Research article

The Effect of Inflation, Interest Rates, Exchange Rates, and Real GDP on Financial Deepening in Indonesia: Evidence from Error Correction Model Approach

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Abstract: Financial deepening is a benchmark for seeing the role of financial services in the economy, as measured by the ratio between the money supply (M2) and Gross Domestic Product (GDP). This study aims to determine and analyze the effect of inflation, interest rates, exchange rates, and real GDP on financial deepening in Indonesia in the long and short term. The type of research used is quantitative. Sources of data used in this study are secondary data sources obtained from Bank Indonesia (BI) and the Central Bureau of Statistics (BPS). Data analysis using the Error Correction Model (ECM) method. The results show that in the long run, inflation is negatively and insignificantly effect to financial deepening, interest rates are negatively and significantly effect to financial deepening, while the exchange rates and real GDP have a positive and significant effect to financial deepening in Indonesia. Meanwhile, in the short term, inflation is negatively and insignificantly effect to financial deepening, interest rates are negatively and insignificantly effect to financial deepening, exchange rates are positively and insignificantly effect to financial deepening, while real GDP has a positive and significant effect to financial deepening in Indonesia.

Keywords: inflation, interest rates, exchange rates, real GDP, and financial deepening

JEL Classification: E1, E2, E3, E4, F1

Abstrak: *Financial deepening* merupakan tolak ukur untuk melihat peran jasa-jasa keuangan terhadap perekonomian, yang diukur dari rasio antara jumlah uang beredar (M2) dan Produk Domestik Bruto (PDB). Penelitian ini bertujuan untuk mengetahui dan menganalisis pengaruh inflasi, suku bunga, nilai tukar, dan PDB riil terhadap *financial deepening* di Indonesia dalam jangka panjang dan jangka pendek. Jenis penelitian yang digunakan yaitu kuantitatif. Sumber data yang digunakan dalam penelitian ini adalah sumber data sekunder yang diperoleh dari Bank Indonesia (BI), dan Badan Pusat Statistik (BPS). Analisis data dengan menggunakan metode *Error Correction Model* (ECM). Hasil penelitian menunjukkan bahwa dalam jangka panjang inflasi berpengaruh negatif dan tidak signifikan terhadap *financial deepening*, suku bunga berpengaruh negatif dan signifikan terhadap *financial deepening*, sedangkan nilai tukar dan PDB riil berpengaruh positif dan signifikan terhadap *financial deepening* di Indonesia. Sedangkan dalam jangka pendek inflasi berpengaruh negatif dan tidak signifikan terhadap *financial deepening*, suku bunga berpengaruh negatif dan tidak signifikan terhadap *financial deepening*, nilai tukar berpengaruh positif dan tidak signifikan terhadap *financial deepening*, sedangkan PDB riil berpengaruh positif dan signifikan terhadap *financial deepening* di Indonesia.

Kata Kunci: inflasi, suku bunga, nilai tukar, PDB riil, dan financial deepening

1. INTRODUCTION

A country cannot be separated from the important role of the financial sector in the process of economic development because the financial sector has an important role to increase economic growth. The 2008 global financial crisis, which began with the United States financial crisis because of the subprime mortgage crisis. This condition has an impact on the reduced liquidity of financial institutions because they do not have asset funds to pay obligations to financial institutions, such as investment banks and asset management. The inability to pay these obligations makes financial institutions that provide loans go bankrupt. Ruslan (2011) states that the development of a country's financial sector triggers an economy, and conversely the development of the financial sector results in a decline in the economy. Comparison of the deepening development of the financial sector in Indonesia, Malaysia, Singapore, Thailand, and the Philippines during the 2008 financial crisis.

