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Relationship between Financial Sector Development and Economic Growth in Indonesia

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Abstract: *Financial sector development and economic growth are two fundamental things that being attention in most countries. Direction of the relationship for finance and growth is still being controversy. Based on that problem, this study aims to analyze the relationship between financial sector development and economic growth in Indonesia for period 2010-2018. Indicators used to describe financial sector development are money supply, total credit, and total asset. Granger causality results indicate a demand following pattern in Indonesia which means economic growth can spur financial sector development. Estimate the long-term by using Johansen cointegration suggests that economic growth has a positive and significant impact on financial sector development. While in the short term by using Vector Error Correction Models (VECM), there is a negative relationship between economic growth and financial sector development.*

Keywords: *economic growth, financial sector development, Johansen Cointegration, VECM*

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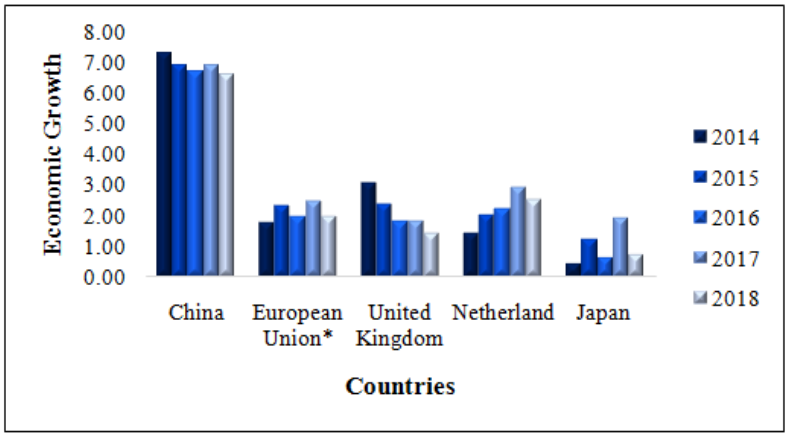
I. Introduction

High economic growth is the hope of all countries. This is because economic growth is one of the developments and success indication of a country's economic conditions. In addition, economic growth becomes important for a country because it is a key standard of living in the long run (Samuelson and Nordhaus, 1985).

In 2018, Indonesia's economic growth experienced fairly good conditions where there was an acceleration of economic growth of 5.17 percent compared to 2017 which only reached 5.07 percent. However, Indonesia's economic growth that has been quite satisfactory still needs to be maintained. This is because the global economy is currently in a worsening condition. Economic growth in various countries in the world has decreased, including countries with large economies shown in the picture below.



Sources: World Bank; National Bureau of Statistics of China;Eurostat; Office for National Statistics; Statisctics Japan
*) 2018 is the last three-quarter growth

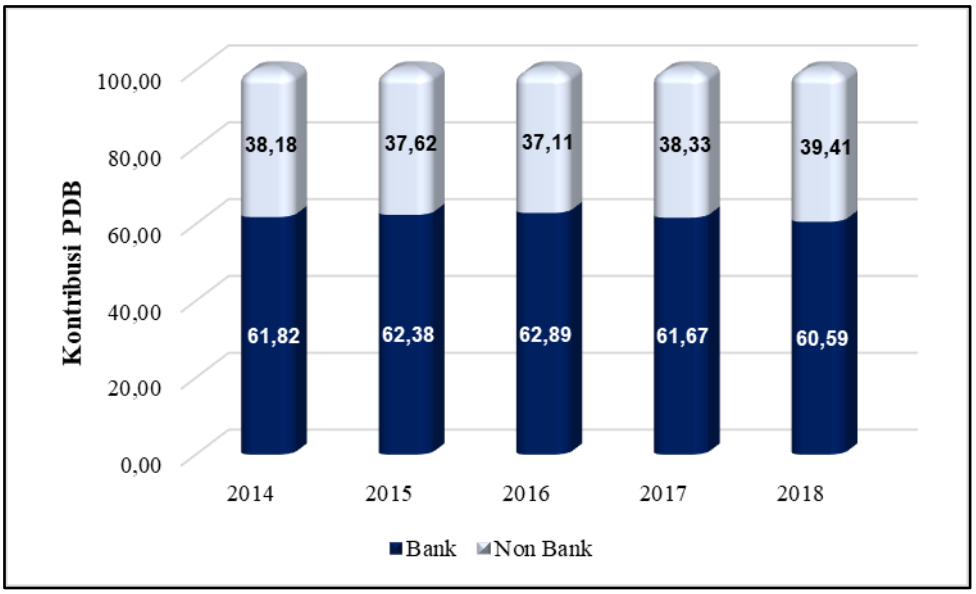
Figure1. Economic Growth of Several Countries in the World, 2014-2018 (Percent)

Economic conditions in other countries that have fluctuated and even tended to decline in 2018 have brought concern to the Indonesian economy. The decline in global economic growth is expected to affect Indonesia's economic growth so that Indonesia needs to be vigilant in facing this condition. This was supported

by the National Economic Committee (2013) which stated that in the midst of an increasingly integrated world economy, Indonesia could not escape completely from the negative influence of the global economic recession. The financial sector is one of the sectors that is considered to be able to maintain the stability of a country's economy. Rohaeni (2009) said that managing the financial sector is one way to restore economic stability when the economic sector has decreased. In Indonesia, the financial sector is dominated by banks. In Figure 2, it can be seen that the contribution of banks to GDP in the financial and insurance categories is greater than that of non-bank financial institutions, which is always above 60 percent every year. In addition, according to Abdurohman (2003) non-bank financial innovation has not significantly affected the development of financial markets in developing countries, including Indonesia. This indicates that the development of the financial sector in Indonesia can be reflected through banking developments.

