is concluded in most studies that inflation negatively influences financial depth. Although only a few researchers have shown the mutual relation between inflation and financial depth, this relationship may exist, especially in developing countries. Consequently, the following hypothesis is suggested:

H_{1b}: Inflation has a negative impact on financial depth.

H₃: Financial depth has a positive impact on inflation.

3. Data and methodology

3.1. Data

Quarterly data are collected from the third quarter of 2004 to the third quarter of 2018. Data on economic growth and inflation are collected from the General Statistics Office of Vietnam (GSO), while those on financial depth are adopted from the International Monetary Fund (IMF).

3.2. Methodology

The Autoregressive Distributed Lag (ARDL) approach is employed to analyze the correlation between the macroeconomy and financial depth. ARDL approach suggested by Pesaran et al. (2001); is superior to other methods for its appropriateness for short data series (Pahlavani et al., 2005; Bui, 2019a; 2019b), and non-stationary at the same level data series (Tursoy and Faisal, 2016).

Following earlier scholars, the author believes that there may exist a two-way relation between the macroeconomy and financial depth (FD). While the former is mainly measured by economic growth (EG) and inflation (INF), the latter is measured by domestic credit to the private sector to GDP, which is preferentially adopted in much empirical research (Klein and Olivei, 2008). Summary of variables is shown in Table 1.

To examine the nexus between the macroeconomy and financial depth, the author suggests the following research models and show in Fig. 1, Fig. 2 and Fig. 3:

Model 1: The impact of economic growth (EG) and inflation (INF) on financial depth (FD).

$$FD = f(EG, INF) \quad (1)$$

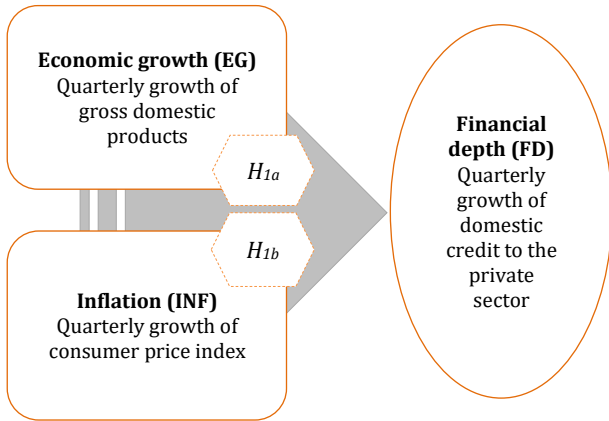


Fig. 1: The impact of economic growth (EG) and inflation (INF) on financial depth (FD)

+ Impact in the long run:

$$FD_t = \beta_{10} + \beta_{11}EG_t + \beta_{12}INF_t + v_{1t} \quad (2)$$

+ Impact in the short run:

$$\Delta FD_t = \lambda_{10} + \sum_{j=1}^k \lambda_{11} \Delta FD_{t-j} + \sum_{j=0}^k \lambda_{12} \Delta EG_{t-j} + \sum_{j=0}^k \lambda_{13} \Delta INF_{t-j} + \phi_1 ECM_{t-1} + \varepsilon_{1t} \quad (3)$$

Model 2: The impact of financial depth (FD) on economic growth (EG)

$$EG = f(FD) \quad (4)$$

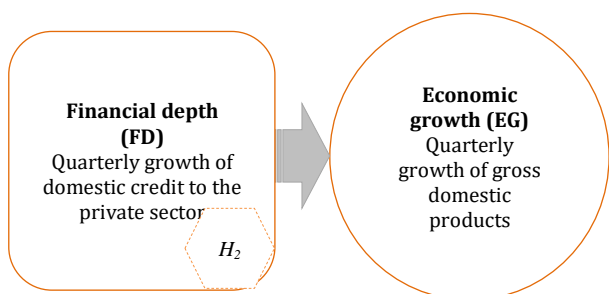


Fig. 2: The impact of financial depth (FD) on economic growth (EG)

+ Impact in the long run:

$$EG_t = \beta_{20} + \beta_{21}FD_t + v_{2t} \quad (5)$$

+ Impact in the short run:

$$\Delta EG_t = \lambda_{20} + \sum_{j=1}^k \lambda_{21} \Delta EG_{t-j} + \sum_{j=0}^k \lambda_{22} \Delta FD_{t-j} + \phi_2 ECM_{t-1} + \varepsilon_{2t} \quad (6)$$

