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Financial development and economic growth in Indonesia: an ARDL-Bounds testing approach

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Abstract

The objective of this paper is to analyze the influence of financial development on economic growth in Indonesia using quarterly time series data for the period of 2005 to 2016. It uses an Autoregressive Distributed Lagged (ARDL-bounds) testing approach to cointegration to estimate the relationships among the variables. The financial development indicators used in this paper are financial credit, financial asset, and third-party funding. **Findings/Originality:** The results of the ARDL model estimates indicate that the variable is cointegrated and there is a long-run relationship between the variables, and therefore, there is a long-term causal relationship. The long-run estimation results disclose a significant positive relationship between economic growth and financial development, where economic growth is found to be significantly influenced by financial development indicators.

Introduction

Economic development in a country depends largely on the dynamic development and real contribution of the banking sector. When the banking sector slumped, the national economy also slumped. Vice versa, when the economy stagnated, the banking sector is also affected by the intermediation function. After the 1997 economic crisis, Indonesia again deregulated the policies on the financial sector in terms of oversight. In addition, there is also a change in local government policy with the issuance of the Regional Autonomy Law of 2000 and has been enforced since 2001, thereby encouraging local governments to develop their territories based on local government budgets and not from the central government. With the enactment of the Law on regional autonomy, each region must make investment planning and regional development so that the regional economic growth that is achieved is also optimal. One sector that can affect regional economic growth is the financial sector.

Theoretical explanations suggest that financial sector intermediary development stimulates economic growth by creating economic conditions that enhance efficiency in resource allocation (Levine, 2004). Building on this theoretical foundation, a number of empirical studies examined the relationship between financial sector development and economic growth (Anwar & Nguyen, 2011; Chang & Caudill, 2005; Nwani & Bassey Orie, 2016; Seetanah, 2008; Uddin et al., 2013). The results of most of these studies show that financial intermediary development is a significant driver of economic growth. Three major components of the financial intermediary system have been widely considered in these studies: the role of financial intermediaries in the mobilization of savings, the role of financial intermediaries in enhancing economic activities in the private sector and the size of the financial intermediary system. According to Levine (1997), Levine (2004), Beck et al. (2011) the growth-generating ability of every financial intermediary system depends significantly on how efficient the system could mobilize and allocate savings in the economy. By attracting

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deposits from various economic units in the economy and financing investment projects in the private sector, financial intermediaries generate higher levels of economic growth, support firms that depend on external finance and reduce the financing constraints of small-and medium-sized enterprises (Beck et al., 2005; Beck et al., 2011; Beck & Demirguc-Kunt, 2006).

The aims of this study are to contribute to existing research by examining Indonesian cases using an Autoregressive Distributed Lag (ARDL) approach to cointegration analysis. Indonesia's financial development has witnessed a number of policy reforms over the last two decades, which are expected to stimulate economic growth through increased savings mobilization, provision of credit to the private sector and reduction of information and transaction costs that make this research necessary. This study contributes to several existing studies using three financial development indicators to examine the sensitivity of a financial-led growth analysis to an alternative combination of financial development indicators.

In the literature there are two views on the relationship between economic growth and poverty. The trickle-down theory of economic growth plays an important role in poverty savings in countries with the provision of fixed distribution income. Supporters of this view support higher economic growth in a decisive country for the poor. Thus, poverty alleviation policies must be directed to encourage economic growth (Aghion & Bolton, 1997; Thorbecke, 2013; Todaro & Smith, 2012).

On the other hand, the trickle-up theory confirms that economic growth does not improve the lives of very poor people. However, the process of growth has declined greatly towards the middle class and the very rich (Todaro & Smith, 2012). This resulted in deteriorating income distribution and then increasing poverty. In other words, the theory states that there are reinforcing factors that have poverty in between poverty and their participation to contribute to economic growth. The literature on the success of the country does not grow quickly, because they are too poor to grow. This is because poverty reduces economic growth, where poverty levels lead to higher growth.