Figure 1 describes a comparison of the deepening of the financial sectors of Indonesia, Malaysia, Singapore, Thailand, and the Philippines as measured using the M2/GDP ratio. Compared to the four ASEAN countries, namely Malaysia, Singapore, Thailand, and the Philippines, that at the time of the global financial crisis in 2008, Indonesia experienced the lowest deepening of the financial sector, this indicates that the financial sector in Indonesia is still lagging when compared to other countries. Malaysia, Singapore, Thailand, and the Philippines.
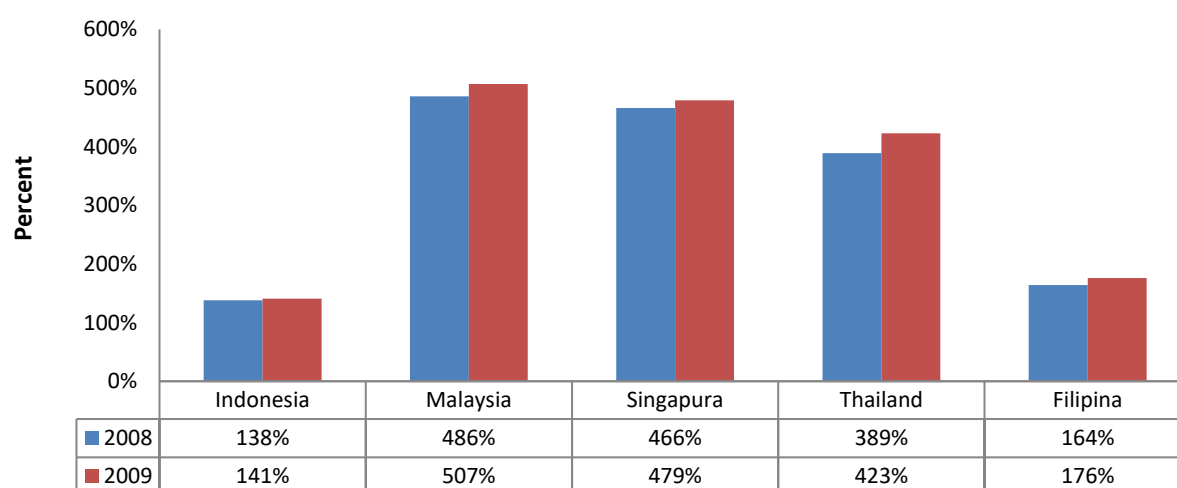

	Indonesia	Malaysia	Singapura	Thailand	Filipina
■ 2008	138%	486%	466%	389%	164%
■ 2009	141%	507%	479%	423%	176%

Figure 1. Financial Sector Deepening among Asian Countries, 2008-2009
Source: Global of Economy, 2020

This study will focus on financial deepening in Indonesia. Financial deepening is defined as an indicator that measures whether there has been an increase in financial services in the economy (Aulia & Masbar, 2016). A country is said to have good financial deepening if the ratio between money supply and GDP is high. An indication of financial deepening is that it can provide the potential to accelerate economic growth in Indonesia by increasing investment, through all activities in the financial services sector such as banking, capital markets, and the non-bank financial services sector.

The components that affect financial deepening are interest rates, exchange rates, and national income (Ruslan, 2011). Meanwhile, Odhiambo (2012) conducted research that affected financial deepening is inflation in Zambia. The debate related to financial deepening is the opinion of Ruslan (2011) that the speed of money movement will cause people to become consumptive, so that the amount of money circulating in the community increases and inflation occurs, because the level of daily needs increases this will cause people's desire to save low and result in a decrease financial deepening. while the opinion of Odhiambo (2012) when high inflation will cause interest rates to fall, failing interest rates will trigger an increase in investment and will cause financial deepening to increase. Based on the description above, the purpose of this study is to find out and

partially and simultaneously analyze the effect of inflation, interest rates, exchange rates, and real GDP on financial deepening in Indonesia in the long and short term.

Referring to Harrod-Domar theory stated that part of the national income should be saved and saved. The equation explains that in achieving high economic growth, every economy needs to save and invest as much as possible part of the added value generated by all business units in a country or called GDP (Gross Domestic Product). Economic growth will be faster, this is able to increase financial deepening (financial sector deepening), due to the increasing role of financial services activities in the economy (Todaro & Smith, 2006).