Model 3: The impact of financial depth (FD) on inflation (INF):

$$INF = f(FD) \quad (7)$$

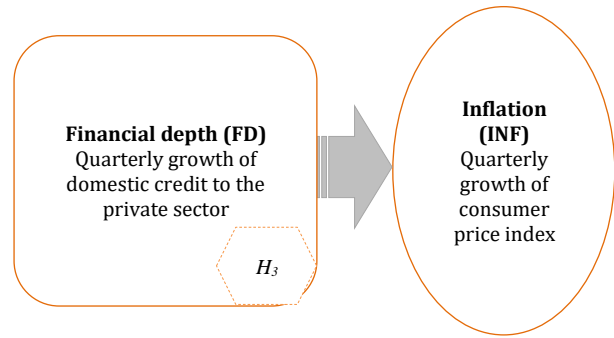


Fig. 3: The impact of financial depth (FD) on inflation (INF)

+ Impact in the long run:

$$INF_t = \beta_{30} + \beta_{31}FD_t + v_{3t} \quad (8)$$

+ Impact in the short run:

$$\Delta INF_t = \lambda_{30} + \sum_{j=1}^k \lambda_{31} \Delta INF_{t-j} + \sum_{j=0}^k \lambda_{32} \Delta FD_{t-j} + \phi_3 ECM_{t-1} + \varepsilon_{3t} \quad (9)$$

Table 1: Summary of variables

Variable name	Code	How to measure
Financial depth	FD	Domestic credit to the private sector to the gross domestic product. This index is calculated as a quarterly growth rate compared to the previous year.
Economic growth	EG	Quarterly growth of gross domestic product (as compared to the same period last year).
Inflation	INF	Quarterly growth of consumer price index (as compared to the same period last year).

4. Results and discussion

4.1. Descriptive statistics

Since Vietnam is a developing country with a growing stock market (officially operated on July 28, 2000) and a banking sector as a key in capital supply for the finance market (Batten and Vo, 2016), the size of banking sector relative to the economy is an essential indicator of financial debt. This is a difference between Vietnam and other developing countries. In Vietnam, the financial sector occupies a considerable position in the economy, specifically domestic credit to the private sector was reported at 130.72% of GDP in 2017 (Fig. 4). Mainly, the size of the financial sector relative to the economy has recently been noticeably raised, which is a big success in the development of Vietnam finance. Table 2 shows Descriptive statistics of all variables.

Table 2: Descriptive statistics of all variables

Variable	Mean	Min	Max
Financial depth (FD)	0.248	0.080	0.632
Economic growth (EG)	0.066	0.031	0.095
Inflation (INF)	0.084	0.000	0.279

In 2007, thanks to positive changes in the economy and the event of becoming an official member of the World Trade Organization (WTO), the

Vietnam banking system impressively developed with considerable growth in domestic credit to the private sector (Fig. 5). However, this growth fell sharply right after that due to the adverse impact of the global financial crisis and national economic predicaments. Face these problems, the State Bank of Vietnam implemented more cautious monetary policies to stabilize the banking system as well as the economy. As a result, growth in domestic credit to the private sector has been gradually recovered and secured in recent years.