The extent to which economic growth results in certain economic growth depends on the distribution of initial income, and how it changes, through economic growth. The Kuznets (1955) curve hypothesis determines that, the compilation of income grows in initial development, income inequality initially increases because the wider population participates in increasing national income. However, if disparities in distribution and income growth deteriorate, there will be an increase in poverty (McKay, 2013). Thus, the higher income in the economy, the smaller the growth in poverty.

Important studies regarding the relationship between poverty and economic growth include those carried out by (Basu & Mallick, 2008; Gwenhure & Odhiambo, 2017; McKay, 2013; Okoroafor & Chinweoke, 2013) analyzing the determinants of changes in poverty and inequality in 12 American countries Latin for the period 1970-1994. They found evidence showing that growth in aggregate income per capita led to a reduction in the incidence of urban and rural poverty.

Basu and Mallick (2008) use several steps to prove the relationship between economic growth and poverty in India. A small number that shows a large number. They reverse the emergence of labor substitution. It has suspended the benefits of economic growth for the poor.
Using the ARDL-Bounds test, Odhiambo (2009) discusses the causal relationship between financial development, economic growth and welfare in South Africa for the period 1960- 2006. The author finds a direct flow of influence from economic growth in relation to welfare in South Africa. In a subsequent study, Odhiambo (2011) found a dynamic relationship between economic growth, acquisition and poverty reduction in South Africa for the period 1969-2006 using Ardl-Bounds testing. The author found no evidence of the relationship between the relationship between poverty alleviation and economic growth in South Africa. Young (2012) uses level estimates and real consumption growth for increasing poverty in 29 sub-Saharan and 27 other developing countries. The authors find living standards in the Sahara states have increased over the past two years - thus implying successful poverty.

McKay (2013) analyzed the relationship of growth and poverty reduction in the 25 largest sub-Saharan countries in the last two decades, using information from household surveys. The

author finds that there has been a significant reduction in poverty in this large country. However, non-monetary poverty is at a lower level than poverty. Okoroafor and Chinweoke (2013) used ols techniques to support the relationship between poverty and economic growth in Nigeria for the period 1990-2011. They found no evidence of either of these variables. They attribute this to the government's poor attitude towards the development of human capital.

Methods

This study used time series data in quarterly form during 2005-2016. The data were collected from several sources, such as *Statistik Ekonomi dan Keuangan Indonesia* (SEKI), Bank Indonesia; International Financial Statistics, Central Bureau of Statistics, and World Bank.

The variable used is the Gross Domestic Product at 2010 constant prices used as a proxy for economic growth. There are three indicators for the financial development used in this research are financial credit by banks, financial assets of commercial banks and third-party funds of commercial banks. All variables are expressed in the form of the natural logarithm.

$\ln GDP$ is the natural logarithm of Gross Domestic Product at 2010 constant price, $\ln FC$ is the natural logarithm of financial credit by banks, $\ln FA$ is the natural logarithm of financial assets of commercial banks and $\ln TFP$ is the natural logarithm of third-party bank deposits, ε_t is the term of white noise error, $\propto_0$ is a constant and $\propto_1, \propto_2, \propto_3$ are parameters to be estimated.

This study used the Autoregressive Distributed Lag (ARDL-Bounds) testing approach for the cointegration proposed by Pesaran et al. (2001). The ARDL approach offers some desirable statistical advantages over the other cointegration techniques. While other cointegration techniques require all variables to be integrated in the same order, the ARDL test procedure provides valid results whether the variables are I(0) or I(1) or are integrated and provide highly efficient and consistent test results in small and large sample sizes (Pesaran et al., 2001). A small number of observations and different integration sequences make ARDL a preferred approach in this research. The ARDL model can be specified as:

$$\Delta \ln GDP_t = \beta_0 + \sum_{i=1}^{n} \beta_{1i} \Delta \ln GDP_{t-i} + \sum_{i=0}^{n} \beta_{2i} \ln FC_{1t-i} + \sum_{i=0}^{n} \beta_{3i} \ln FA_{1t-i} + \sum_{i=0}^{n} \beta_{4i} \ln TFP_{1t-i} + \beta_5 \ln GDP_{t-1} + \beta_6 \ln FC_{t-1} + \beta_7 \ln FA_{t-1} + \beta_8 \ln TFP_{t-1} + \varepsilon_{1t,}$$