This study refers by Putri & Mubin (2021) the found of this study are based on short-term and long-term analysis in Indonesia, the exchange rate has a significant effect on financial deepening, and there is also no significant effect between interest rate variables and national income on financial deepening based on short-term and long-term analysis. Meanwhile, Alrabadi & Kharabsheh (2016), the findings results show that economic growth and financial deepening have a two-way relationship, this is according to the results of causality testing. Meanwhile, based on cointegration testing, the results show that in the long term it has a statistically significant effect between economic growth and financial deepening. Obafemi, and Amoke (2016) found that the investment and financial deepening variables have a two-way relationship.

Several other studies such as the study conducted by Olusola (2020) found that interest rates had a significant and negative relationship with financial deepening, while the exchange rate had a significant and positive relationship with financial deepening, and lastly, economic performance or national income had a significant and positive effect on negative. Harisuddin & Hartono (2019) found that regional economic growth results are positively and significantly influenced by the financial deepening variable. Ogoun (2020) found that the effect of exchange rates with financial deepening is significant, this is based on the results of simple linear regression analysis.

2. RESEARCH METHODS

2.1. Data

This research was conducted in Indonesia. The type of data used is secondary data obtained from books published by Bank of Indonesia (BI), and books published by the Central Bureau of Statistics (BPS). The population in this study is Indonesia, with sampling by applying the saturated sample technique, which means that the entire population is used as a sample (Sugiyono, 2015). The sample in this study was 40 samples (data for the first quarter-fourth quarter of 2010-2019). The following is the operational definition of the variables in this study:

Table 1. Data and Source

Notation	Definition	Measurement	Source
FD	Financial Deepening can also be defined as broader financial services for all levels of society, this means an increase in the ratio of money in circulation to GDP (Alrabadi & Kharabsheh, 2016). The financial deepening variable as measured by M2/GDP in Indonesia.	Ratio	Bank of Indonesia
IF	Inflation is an overall and prolonged increase in the price of goods (Rahardja & Manurung, 2008). prices of goods and services with a general and prolonged increase in Indonesia led to inflation.	Percent	BPS
SB	interest rate is the price of the amount of money in a certain period (Utami, 2012).	Ratio	Bank of Indonesia

Notation	Definition	Measurement	Source
NT	Exchange Rate, the exchange rate is the price of a currency against other currencies (Syarifuddin, 2015)	Percent	Bank of Indonesia
PR	Real GDP is the added value of a certain business unit in a country (Dinar & Hasan, 2018).	Rupiah	BPS

2.2. Model

The analytical method used is multiple regression analysis with the Error Correction Model (ECM) analysis method with the following long-term equation model. This study uses a long-term regression equation which can be seen as follows.

$$FD_t = \beta_0 + \beta_1 IF_t + \beta_2 SB_t + \beta_3 NT_t + \beta_4 PR_t + e_t \tag{1}$$

where: FD_t is financial deepening; $\beta_1, \beta_2, \beta_3, \beta_4$ is coefficient; IF_t is Inflation; SB_t is Interest Rate, NT_t is Exchange Rate; PR_t is Real GDP; e is error term, and t is time series. While the short-term regression model of this study is as follows:

$$\Delta FD_t = \beta_0 + \beta_1 \Delta IF_t + \beta_2 \Delta SB_t + \beta_3 \Delta NT_t + \beta_4 \Delta PR_t + \beta_5 \Delta ECM_{(-1)} + \mu_t \tag{2}$$

Where, ΔFD is the change in financial deepening; β_0 is the constant (intercept); $\beta_1, \beta_2, \beta_3, \beta_4$ is the ECM coefficient; β_5 is the ECM coefficient; ΔIF is the change in inflation; ΔSB is the change in interest rates; ΔNT is the change in exchange rates; ΔPR is the change in real GDP; ECT is error correction term; μ is confounding variable; and t is period of time.