The relationship between financial sector development and economic growth has been of much concern in the field of research. But there are still inconsistencies in the direction of the relationship between the two studies. The direction of this relationship shows whether the development of the financial sector is driving economic growth or economic growth that enhances the development of the financial sector. According to Patrick (1966) in (Calderón and Liu, 2002), there are two forms of relationships that describe the development of the financial sector and economic growth, namely supply-leading and demand-following.

The inconsistency in the direction of the relationship between financial sector development and economic growth allows for errors in policy making. In addition, this research can be used to develop research in this field. Given the large amount of research in this field, clear results are needed for conditions in Indonesia. This is because by obtaining the results that there is a relationship between the financial sector development and economic growth, the research on these two things in Indonesia can be continued further to other parts. If there is no relationship between the two, then the amount of research on these two things will decrease. So that this study aims to determine the relationship of financial sector development and economic growth in Indonesia in 2010-2018. In addition, it is also to find out the role of real economic activity seen from economic growth towards the development of the financial sector in Indonesia.



Source: BPS-Statistics Indonesia

Figure 2. Bank and Non-bank Contributions to the GDP of Financial and Insurance Services in Indonesia, 2014-2018 (Percent)

II. Literature

Financial Sector Development

According to Department for International Development (2004), the financial sector is called developing if it meets several conditions.

1. The efficiency and competitiveness of the financial sector is increasing.
2. The coverage of available financial services is increasing.
3. The diversity of institutions operating in the financial sector is increasing.
4. The amount of money delivered through the financial sector is increasing.
5. The level of capital allocation by financial institutions to private enterprises (compared to direct government loans from government banks) is increasing.

6. Regulation and stability in the financial sector are increasing.

Basically, the development of the financial sector is about overcoming the costs that occur in the financial system (World Bank, 2013). The process of reducing the cost of obtaining information, implementing contracts and making transactions results in the emergence of markets and financial intermediation. Financial sector developments occur when instruments, markets and financial intermediation facilitate the effects of information and transaction costs, so that work works well in carrying out the core functions of the financial sector towards the economy.

Financial Sector Development and Economic Growth

The relationship between the development of the financial sector and economic growth is still a debate. Graff (2001) divided the causal relationship between the development of the financial sector and economic growth into four, namely:

1. There is no connection between financial sector development and economic growth.
2. Financial sector development follows the economic development or economic growth enhances institutional changes and financial sector development.
3. Financial sector development determines economic growth because the financial sector is a prerequisite and effectively encourages economic growth.
4. Financial sector development is a hindrance to economic growth because the institutional inadequacies and financial sector crises that often occur can disrupt economic growth.

Joseph Schumpeter (1991) in Burzynska (2009) argued that the development of the financial sector led to economic growth. The main points are services carried out by financial intermediaries, such as: mobilizing savings, risk management, facilitating transactions or evaluating projects, and technology so that economic growth is stimulated. Chen (2006) in Zhang (2012) identified two ways that the financial sector contributes to the economy, namely mobilizing savings and replacing credits for funding.

According to Inggrid (2006), the financial sector is the locomotive for the growth of the real sector via capital accumulation and technological innovation. More precisely, the financial sector is able to mobilize savings. They provide borrowers with various high quality and low risk financial instruments. This will increase investment and ultimately accelerate economic growth.

However, Robinson (1952) in Djoumessi (2009) has another view that states about entrepreneur is driving the development of the financial sector. This research was reinforced by the research of Patrick (1996) in Kargbo and Adamu (2011). Patrick argued that creations in modern financial institutions, financial assets, and obligations are responses from demand for services by investors and savers in the real economy. This means that increased demand for financial services will encourage the expansion of the financial sector (the financial sector responds positively to economic growth). This opinion was also supported by Gurley and Shaw (1967), and Goldsmith (1969) and Jung (1986) (Kargbo and Adamu, 2011).

In addition, Lewis (1995) in Akinlo and Egbetunde (2010) found a two-way relationship between financial sector development and economic growth. This means that the development of the financial sector is a consequence of economic growth that has a reciprocal relationship in stimulating real growth. According to Akinlo and Egbetunde (2010), several studies that also agree on this reciprocal relationship are Patrick (1996), Greenwood and Jovanovic (1990), Wood (1993), Greenwood and Bruce (1997), and Luintel and Khan (1999).

Even according to Levine (1996) in Burzynska (2009), some studies ignore the role of finance when analyzing economic growth. This can be seen in the works of 'economic development pioneers', among them are works by three Nobel prize winners (Bauer, Colin Clark, Hirschman, Lewis, Myrdal, Prebisch, Rosenstein-Rodan, Rostow, Singer, and Tinbergen). None of them considered finance as a factor in economic growth. In addition, the study of Dornbusch and Reynoso (1989) in Burzynska (2009) concluded that financial factors are important only when financial instability becomes the main impetus in the economy.

Meanwhile, Shan, Morris and Sun (2001), Demetriades and Hussein (1996), and Arestis and Demetriades (1997) in Burzynska (2009) all found positive relationships, two-way relationships and negative relations depending on the country used as the study. So, they concluded that there was a need for caution in generalizing results because each country had a different case.