where Δ is an operator for difference? The test involves performing the F-test for the coefficient of significance alongside the remaining variable coefficients for the purpose of examining the existence of long-term relationships among variables. Following Pesaran et al. (2001) procedure, the null hypothesis of no long-term relationship exists between the variables (Ho: $\beta_5 = \beta_6 = \beta_7 = \beta_8 = 0$) is checked. The decision to reject or accept Ho is based on the following conditions: if F-value > upper bound, then reject Ho and its variables are integrated, if the value of F < lower bound, then accept Ho and the variable is not cointegrated, but if F- lower bound and upper bound, then the decision is not convincing. The error correction model for short-term estimation is determined as follows:

$$\Delta \ln GDP_t = \beta_0 + \sum_{i=1}^{n} \beta_{1i} \Delta \ln GDP_{t-i} + \sum_{i=0}^{n} \beta_{2i} \Delta \ln FC_{1t-i} + \sum_{i=0}^{n} \beta_{3i} \Delta \ln FA_{2t-i} + \sum_{i=0}^{n} \beta_{4i} \Delta \ln TFP_{3t-i} + \mu_1 ECM_{t-1} + u_{1t}$$

The negative and significant ECM_{t-1} coefficient (μ_1) implies that short-term disequilibrium between the dependent variable and the explanatory variable will return to the long-run equilibrium relationship. This study applies an ARDL cointegration analysis using EViews 8.

The Autoregressive Distributed Lag (ARDL-Bounds) model used in this study can be expressed as follows:

$$\ln \text{GDP} = \propto_0 + \propto_1 \ln \text{FC} + \propto_2 \ln \text{FA} + \propto_3 \ln \text{TFP} + \varepsilon_t$$

Results and Discussion

Estimation of the ARDL model

The approximate long-term coefficients of the ARDL model specifications are presented in Table 1.

Table 1. Long-run Coefficients

Variable	Coefficient	Standard Error	t-statistic	Probability
C	8.314	0.236	35.240	0.000
ln FC	0.150	0.090	1.659	0.104
ln FA	0.320	0.178	1.792	0.080
ln TFP	-0.130	0.241	-0.538	0.593

Table 2. Short-run Error Correction Estimates

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.012	0.010	1.217	0.238
D(Ln_GDP(-1))	-0.312	0.305	-1.022	0.319
D(Ln_GDP(-2))	-0.249	0.276	-0.901	0.379
D(Ln_GDP(-3))	-0.206	0.244	-0.843	0.409
D(Ln_GDP(-4))	0.810	0.220	3.682	0.002
D(Ln_FC(-1))	0.010	0.048	0.216	0.831
D(Ln_FC(-2))	0.012	0.043	0.268	0.791
D(Ln_FC(-3))	-0.071	0.035	-2.027	0.056
D(Ln_FC(-4))	-0.046	0.035	-1.315	0.203
D(Ln_FA(-1))	-0.207	0.135	-1.527	0.143
D(Ln_FA(-2))	-0.068	0.131	-0.518	0.610
D(Ln_FA(-3))	0.072	0.119	0.604	0.553
D(Ln_FA(-4))	-0.124	0.133	-0.935	0.361
D(Ln_TPF(-1))	0.227	0.119	1.918	0.070
D(Ln_TPF(-2))	0.082	0.120	0.684	0.502
D(Ln_TPF(-3))	0.008	0.106	0.071	0.944
D(Ln_TPF(-4))	0.175	0.119	1.465	0.158
ECT(-1)	0.126	0.134	0.938	0.360
R-squared	0.987	Mean dependent var		0.013
Adjusted R-squared	0.977	S.D. dependent var		0.025
S.E. of regression	0.004	Akaike info criterion		-8.019
Sum squared resid	0.000	Schwarz criterion		-7.243
Log likelihood	170.352	Hannan-Quinn criter.		-7.743
F-statistic	92.464	Durbin-Watson stat		1.947
Prob(F-statistic)	0.000			