3. RESULTS AND DISCUSSION

3.1. Research Result

This section reports the results of the unit root test which are presented in Table 2. These results indicate that the statistical value of the Augmented Dickey-Fuller (ADF) test is at the level has smaller than the critical value of 5 percent Mackinnon, which means that all variables are not stationary, so it is necessary to test the degree of integration on first differentiation.

Table 2. Result of Unit Root Test

Variables	Statistics			
	Level		First differences	
	ADF-test	Prob	ADF-test	Prob
Δ(FD)	-2.401	0.149	-16.906	0.000
Δ(IF)	-1.365	0.588	-7.406	0.000
Δ(SB)	-1.790	0.380	-8.375	0.000
Δ(NT)	-1.010	0.740	-5.895	0.000
Δ(PR)	2.249	1.000	-111.166	0.000

Source: Authors' calculations

The results Augmented Dickey-Fuller (ADF) test on first differentiation show that all variables are stationary in the first differentiation degree of integration test, so it can be concluded that all variables are stationary in the second differentiation and can be used in the Error Correction Model analysis.

Table 3. Cointegration Test Based On Trace Statistics

Hypothesis	Trace Statistic	Prob.	Max Eigen Statistic	Prob.
r = 0	67.07566*	0.0811	33.86427**	0.0502
r ≤ 1	33.21139	0.5452	16.77699	0.5992
r ≤ 2	16.43439	0.6814	10.26999	0.7189
r ≤ 3	6.164404	0.6761	5.928795	0.6224
r ≤ 4	0.235609	0.6274	0.235609	0.6274

Source: Authors' calculations

Table 3 reports the cointegration test based on the trace statistical approach showing that the model used is cointegrated at r = 0 at the 10 percent significance level. Meanwhile, the Max-Eigen Statistics approach shows that it is cointegrated at a significance level of 5 percent with a probability value of 0.05.

The results of this study also report that they have met the classical assumption test, namely the normality test, multicollinearity test, heteroscedasticity test, and autocorrelation test which are presented in Table 4. The results of the normality test using the Jarque-Bera method with a probability value of 0.988 greater than 0.05, so it can be concluded that the data is normally distributed. The results of multicollinearity testing using the VIF method show an average VIF value of 6.011 which states that the four variables have a VIF value of not more than 10, so it can be concluded that there are no symptoms of multicollinearity. Table 4 also reports the results of the heteroscedasticity test with an f-stat probability value of 0.09 which is greater than 0.05, so it can be concluded that there is no heteroscedasticity problem. In addition, the results of the autocorrelation test in this study indicate that the f-stat probability value of 0.071 is greater than 0.05, so it can be concluded that there is no autocorrelation problem.

Table 4. Long-Term Regression Test Results

Dependent variable = FD			
Variable	Coefficient	t-stat	Prob
Long-Term			
Constant	134.958	13.903	0.000
IF	-1.133	-1.620	0.114
SB	-2.443	-2.143	0.039
NT	0.005	4.837	0.000
PR	0.000	2.232	0.032
R^2 = 0.654; F-stat = 16.506 (0.000)			
Short-Term			
Constant	-0.000	0.000	1.000
$\Delta(IF)_{t-1}$	-0.845	-1.147	0.260
$\Delta(SB)_{t-1}$	-3.212	-1.393	0.173
$\Delta(NT)_{t-1}$	0.000	0.187	0.853
$\Delta(PR)_{t-1}$	0.000	3.491	0.001
ECM_{t-1}	-1.002	-3.605	0.001
R^2 = 0.630; F-stat = 10.894 (0.000)			
Diagnostic test	F-Stat (prob.)		
Normality	0.024 (0.988)		
Autocorrelation	2.515 (0.0963)		
Heteroscedasticity	2.189 (0.904)		
VIF mean	6.011		