Previous Research

Inggrid's research (2006) entitled "Financial Sector and Economic Growth in Indonesia: Causality Approach in Multivariate Vector Error Correction Model (VECM)" aims to investigate the role of the financial sector in encouraging economic growth in developing countries, especially Indonesia in 1992 to 2004 using the VECM method. The financial sector development variables used were bank credit to the private sector and spread variables. The control variables in the study consisted of the real exchange rates obtained from the nominal exchange rate and the Consumer Price Index (CPI) and the interest rates of Bank Indonesia Certificates (SBI). The results obtained from this Inggrid study were support the hypothesis of the significance of the role of

the financial sector as an engine of economic growth. The results of Granger causality showed bi-directional causality between economic growth and credit volume. However, it was proven that there was one-way causality between spread and output.

Study of Zhang (2012) entitled Financial Development and Economic Growth: Evidence from China aims to investigate the relationship between financial intermediation and economic growth in China in the period of 2001–2006. The study usedthe generalized method of moments (GMM) for dynamic panel data. There were five indicators of financial sector development used in the study, namely: total credit, total deposits, total household savings, fixed asset investment by domestic credits, and company deposits in the financial system. The results of the study proved that the development of financial intermediation in China has a positive effect on economic growth.

Study of Odhiambo (2008) entitled Financial Development in Kenya: A Dynamic Test of Finance-led Growth Hypothesis aims to examine the direction of the relationship between financial sector development and economic growth using the Granger dynamic causality model in Kenya. The period used was 1968-2002. To measure the development of the financial sector, the study used 3 indicators, namely the monetization ratio (M2 / GDP), the ratio of currencies to GDP, and the ratio of credit to GDP. The results of the study proved that the monetization ratio has a two-way relationship with GDP, while the indicator of the currency ratio and the credit ratio has a demand-following pattern. According to Odhiambo (2008), the results of research related to the development of the financial sector and economic growth were sensitive to the selection of measurement of financial sector development.

Research by Mhadhbi et al (2017) entitled Banking sector development and economic growth developing countries: A Granger causality analysis bootstrap panel aims to determine the relationship between the development of the banking sector and economic growth in forty developing countries in the period of 1970-2012. Two different categories were used to measure banking sector development, namely banking sector output and banking sector input. Furthermore, to estimate the relationship between the two variables, the Granger Non-Causality Panel test was used. The results obtained indicated that there were different relationships between forty developing countries. The relationship between the development of the banking sector and its economic growth was divided into supply-leading, demand-following, reciprocal relations, and no relationship between the two.

III. Data and Methodology

Data

This research was conducted to analyze the relationship between the development of the financial sector and economic growth in Indonesia from the first quarter of 2010 to the fourth quarterof2018. The use of this period is due to the availability of data and the number of observation periods used is sufficient for estimation using time series data. The variables used are economic growth, financial sector development, and control variables.

This study uses three indicators of financial sector development. The first indicator is money supply. The data used is M2 and obtained from Bank Indonesia. Money supply is the sum of M1 and quasi money. According to World Bank (1989) and King and Levine (1993) in Abu-Bader and Abu-Qarn (2008), money supply has been used as a standard measurement of the development of the financial sector in many studies. Higher money supply implies a larger financial sector resulting in the development of financial intermediation.

The second indicator of financial sector development is total credit. The data used is total credit obtained from Bank Indonesia. According to Gregorio and Guidotti (1995) in Abu-Bader and Abu-Qarn (2008), bank credit is related to the quantity and efficiency of investment and therefore also relates to economic growth. According to Abu-Bader and Abu-Qarn (2008), bank credit has been widely used in various studies such as King and Levine (1993), Gregorio and Guidotti (1995), Levine and Zervos (1993), Demetriades and Hussein (1996).

The third indicator is total asset. The data used is total asset obtained from Bank Indonesia. This indicator is used in Waqabaca (2004), Akimov (2009), and Ljungwall (2007) studies. This indicator of total asset is an approach to see the development of the financial sector in terms of the development of financial intermediation.

Economic growth is described by using the natural logarithm of real GDP in rupiah. These real GDP data (or at constant prices) are obtained from the Central Statistics Agency (BPS). In addition to the variables of financial sector development and economic growth, this study also uses control variables. The use of the control variable is to control the risk of bias between the two variable interactions (Jarreau and Sandra, 2010). In addition, referring to previous studies, such as Inggrid (2006), Akimov (2009), and Adelakun (2010), the use of control variables provides good significance in the model compiled.

The control variables used are: first, inflation is measured using changes in the Consumer Price Index (CPI). This inflation is an approach that shows macroeconomic stability. This inflation data is obtained from

BPS. Second, trade openness as measured by the ratio of the number of exports and imports to GDP. This data is obtained from BPS.

Methodology

Factor Analysis

Factor analysis is one of the statistical techniques used to provide relatively simple descriptions through the reduction of the number of variables called factors. Factor analysis is a data analysis to find out the dominant factors in explaining a problem. The process of factor analysis tries to find a relationship between a number of variables that are mutually independent of one another so that one or several sets of variables can be made which are fewer than the initial number of variables.

Factor analysis can be seen as an extension of the main component analysis which basically aims to obtain a small number of factors that have properties:

1. Able to explain as much as possible the diversity of data,
2. These factors are mutually independent, and
3. Each factor can be interpreted.