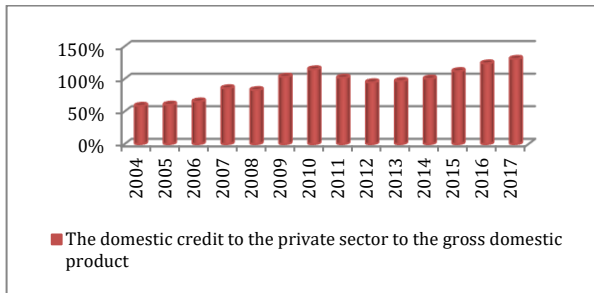


Fig. 4: Domestic credit to the private sector to GDP in Vietnam

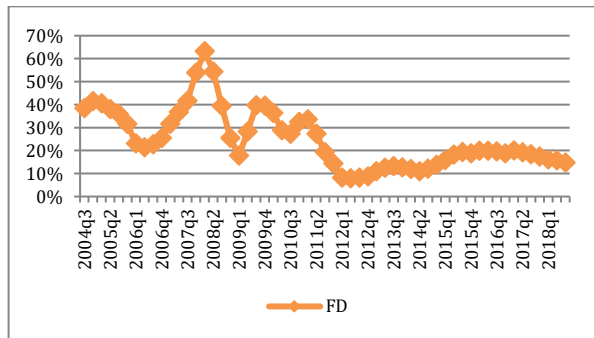


Fig. 5: Financial depth (FD) in Vietnam

Fig. 6 reveals that economic growth (EG) in Vietnam reached a peak in the last quarter of 2007 (9.45%) thanks to the event of being an official member of WTO. Nevertheless, economic growth significantly dropped together with high inflation (Fig. 7) in light of being negatively influenced by the global financial crisis. Positively, the economy has been gradually recovered and stabilized.

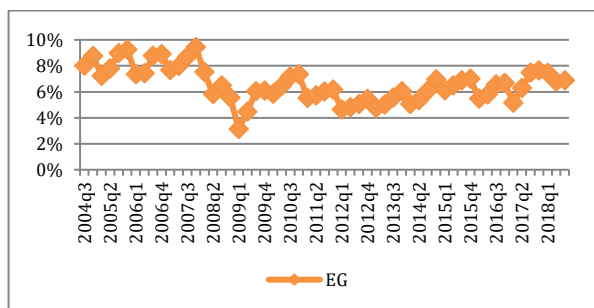


Fig. 6: Economic growth (EG) in Vietnam

4.2. Stationarity test

Results of the stationarity test suggested by Dickey and Fuller (1979) is shown in Table 3.

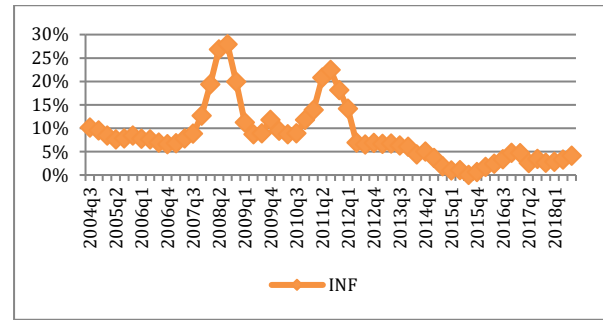


Fig. 7: Inflation (INF) in Vietnam

Table 3: Stationarity test

Variable	At Level	At Δ
	I(0)	I(1)
FD	0.455	0.003***
EG	0.045**	0.000***
INF	0.455	0.002***

Note: ***, ** represent 1%, 5% level of significance respectively

Table 3 indicates that economic growth (EG) is stationary at the root time-series I(0) with the 5% level of significance. Meanwhile, financial depth (FD) and inflation (INF) become stationary after the first difference I(1) at the significance of 1%. It can be concluded that the data series is not fixed at the same level. Alternatively, the ARDL approach is correlated with the analysis.

4.3. ARDL bound testing cointegration

By employing the Bayesian Information Criterion (BIC), the lag of variables in the models is determined. Then, ARDL bound test suggested by Pesaran et al. (2001) is also used to test cointegration among data series.

Table 4 reports the existence of cointegration among variables in the three models are significant at the 5%, 10% and 1% level respectively. It can be deduced that the ARDL approach can be utilized for the analysis of the models in the long run and short run.

Table 4: ARDL bound testing cointegration

Model 1: The impact of economic growth (EG) and inflation (INF) on financial depth (FD)		
	$F_1 = 6.299$	
p-value	I(0)	0.005***
	I(1)	0.017**
Model 2: The impact of financial depth (FD) on economic growth (EG)		
	$F_2 = 5.161$	
p-value	I(0)	0.048**
	I(1)	0.085*
Model 3: The impact of financial depth (FD) on inflation (INF)		
	$F_3 = 17.259$	
p-value	I(0)	0.000***
	I(1)	0.000***

Note: ***, **, * represent 1%, 5%, 10% level of significance respectively

4.4. Regression results

It can be seen from Table 5 that Model 1 has statistical significance at the 1% level. Its R-squared is 61.54%, so economic growth (EG) and inflation (INF) can explain 61.54% of the variance in financial depth (FD). Also, autocorrelation, heteroskedasticity,

and Ramsey reset tests show valid results. Therefore, Model 1 is appropriate and utilizable. Its results show that economic growth (EG) is positively correlated to financial depth (FD) at the 5% level of significance in the long run while financial depth (FD) is negatively (-0.806) influenced by inflation (INF) at the lag of one period with the 1% level of significance.