Source: Authors' calculations

Estimation result from Table 4 reports the coefficient of determination of inflation, interest rates, exchange rates, and real GDP on financial deepening in Indonesia in the long term is 65,4 percent, while in the short term it is 63 percent. Table 4 reports the long-term regression equation is found that inflation, interest rates, exchange rates and real GDP are zero, the financial deepening in Indonesia is 134.958 percent. The next found that inflation has a negative effect. If inflation falls by 1 percent, it will increase financial deepening in Indonesia by 1.133 percent. Interest rates have a negative effect. If interest rates fall by 1 percent, it will increase financial deepening in Indonesia by 2.443 percent. The exchange rate has a positive influence. If the exchange rate increases by 1 rupiah, it will increase the financial depth in Indonesia by 0.005 percent. Real GDP has a positive effect, if real GDP increases by 1 rupiah, it will increase financial deepening in Indonesia by 0.000 percent.

Table 4 also reports that t-stat in the long-term interest rates, exchange rates, and real GDP have a significant effect on financial deepening in Indonesia, while inflation has no significant effect on financial deepening in Indonesia. In the short term, only real GDP has a significant effect on financial deepening in Indonesia, while inflation, interest rates, and exchange rates have no significant effect. The F-stat probability value is less than 0.05 so it can be concluded that overall, the independent variables affect the dependent variable in the long and short term.

Regression result on Table 4 reports that the Error Correction Term (ECM) coefficient is -1.002 with a significant probability level of 0.001 at = 0.05 percent, so it can be concluded that the ECM test can be said to be valid. Based on the results of the short-term regression test, the value of the negative constant is -0.000. A negative constant value does not say that this study failed, this is supported by the theory expressed by Dougherty (2002) regarding negative intercept/constant. The short-term regression equation is found that inflation, interest rates, exchange rates and real GDP are zero, the financial deepening in Indonesia is 0.000 percent. While inflation has a negative effect. If inflation falls by 1 percent, it will increase financial deepening in Indonesia by 0.845 percent. Interest rates have a negative effect. If interest rates fall by 1 percent, it will increase financial deepening in Indonesia by 3.212 percent. The exchange rate has a positive influence. If the exchange rate increases by 1 rupiah, it will increase financial deepening in Indonesia by 0.000 percent. Real GDP has a positive effect. If real GDP increases by 1 rupiah, it will increase financial deepening in Indonesia by 0.000 percent.

3.2. Discussions

3.2.1. Effect of Inflation on Financial Deepening

The long-term results of this study found that inflation has no effect on financial deepening caused by the development of Indonesia's inflation during 2010-2019 which tends to fluctuate (up and down) caused by shocks in world oil prices, and increases in various commodity prices that cause a decline in the real income of fixed-income people this will cause a decline in real value and losses for fixed-income people, this loss causes the prices of goods and services to be higher while the income received is fixed. Keynesian opinion, low real income will cause a decrease in the interest of savers to save their funds in banks, this is due to the declining value of the currency and causes no effect of decreasing inflation on financial deepening in the long term (Mankiw, 2012).

In the short term, with a period of less than 1 year, inflation has no effect on financial deepening. This is since Indonesia's inflation tends to fluctuate (up and down) due to the unstable condition of Indonesia's economic fundamentals after the global financial crisis in 2008, this will raise doubts for investors. investors to invest, because investors will have little difficulty in determining the right investment instrument to do, to obtain a higher rate of return on investment than inflation. Thus, this causes a low desire of investors to invest and results in no effect of decreasing inflation on financial deepening in the short term. The results of this study in the long and short term are in line with research conducted by Hanifah and Khanifah (2017) where inflation has a negative and insignificant effect on the volume of savings. In contrast to the research conducted by Odhiambo (2012).