The stages of factor analysis are in line with the process which is summarized into four stages, namely:

1. Choosing the appropriate variables to be included in the factor analysis. Because factor analysis attempts to classify a number of variables, there should be a fairly strong correlation between variables, so that grouping will occur.
2. After the number of variables was selected, the extraction of these variables is carried out to become one or several factors.
3. In many cases, the factors formed do not reflect the differences between the factors that exist. But if the contents of the factor are still in doubt, a rotation process can be carried out to clarify whether the factors formed have been significantly different from other factors.
4. After the factors have really been formed, then the process is continued by naming the existing factors.

Time Series Analysis

Stationarity Test

According to Cryer (1986), there are two types of stationarity, namely weak stationary and strong stationary:

1. Strong stationary

A data is stationary if for all times $t_1, t_2, \dots, t_n$has the same distribution function for all time lags.

2. Weak stationary

A data is said to be weak stationary if the average and the covariance do not depend on time *t*.

In Gujarati (2004), stationary properties are stated as follows:

$$E(Y_t) = \mu \quad (1)$$

$$var(Y_t) = E(Y_t - \mu)^2 = \sigma^2 \quad (2)$$

$$cov(Y_t, Y_{t+k}) = E[(Y_t - \mu)(Y_{t+k} - \mu)] = \gamma_k \quad (3)$$

Stationary tests can be done with various methods, including:

1. Graph method
2. Correlogram test
3. Unit roots test

The basic idea of data stationarity testing through the root test of this unit can be explained through the AR (1) model below:

$$\Delta Y_t = \delta\ Y_{t-1} + \varepsilon_t \quad (4)$$

where: $\varepsilon_t$israndom or stochastic error.

If$\delta = 0$, thenthe random variable (stochastic) Y have unit roots.If the time series data has a root unit, it is said that the data is not stationary. Stationarity test is carried out by hypothesis:

Ho:$\delta = 0$ ($Y_t$not stationary)

H_1:$\delta < 0$ ($Y_t$stationary)

There are three-unit root tests, namely Dickey Fuller, Augmented Dickey Fuller, and Phillips-Perron. In this study, the stationarity test used was unit root test using the Phillips-Perron method. Distribution statistics *t* do not follow the normal distribution statistics but follow the Phillips-Perron statistical distribution while the critical value is used by the critical value stated by Mackinnon. The advantage of the Phillips-Perron test compared to the Dicky Fuller Augmented Test is to consider the existence of heteroscedasticity at error. Another advantage is that there is no need for specification of lag length for regression tests.

Optimum Lag Test

Determination of the length of the lag needs to be done because in addition to increasing the number of parameters it will also cause a decrease in the degrees of freedom. So that the determination of lag length is an important criterion in forming the VAR model. The way to determine the optimum lag length of VAR can be done by several methods, for example based on the Akaike Information Criterion (AIC) criteria and Hannan-Quinn Informatin Criterion (HQ).

The formula for optimum AIC lag selection is as follows (Enders, 2004):

$$AIC = T\ log|\boldsymbol{\Sigma}| + 2k' \quad (5)$$

where:

T = number of observations

k' = number of parameters, where the value is equal to*p (pk + 1)*. where: k= lag length;

p = number of variables; added by intercept

$|\boldsymbol{\Sigma}|$ = determinant of the error covariance variance matrix

Johansen Cointegration Test

Cointegration is a long-term relationship between stationary variables at the same degree of integration. The concept of cointegration states that if one or more variables are not stationary but are cointegrated, the linear combination between variables in the system will be stationary, so that the system of long-term equations is relatively stable (Enders, 2004).

To explain the Johansen test, we can note the autoregressive model with the following *p* orders:

$$Y_t = A_1 Y_{t-1} + \ ... + \ A_p Y_{t-p} + \varepsilon_t \quad (6)$$

where: $Y_t$isvectors of non-stationary variables and$\varepsilon_t$is error vector. The above equation can be rewritten:

$$\Delta Y_t = \sum_{i=1}^{p-1} \Gamma_i \Delta Y_{t-1} + \Pi Y_{t-1} + \varepsilon_t \quad (7)$$

where: $\Pi = -(\mathrm{I} - \sum_{\mathrm{i}=1}^{\mathrm{p}} \mathrm{A_i})$ dan $\Gamma_\mathrm{i} = -\sum_{\mathrm{i}=1+1}^{\mathrm{p}} \mathrm{A_i}$

The rank ofΠisthe same as the number of independent cointegration vectors. Clearly, if rank(Π) = 0, then the matrix consists of zero elements and no cointegration. Meanwhile, if rank(Π) = 1, then there is a single cointegration vector and$\Pi Y_{t-1}$is error correction term.

Granger Causality Test

Granger Causality only tests relationships between variables and does not estimate models. Granger causality model for 2 variables:

$$Y_t = a_0 + a_1 Y_{t-1} + \cdots + a_p Y_{t-p} + b_1 X_{t-1} + \cdots + b_p X_{t-p} \quad (8)$$

$$X_t = a_0 + a_1 X_{t-1} + \cdots + a_p X_{t-p} + b_1 Y_{t-1} + \cdots + b_p Y_{t-p} \quad (9)$$

with a hypothesis for each equation:

$$H_0 : b_1 = b_2 = ... = b_p = 0$$

where $H_0$is X not the cause of GrangerY for the first regression and Y not the cause of GrangerX for the second regression. If it accepts the hypothesis that X is not the cause of Granger Y butit rejectsthe hypothesis that Y is not the cause of Granger X,thenGranger Causality can conclude that Y causes X.