Table 5: Regression results (model 1)

Model 1 (dependent variable: FD)		
Variable	Coef.	Prob.
Long-run results		
EG	7.922	0.018**
INF	0.699	0.340
Short-run results		
Δ FD	0.654	0.000***
Δ EG	1.188	0.016**
Δ INF	0.209	0.451
Δ INF(-1)	-0.806	0.001***
ECM(-1)	-0.150	0.031**
Constant	-0.052	0.097
R-squared	61.54%	
Significance level	Prob > F = 0.000***	
Autocorrelation test	Prob > chi2 = 0.540	
Heteroskedasticity test	Prob > chi2 = 0.324	
Ramsey reset test	Prob > F = 0.920	

Note: ***, ** represent 1%, 5% level of significance respectively

Table 6 presents the statistical significance at 1% level of Model 2. Its R-squared is 21.53%, so financial depth (FD) can explain 21.53% of the variance in economic growth (EG). Similarly, results of autocorrelation, heteroskedasticity, and Ramsey reset tests are valid, so Model 2 shows its appropriateness for the analysis. The findings report that financial depth (FD) exerts a positive impact (0.054) on economic growth (EG) at the 5% significance level in the short run.

As can be seen from **Table 7**, Model 3 has statistical significance at 1% significance level and R-squared at 39.44% which means that 39.44% of the variance in inflation (INF) can be explained by financial depth (FD). Similar to the other models,

results of autocorrelation, heteroskedasticity and Ramsey reset tests show the validity of this model so that it can be used for the analysis. Its findings also reveal that financial depth (FD) has a positive influence on inflation (INF) with significance at 1% level in the long run and short run.

Table 6: Regression results (model 2)

Model 2 (dependent variable: EG)		
Variable	Coef.	Prob.
Long-run results		
FD	0.027	0.396
Short-run results		
Δ FD	0.054	0.025**
ECM(-1)	-0.313	0.004***
Constant	0.018	0.003***
R-squared	21.53%	
Significance level	Prob > F = 0.005***	
Autocorrelation test	Prob > chi2 = 0.434	
Heteroskedasticity test	Prob > chi2 = 0.496	
Ramsey reset test	Prob > F = 0.911	

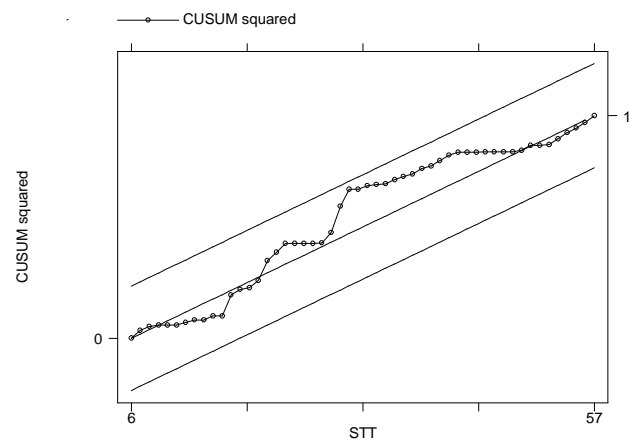
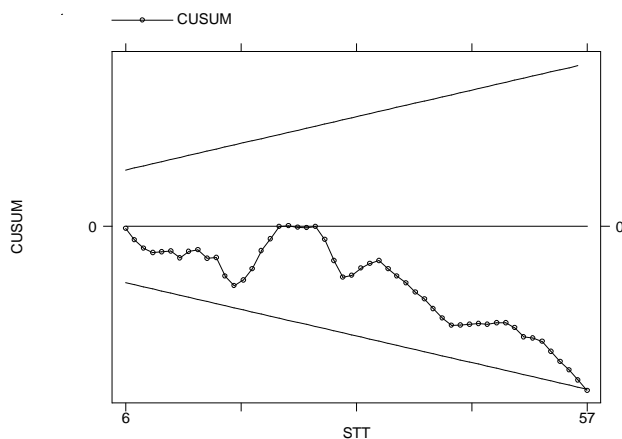
Note: ***, ** represent 1%, 5% level of significance respectively

Table 7: Regression results (model 3)