3.2.2. Effect of Interest Rates on Financial Deepening

The long-term results of this study indicate that interest rates influence financial deepening in the long term for more than 5 years, because the development of Indonesian interest rates over the last ten years tends to fluctuate. However, in 2014-2019 the average quarterly interest rate in Indonesia tends to decrease. This is because low interest rates will increase investment, when investment increases, it indicates more and more money supply entering the financial sector, in line with the classical theory of interest rates which states that investment is a function of interest rates, the lower the interest rate causes the desire to invest. high and vice versa (Nopirin, 1990). The results of this study in short-term show that interest rates have no effect on financial deepening in a period of less than 1 year, because after the global financial crisis in 2008 the rise and fall of interest rates will not affect investment demand, because with this condition investors are more aware of and consider various risks. the risk of uncertainty conditions that support the economy in the future, so in this case the government needs to create something more certain and transparent so that investors can easily make decisions to invest or not.

3.2.3. Effect of Exchange Rates on Financial Deepening

The long-term result finds that accordance with the condition of the State of Indonesia as a developing country that is promoting international trade activities, it will certainly have an impact on export activities, because when the exchange rate depreciates, it will encourage economic actors to be more productive because of favorable export prices. Increased exports will cause goods sold domestically to be cheaper than the prices of goods sold abroad. When exports increase, it shows that the Indonesian state will receive more and more income from abroad or is called receiving foreign exchange reserves (forex) and will certainly increase the money supply. Capital in the financial sector will increase so that the investment value will increase. The findings of this study are in line with research conducted by Olusola (2020) showing that the exchange rate has a positive and significant effect on financial deepening. Meanwhile, this found is not in line with research conducted by Ruslan (2011).

In the short term, the exchange rate has no significant effect on financial deepening due to low investment after the global financial crisis in 2008, this is due to the high interest rates as proven in 2013 and 2014 interest rates tend to increase. This causes investors' desire to invest low, because when interest rates are high, the amount of borrowed funds will be greater than the amount obtained. When investment is low, it will trigger low funds entering the financial sector and cause low financial deepening. This study is in line with research conducted by Ruslan (2011) which states that the exchange rate has no significant effect on financial deepening. Contrary to the results of research conducted by Carissa & Khoirudin (2020) where the exchange rate affects financial deepening.

3.2.4. Effect of Real GDP on Financial Deepening

The long-term result shows a positive and significant direction. This is due to the increase in Indonesia's real GDP over the last ten years. An increase in real GDP indicates an increase in income. An increase in public income will increase the amount of savings in the financial sector (financial deepening), an increase in GDP will have implications for increasing levels of monetary liquidity in an economy, the amount of output obtained will have an impact on increasing the volume of public economic transactions and will be able to increase public monetary transactions in the economy. With economic growth Smith said that this theory or not economic growth in a country is determined by the accumulation of capital owned. The availability of capital accumulation obtained through savings, causes economic actors to get capital owned by the real sector, because in economic growth capital has an important role. Increased economic growth will encourage a growing financial sector through financial services, and increased income distribution, this will increase financial deepening (Todaro and Smith, 2006).

The short-term results of this study show that in the short-term real GDP influences financial deepening, this is because after the global financial crisis in 2008 Indonesia's real GDP tends to

increase, this is due to the improvement in the economic system and accompanied by a stable domestic political situation, resulting in progress Indonesia's economy which can be seen from the value of GDP which tends to increase. This causes investors to start believing in investing and when real GDP increases, it indicates that people's incomes increase and encourages people to save. This research is in line with research conducted by Citra, Masbar, & Syahnur (2018) there is a significant effect of real GDP with financial deepening. However, this contradicts the research conducted by Putri & Mubin (2021).

4. CONCLUSIONS

The conclusion of the research partially in the long term that the variables of interest rates, exchange rates, and real GDP have a significant effect on financial deepening, while the inflation variable has no effect. In the short term, only real GDP has a significant effect on financial deepening, while inflation, interest rates, and exchange rates have no significant effect. However, partially short-term and long-term effect the independent variable affects the dependent variable. Things that must be done related to the results of this research, namely the rise and fall of inflation, interest rates, exchange rates, and real GDP can affect the depth of the financial sector, so it is necessary to maintain macroeconomic stability through the formation of appropriate policies.

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