Vector Autoregressive (VAR) / Vector Error Correction Model (VECM)

According to Sims (1980) in Enders (2004), the VAR method has been widely used for macroeconomic research, which allows researchers to analyze mutual relations between variables in the system of equations. Based on the standards in the VAR model, the general form for multivariate cases is as follows:

$$Y_t = \mu + A_1 Y_{t-1} + \cdots + A_p Y_{t-p} + \varepsilon_t \quad (10)$$

Y_t : Endogenous variable vector in a (k x 1) dimension

A : Dimensional parameter matrix (k x k)

p : Lag of the VAR model

μ : Intercept

ε_t : Error matrix

The form of the VAR above is an ordinary, restriction-free VAR form used if the data is stationary. Variations in the form of VAR usually occur due to differences in the degree of integration of variable data, which is known as VAR and VAR in difference. VAR is used when the research data has a stationary form with 0 degree of integration.

There are two choices that can be made if the data is not stationary at the level, namely the VAR model with differentiation (VAR in difference) for non-cointegrated data and VECM for cointegrated data. If the first choice is obtained, long-term information will be lost because it only explains the short-term relationship so that

the relationship between the variables at the level becomes lost because it is based on non-cointegrated parameters.

VECM includes short-term and long-term information because the equations contain short-term and long-term parameters. So that the relationship between the financial sector development variables and economic growth variables can be seen in this method. The general VECM model is as follows (Lutkepohl and Kratzig, 2004):

$\Delta Y_t = \Pi Y_{t-1} + \Gamma_1 \Delta Y_{t-1} + \cdots + \Gamma_{p-1} \Delta Y_{t-P+1} + \varepsilon_t$ (11)

dengan:ε_t = error, $\Pi = -(I_K - A_1 - \cdots - A_p)$ dan $\Gamma_i = -(A_{i+1} + \cdots + A_p)$ untuk *i* = 1, ... , p-1.

Impulse Response Function (IRF)

According to Enders (2004), the best way to characterize dynamic structures in a model is to analyze the response of the model to shock. With this method can see the shock effect of certain endogenous variables which will directly affect the variable itself and so on to other endogenous variables.

Variance Decomposition

Variance decomposition describes the contribution in endogenous variables into shocks of endogenous variable components in VAR. Variance decomposition provides information about the relative importance of each shock to the variable in VAR. In other words, variance decomposition shows the percentage of error variance forecasting for each variable that may be connected with its own shock and to fluctuations in other variables in the system. Both variance decomposition and IRF are obtained from the Moving Average (MA) model obtained from the original VAR model.

Model Spesification

Based on the general equation model and by using variables in the study, namely economic growth (LNGDP), financial sector development (FD) and control variables (economic openness (O) and inflation (LNCPI)), the equation matrix of the research is as follows.

VAR equation

$LNPDB_t = \alpha_0 + \sum_{i=1}^{p} \alpha_{1i} LNPDB_{t-i} + \sum_{i=1}^{p} \alpha_{2i} PK_{t-i} + \alpha_3 \theta_t + \varepsilon_{1t}$ (12)

$PK_t = \beta_0 + \sum_{i=1}^{p} \beta_{1i} PK_{t-i} + \sum_{i=1}^{p} \beta_{2i} LNPDB_{t-i} + \beta_3 \gamma_t + \varepsilon_{2t}$ (13)

VECM equation

$\Delta LNPDB_t = \alpha_0 + \sum_{i=1}^{p-1} \alpha_{1i} \Delta LNPDB_{t-i} + \sum_{i=1}^{p-1} \alpha_{2i} \Delta PK_{t-i} + \alpha_3 \theta_t + \alpha_4 ECT_{t-1} + \varepsilon_{1t}$ (14)

$$\Delta PK_t = \beta_0 + \sum_{i=1}^{p-1} \beta_{1i} \Delta PK_{t-i} + \sum_{i=1}^{p-1} \beta_{2i} \Delta LNPDB_{t-i} + \beta_3 \gamma_t + \beta_4 ECT_{t-1} + \varepsilon_{2t} \quad (15)$$

whereΔshows*difference*; θandγarecontrol variables, namelyopenness and inflation; *p*is optimum lag; $\varepsilon_t$is error.

IV. Results and Analysis

Financial Sector Development Indicator

Before forming the factors of the indicators used, Kaiser-Meyer-Olkin (KMO) and Bartlett's Test of Sphericity need to be seen first. This is useful to find out whether factor analysis is suitable for use in the formation of financial sector development factors. The results of the calculation of data processing with the KMO and Bartlett's Test of Sphericity method can be seen in the following table.

Table 1. Kaiser-Meyer-Olkin (KMO) and Bartlett`s Test of Sphericity

Test	Value
(1)	(2)
Kaiser-Meyer-Olkin	0,764
Bartlett's Test of Sphericity	0,000 (Sign.)