Based on Table 1, it can be concluded that the positive coefficient and significant value at a 10% level of significance are financial assets of commercial banks (In FA), positive coefficient and not significant value is financial credit by banks (In FC) and negative coefficients and not significant is third party fund of commercial banks (ln TFP). This indicates that the indicators of financial development in the form of financial credit by banks and financial assets of commercial banks have

a positive long-term impact on economic growth, but which has a significant impact is financial assets of commercial banks. Meanwhile, the indicator of financial development in the form of third-party funds of commercial banks has a negative and no significant impact on economic growth.

The error correction term coefficient for the ARDL model specification is shown in Table 2. Based on Table 2, it can be concluded that the coefficient of ECT (-1) is positive and not significant.

Unit Root Test

Based on stationary test results, the variables used in this study have the same stationarity, that is all stationary variables on the first difference, so bound testing cointegration can be done. In summary, the results of stationarity test data can be seen in Table 3 and Table 4.

Table 3. Unit Root Test in Level

Variabel	ADF-test	Test Critical Values			
		1%	5%	10%	
GDP	-1.752	-3.601	-2.935	-2.606	Constant
	(0.398)				
	0.019	-4.199	-3.524	-3.193	Constant, Linear Trend
	(0.995)				
FC	-2.181	-3.578	-2.925	-2.601	Constant
	(0.216)				
	-0.426	-4.166	-3.509	-3.184	Constant, Linear Trend
	(0.984)				
FA	-1.276	-3.593	-2.931	-2.604	Constant
	(0.632)				
	-1.616	-4.187	-3.518	-3.190	Constant, Linear Trend
	(0.770)				
TPF	-2.030	-3.611	-2.939	-2.608	Constant
	(0.273)				
	1.885	-4.212	-3.530	-3.200	Constant, Linear Trend
	(1.000)				

Table 4. Unit Root Test in First Difference

Variable	ADF-test	Test Critical Values			
		1%	5%	10%	
GDP	-3.332147	-3.601	-2.935	-2.606	Constant
	(0.0197)				
	-3.853214	-4.120	-3.524	-3.193	Constant, Linear Trend
	(0.0235)				
FC	-6.167167	-3.581	-2.927	-2.601	Constant
	(0.0000)				
	-6.554366	-4.170	-3.511	-3.186	Constant, Linear Trend
	(0.0000)				
FA	-2.099674	-3.593	-2.9314	-2.604	Constant
	(0.0086)				
	-2.338014	-4.187	-3.518	-3.190	Constant, Linear Trend
	(0.0120)				
TPF	-8.994832	-3.593	-2.931	-2.604	Constant
	(0.0000)				
	-6.220043	-4.212	-3.530	-3.196	Constant, Linear Trend
	(0.0000)				

Cointegration Analysis

The results of the data cointegration test can be seen in Table 5 below. The results of this cointegration test will determine the lag where this model will be optimum. The Johansen cointegration test is performed because the obtained F-statistic value is in the lower critical value and the upper critical value. Johansen cointegration test results can be seen in the following table.

Table 5. Johansen Cointegration Test Results

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None*	0.554	67.569	47.856	0.000
At most 1*	0.364	32.896	29.797	0.021
At most 2	0.176	15.495	13.431	0.012
At most*	0.112	5.114	3.841	0.024

Note: Trace test indicates 2 cointegrating equations at the 0.05 level, * denotes rejection of the hypothesis at the 0.05 level, ** MacKinnon-Haug-Michelis (1999) p-values

Based on the results of the cointegration test above can be concluded that the model has F-statistic between lower critical value and upper critical value cointegrated. This can be seen from the value of trace statistic > critical value.