Model 3 (dependent variable: INF)		
Variable	Coef.	Prob.
Long-run results		
FD	0.775	0.001***
Short-run results		
Δ FD	0.140	0.000***
ECM(-1)	-0.180	0.001***
Constant	-0.020	0.007***
R-squared	39.44%	
Significance level	Prob > F = 0.000***	
Autocorrelation test	Prob > chi2 = 0.344	
Heteroskedasticity test	Prob > chi2 = 0.321	
Ramsey reset test	Prob > F = 0.391	

Note: *** indicates significance at the 1% level

Fig. 8, Fig. 9 and Fig. 10 demonstrate the results of stability tests suggested by [Brown et al. \(1975\)](#). Accordingly, the cumulative sum of recursive residuals (CUSUM) and cumulative sum of squares of recursive residuals (CUSUM squared) are within the standard bound at the 5% level of significance.

**Fig. 8: Stability tests (model 1)**

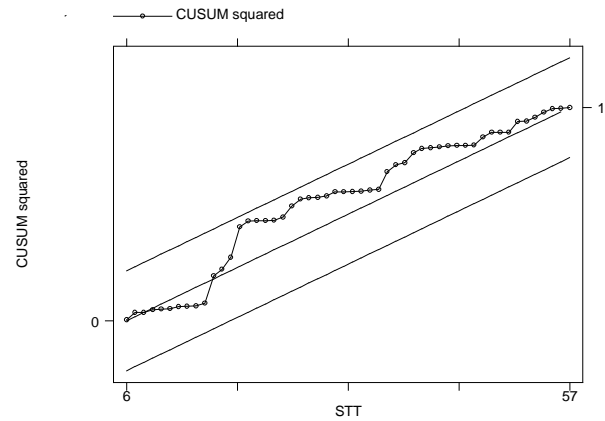
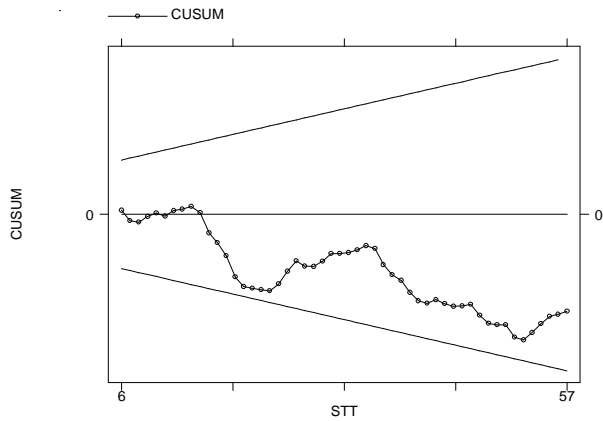


Fig. 9: Stability tests (model 2)

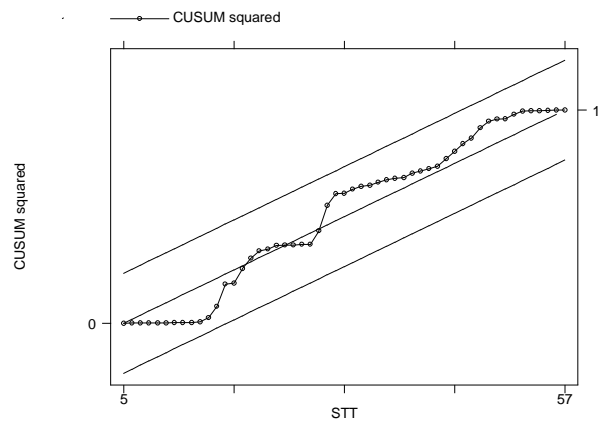
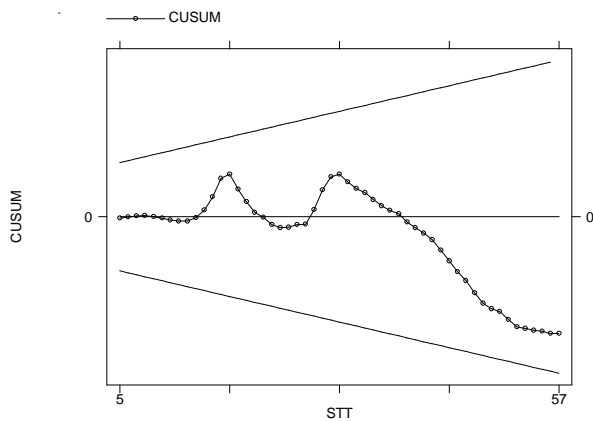