Based on Table 1, it can be seen that the measured KMO from the data results is 0.764, above 0.5. It means that the existing factors can be further analyzed. This refers to Kaiser and Rice (1974) in Ekaria (2004) who determined the feasibility value criteria for KMO which stated that KMO values above 0.7 were sufficient to continue the use of factor analysis

The results of Bartlett's Test of Sphericity are indicated by a value called the significance number that is 0,000 which means below α. In this case, it is used α = 0.05. A significance small number which is below 0.05 indicates a significant relationship or correlation between the indicators used in the study. Thus, the indicators used in the study have met the requirements for further analysis.

The next step in forming a factor is to determine the number of factors formed.

Table 2. Factor Extraction Results

Factor	Initial Eigen Value			Extraction Results		
	Value	% Variance	% Cummulative	Value	% Variance	% Cummulative
(1)	(2)	(3)	(4)	(5)	(6)	(7)
1	2.995	99.822	99.822	2.995	99.822	99.822
2	0.005	0.154	99.976			
3	0.001	0.024	100.000			

In determining the number of factors formed a reference from Morrison (1976) was used, which is a factor that has a cumulative proportion of variance above 75 percent. Based on Table 2, the three indicators analyzed form a factor called financial sector development. The extraction factor above can represent 99.82 percent of the overall variation in the research variable.

After it is known that the factors formed are one, then it can be seen the communal value of each indicator used. Communality is the number of variations of each indicator that can be explained by the factors formed. The number of communities is as follows.

Table 3. Communality Results from Factor Analysis

Indicators	Communality
(1)	(2)
M2	0,999
Credit	0,997
Asset	0,999

In Table 3, it can be seen that the factors formed are able to explain variations of M2 by 99.9 percent, variations of credit by 99.7 percent, and variations on assets of 99.9.

High variations with a contribution of around 90 percent of M2, credit, and assets that can be explained by the factors formed indicate that the three indicators are important in forming factors. Meanwhile, to find out the correlation of each indicator to the factors formed can be known through the loading factor. The loading factor value can be seen in the table below.

Table 4. Factor Loading of Factor Analysis Results

Indicators	Communality
(1)	(2)
M2	0,999
Credit	0,998
Asset	0,999

The loading value shows a positive value which means there is a positive correlation of all indicators used in the financial sector development. Money supply and total asset show the relationship most closely with the financial sector development, where this shows that transactions and liquidity in the economy are very influential on developments in the sector. The more emerging financial product innovations due to technological advances, the more it will encourage an increase in economic liquidity. The greater economic liquidity, which mostly comes from funds collected by banks, shows the greater funding to businesses and the public for investment and consumption.

Total credit also shows a large positive correlation with the financial sector development. Lending and raising public funds are the core role of the banking sector in terms of financial intermediation, namely channeling funds from parties with excess funds to those who lack funds. This positive relationship means that the more loans channeled by banks, the financial sector will grow

The next step in factor analysis is to get the factor score formed. This factor score is needed to obtain data from the results of the financial sector development factors formed to carry out further analysis in this study using time series analysis.

StationarityTest

The most important assumption before conducting a time series analysis is stationarity. This needs to be done to avoid spurious regression or straight regression. To conduct stationarity tests in this study, ituses the unit root test of the Phillips-Perron method. The results of testing stationary economic growth, financial sector development, economic openness, and inflation are as follows.

Table 5. Stationarity Test UsingPhillips-Perron

Variables	Level			First Difference		
	t-test	t-table	Stationarity	t-test	t-table	Stationarity
(1)	(2)	(3)	(4)	(5)	(6)	(7)
LNGDP	-1,379	±2,948	Not stationary	-8,107	±2,951	Stationary
FD	0,520	±2,948	Not stationary	-11,724	±2,951	Stationary
Openness	-2,249	±2,948	Not stationary	-10,653	±2,951	Stationary
LNCPI	-2,459	±2,948	Not stationary	-6,149	±2,951	Stationary

The Phillips-Perron test shows that economic growth, financial sector developments, economic openness, and inflationare not stationary at the level of a 5 percent significance level. Required reduction in the value of the present period with the previous period called the difference data of each variable so that the stationary assumptions are met. In Table 5, it is known that all research variables are stationary at first difference with a significance level of 5 percent. So, it can be concluded that all variables are integrated in the same degree, namely I(1).

Before forming a system of equations in the VAR/VECM method, it must first go through sequential stages, namely the stationary data test, then determine the optimum lag length. After going through statistical tests and data declared to be stationary, then the next step determines the optimum lag length in the VAR/VECM model.

Table6. Optimum Lag Test Results

Lag	AIC
(1)	(2)
0	-13.12486
1	-19.55511
2	-21.33559
3	-21.76289*

Based on Table 6, the lag used in cointegration testing and the formation of the VAR/VECM model is lag 3. After knowing the stationary conditions of all the optimum variables and lags, the next step is to find out the cointegration test results shown in the table below. The table displays the value of the trace statistic and p-value resulting from the cointegration test.

Table7. Cointegration Test Results

Number of Cointegration	Cointegration Test	
	Trace Statistic	P-value
(1)	(2)	(3)
None	80.5423	0.0000*
At most 1	33.1203	0.0200*
At most 2	14.7396	0.0648
At most 3	0.66450	0.4150

*) P-value less than 0.05

It can be seen from Table 7 that all equations have a p-value that is less than 0.05 so that the decision is taken to reject the initial hypothesis. This means that there is cointegration at the 5 percent significance level. That is, the variable of financial sector development has a long-term relationship with economic growth and with its control variables, namely inflation and economic openness. Because there is cointegration, the model used in this study is the VECM model.