Optimal Lag Selection for ARDL Method

The selection of appropriate lags for the model in this study was selected using the Schwarz criterion (SIC) and Akaike info criterion (AIC). A good model is a model that has the smallest criterion value information. The optimum lag chosen depends on the extent to which the lag is cointegrated. The result of the lag selection for ARDL method in the model can be seen in Table 6. At the time of the stationary test, the maximum lag is 6. However, the optimum lag determination test is only up to lag 4, because after lag 4 the consistent criteria value is always greater.

Table 6. Optimal Lag Selection

Lag	Schwarz criterion (SIC)	Akaike info criterion (AIC)
6	-7.152	-8.454
4	-7.352	-8.257
2	-5.375	-5.913

Source: data processed

Diagnostic and Stability Tests

From the diagnostic test results (see the results in Table 7), there is no evidence of serial correlation and heteroscedasticity in each specified Autoregressive Distributed Lag (ARDL-Bounds) model.

Table 7. Breusch-Godfrey Serial Correlation LM Test

F-statistic	1.051364 Prob. F(4,13)	0.419
Obs*R-squared	9.288175 Prob. Chi-Square(4)	0.054

Figure 1 shows that the cumulative number of recursive residues (CUSUM) is within critical limits for the 5% significance level indicating that the ARDL model coefficients in each specification are stable.

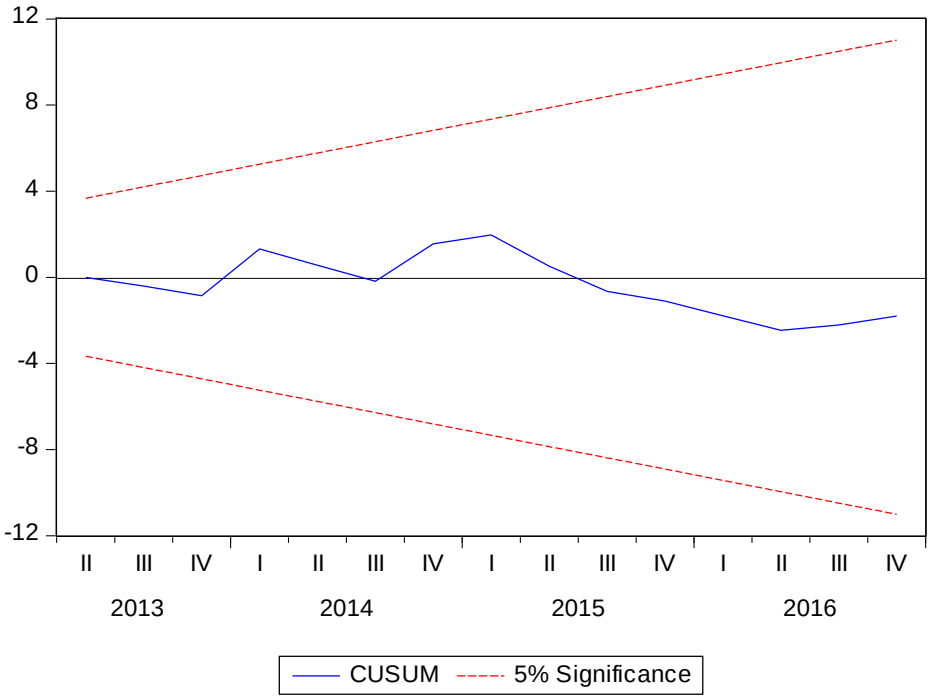

Figure 1. The plot of CUSUM for coefficient stability of Error Correction Model (ECM)

Conclusion

Motivated by the increasing interest of researchers and policy makers in understanding the impact of the development of financial sector intermediation on economic growth, this paper empirically examines the impact of financial development on economic growth in Indonesia during the period 2005:1 to 2016:4 using an autoregressive distributed lag (ARDL). The results indicate that indicators of financial development in the form of financial credit by banks and financial assets of commercial banks have a positive long-term impact on economic growth, but which has a significant impact is financial assets of commercial banks. Meanwhile, the indicator of financial development in the form of third-party funds of commercial banks has a negative and no significant impact on economic growth. While for the short-term financial development indicators are not significantly affect economic growth.

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