Fig. 10: Stability tests (model 3)

4.5. Discussion

4.5.1. The correlation between economic growth and financial depth

The results affirm that economic growth (EG) exerts a positive influence on financial depth (FD) in the short run and long run. On the reverse side, financial depth (FD) positively affects economic growth (EG) in the short run. Thus, it can be concluded that economic growth (EG) is positively related to financial depth (FD). This is in line with what has been reported by Patrick (1966) and Bencivenga and Smith (1998). This also reveals the essential role of financial depth in boosting economic growth. Further, the healthy growth of the economy facilitates an increase in financial services. Table 8 shows the results of testing hypotheses and Fig. 11 shows Economic growth (EG) and financial depth (FD) in Vietnam.

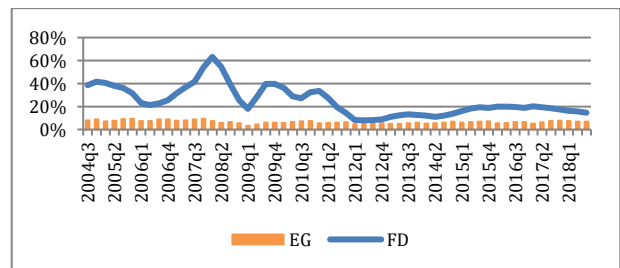


Fig. 11: Economic growth (EG) and financial depth (FD) in Vietnam

4.5.2. The correlation between inflation and financial depth

In the short run, financial depth (FD) is negatively influenced by inflation (INF) at the lag of one period. Reversely, financial depth (FD) exerts a positive impact on inflation (INF) in the short run and long run. Consequently, there exists a bidirectional relationship between inflation (INF) and financial depth (FD) (Boyd et al., 2001). It can be stated that inflation causes a decrease in the size of the financial sector, particularly the quantity of its credits. On the other hand, its credits are the original root of high inflation. Fig. 12 shows Inflation (INF) and financial depth (FD) in Vietnam.

Table 8: Results of testing hypotheses

No	Hypothesis	Results
H _{1a}	Economic growth has a positive impact on financial depth	EG \Rightarrow FD Accepted
H _{1b}	Inflation has a negative impact on financial depth	INF \Rightarrow FD Accepted
H ₂	Financial depth has a positive impact on economic growth	FD \Rightarrow EG Accepted
H ₃	Financial depth has a positive impact on inflation	FD \Rightarrow INF Accepted

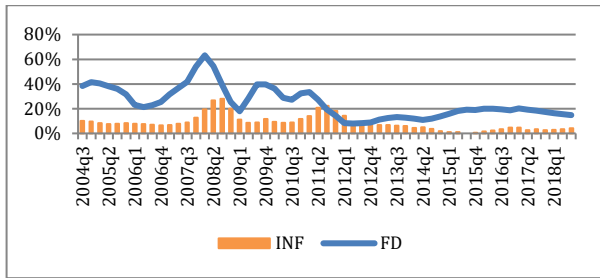


Fig. 12: Inflation (INF) and financial depth (FD) in Vietnam

5. Conclusion

The paper succeeds in gaining its objectives on the bidirectional correlation between the macroeconomy and financial depth in Vietnam. Despite its necessity, this topic has not been commonly examined in earlier studies. Therefore, the results are meaningful to Vietnam as well as in other developing countries. The author finds the positive relationship between economic growth (EG) and financial depth (FD). Also, as a macroeconomic factor, inflation (INF) negatively influences financial depth (FD) in the short run. On the other side, financial depth (FD) exerts a positive impact on inflation (INF) in the short run and long run. These findings are essential for consideration by Vietnamese authorities in managing macroeconomic policies for sustainable development of the financial industry.

The paper succeeds in giving first empirical evidence on the two-way correlation between the macroeconomy and financial depth in Vietnam. However, it has a big limitation with a short dataset due to the characteristic of Vietnam as a developing country. Another limitation is that financial depth has not been analyzed from the perspective of the stock market yet because the Vietnam stock market is nascent and small as compared to the economy. This may be an exciting proposal for future research.

Compliance with ethical standards

Conflict of interest

The authors declare that they have no conflict of interest.

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