Direction of Relationship Between Financial Sector Development and Economic Growth

The Granger causality test is needed to determine the direction of the relationship that has been debated between financial sector development and economic growth. From the Granger causality test, it will be known whether the relationship is a two-way, one-way relationship, or does not have a significant relationship.

Table8. Granger Causality Test Results

Hypothesis	F-Statistic	P-value	Results
(1)	(2)	(3)	(4)
FD→ LNGDP	2.90670	0.0536	Failed to Reject H_0
LNGDP →FD	8.48127	0.0004	Reject H_0

The results of the Granger causality test show that the hypothesis of the financial sector development does not encourage economic growth to fail at the 5 percent significance level because it has a p-value of more than 0.05. While the hypothesis of economic growth does not encourage the financial sector development to be

rejected at the 5 percent significance level because it has a p-value of less than 0.05. So, it can be concluded that there is a one-way relationship from economic growth to the financial sector development.

Based on the pattern of relationship between financial sector development and economic growth mentioned by Patrick (1966), namely supply leading and demand following, then in this study it is known that the two relations in Indonesia are included in the demand following pattern. The demand following implies that the financial sector is basically passive in the growth process. Whereas as a consequence of real economic growth, financial markets will grow, broad, and perfect. This increases the opportunity to obtain financial liquidity and then this financial sector can stimulate real growth. The demand following pattern is in line with the results of research conducted by Best & Francis (2017) with a case study in Barbados. According to Best & Francis (2017), the demand following pattern illustrates that the development of the real sector can encourage broader and deeper financial markets which will later lead to the development of the financial sector. The real growth that drives the development of the financial sector is also seen in the Zang & Kim (2007) study (Yıldırım, 2013) using panel data from 74 countries. In addition, Ndlovu's (2013) study also found this pattern of demand-following relationships in Zimbabwe.

The Effect of Economic Growth on Financial Sector Development

Based on the results of stationarity and cointegration tests, it can be decided that the model used in this study is the VECM model.

Table9. Long Term Equation Results

FD(-1)	LNGDP(-1)	Openness(-1)	LNCPI(-1)	C
(1)	(2)	(3)	(4)	(6)
1	-10,1243*	-7.5990*	2,3117	139,4321
	(3,1179)	(2.4544)	(3,5588)	
	[-3,2472]	[-3.0961]	[0,6496]	

where () is standard error; [] is t-statistics; *5%significance

The results of the long-term relationship in Table 9 have the opposite sign of the sign in the equation, where the negative coefficient is interpreted as a positive effect. The long-term equation formed is as follows.

$$\mathbf{FD_{t-1} = -139,43 + 10,12\ (LNGDP)_{t-1} + 7,60(Openness)_{t-1} - 2,31(LNCPI)_{t-1}}$$

The long-term equation above shows that economic growth has a significant effect on the financial sector development at the level of 5 percent. The control variable of economic openness also has a significant effect on the financial sector development at the level of 5 percent. But inflation does not have a significant influence on the financial sector development.

Real economic growth influences indicators of financial sector development positively and significantly that consist of M2, total credit, and total asset in the long run of 10.12. That is, every1 percent increase in economic growth will cause the development of the financial sector to increase by 10.12 points. The results that show the significant role of economic growth in the banking financial sector are in accordance with the research conducted by Iyare et al. (2005) in Trinidad and Tobago. Economic growth that can affect the development of the financial sector shows that a stable real sector can also bring stable conditions to the financial markets in Indonesia.

In addition, based on the results of the long-term equation in Table 9, it is known that the level of economic openness as one of the control variables positively and significantly affects the development of the financial sector in the long run at 7.60. That is, every 1 percent increase in the level of economic openness will cause an increase of 7.60 points. These results indicate compliance with the theory that a high level of economic openness can drive the development of the financial sector. This is consistent with the statement of Newbery & Stiglitz (1984) and Svaleryd & Vlachos (2002) that trade openness contributes to the development of the financial sector by increasing insurance needs and risk diversification through financial institutions due to increased uncertainty, income volatility, foreign competition and higher exposure against external shocks (Yilmaz, 2017). In addition, several studies state that financial and trade openness have a positive effect on the development of the financial sector, such as the research of Law and Demetriades (2006), Law (2007), Baltagi et al. (2009), Law (2009), Acikgoz et al. (2012), Zhang et al. (2015), Onanuga and Onanuga (2016) (Yilmaz, 2017).

In addition to long-term relationships, VECM can show short-term relationships in the relationship of financial sector development and economic growth. The relationship is as follows.

Table10. Short Term Relationship of VECM on Lag 3

Lag	D(FD)	D(LNGDP)	D(Openness)	D(LNCPI)
(1)	(2)	(3)	(4)	(5)
1	-0,4897*	-2,9222*	-0,3939	-0,0210
2	-0,0597	-0,4139	0,3896*	-1,6032
3	-0,2323	-3,5911	- 0,1809*	0,4401
Intercept		0,2618*		
ECT(-1)		-0,0760*		
R-squared		0,7699		
F-stat		4,6327*		

*5%significance

Table 10 shows a fairly high R-squared value, which is 0.7699. This means that 76.99 percent of the variation in the development of the financial sector can be explained by variables of economic growth, inflation, and economic openness. Similarly, a significant F-statistic value means that all variables simultaneously significantly influence the financial sector development. This shows that the model used is appropriate.

The Error Correction Term (ECT) coefficient is negative and significant. This is in accordance with the expected conditions. The ECT value of 0.076 indicates that there are short-term adjustments to achieve a long-term equilibrium condition of 7.60. In the short term, the variable economic growth and the level of economic openness have a significant effect on the financial sector development. While inflation does not have a significant influence on the financial sector development.

The last quarter of economic growth had a negative and significant effect on the financial sector development with a 5 percent confidence level. It can be seen from the table that one percent increase in economic growth in thelast quarterwill cause a decline in the financial sector development by 2.92 points. Similarly, in the previous two and three quarter of economic growth had a negative but not significant effect on the financial sector development with a confidence level of 5 percent. This result is similar to study of Ahmed (2010), Song Zan et al. (2010), and Halkos & Trigoni (2010) who find that there was a long-run equilibrium relationship between financial development and economic growth (Choong & Chan, 2011). However, in the short term the relationship is not stable.

This result is also reinforced by research conducted by Deidda & Fattouh (2002) in Valíčková (2012). They stated that in the early stages of the effect the relationship between the financial sector development and economic growth was ambiguous while at the next stage of development would be a significant positive. The same as in the Loyza & Ranciere (2006) study in Valíčková (2012),it found that there was a negative relationship in the short term and a positive long-term relationship between financial intermediation and output growth.

The negative relationship between the financial sector development and economic growth in the short term is also in accordance with the research conducted by Graff (2001). According to Graff, the causal line stems is from the financial sector development for real development, but the focus lies in the potentially destabilizing effects of finance and crises. This view assumes that the financial system is an unstable relationship. Keynes (1936), Diamond and Dybvig (1983), Singh (1997) and Krugman (1998) are some economists who have the same opinion (Graff, 2001).

Response of Financial Sector Development to Shock in Economic Growth

At first, there was no significant response from financial sector development due to the shock of economic growth. This can be seen from the response of the financial sector development which is zero in the initial lag due to the shock of economic growth. The financial sector development began to respond when there was a shock to economic growth in the second quarter. The response given by the development of the financial sector in the second quarter was negative, but starting in the fifth quarter the response to the financial sector development turned positive and for the next 3 years is still ongoing.

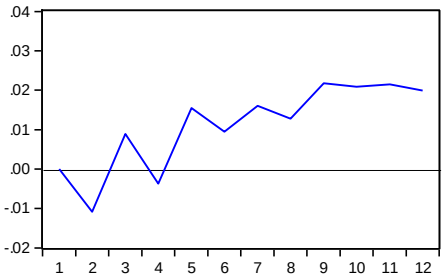


Figure 3. Result of Impulse Response Function (Percent)

Contribution of Economic Growth in Explaining Financial Sector Development

In the first quarter, variations in the development of the financial sector can be explained by the variable itself by 100 percent, while economic growth has no effect. However, in the following quarter the contribution of economic growth in explaining the development of the financial sector was quite good. This can be seen from the percentage variation in the financial sector development which can be explained by the financial sector development itself has an upward trend until the third year, which is increasing to 18.81 points.

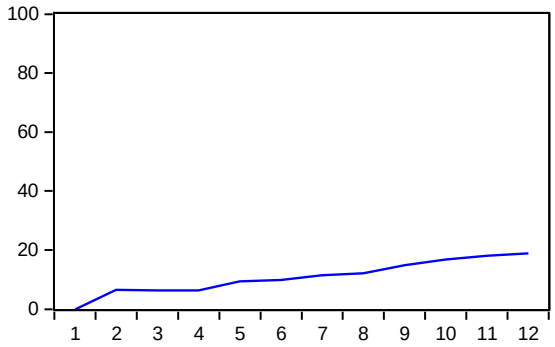


Figure4. Result of Variance Decomposition(Percent)

Although until the third-year variations in economic growth were largely explained by themselves, the role of the financial sector cannot be ignored. It can be seen in Figure 4 that there is a downward trend in the contribution of financial sector development in explaining variations in itself every quarter and on the other hand economic growth shows an increasing contribution in explaining variations in the financial sector development. The increase in the contribution shows that the role of economic growth in the financial sector development will be increasingly important.

V. Conclusions and Recommendations

This paper analyzes the relationship between financial sector development and economic growth using three indicators of financial sector development, namely money supply (M2), total credit, and total asset. Of the three indicators, one variable in the development of the financial sector was formed using factor analysis. Furthermore, it is seen the pattern of the relationship between financial sector development and economic growth using the Granger causality test. The estimation results show that the relationship pattern of financial sector development and economic growth in Indonesia is the demand following. That is, economic growth can encourage an increase in the financial sector development, while the financial sector development has no significant influence on economic growth.

To find out more about the effect of economic growth on the financial sector development, control variables are also included for macroeconomic conditions in Indonesia, namely the variables of economic openness and inflation. By using the Vector Error Correction Model (VECM) analysis, the results show that in the short term the relationship between the two variables shows a negative direction. But in the long run, economic growth has a positive and significant effect on the variables of financial sector development.

Based on this study, the author provides suggestions, namely: 1) To improve the financial sector in Indonesia, the government can better consider and focus on increasing economic activity and economic growth. 2) More in-depth analysis of financial sector developments and economic growth is needed to obtain more detailed information and better models. Future research can add financial indicators from the non-bank sector, focusing more on investment credits with a large impact on economic growth, and more specifying the research area to a smaller scope, such as the province.

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