

FINANCIAL INTERMEDIATION AND THE REAL SECTOR IN INDONESIA

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1. Introduction

The evidence over the last thirty years has shown the existence of a relationship between financial structure and economic development. The traditional development economists, like Goldsmith (1969), McKinnon (1973) and Shaw (1973), offer detailed arguments and evidence on the role of organised financial structure of an economy to accelerate economic growth and improve economic performance. They believe that the surplus funds would be channelled efficiently to deficit units to stimulate the economy. In their view, differences in the quality and quantity of services provided by financial intermediation are the main reason for different economic growth of every country. Also, McKinnon and Shaw stress on the reform of financial markets that seems to be optimal strategy to generate both faster and steadier growth in real output by rising saving propensities and the quality of capital formation. However, these traditional economists only focus on the components of financial liabilities like money supply (which includes M1, M2 and M3) through savings or deposits in the financial intermediaries in generating more economic growth.

In contrast, during the 1980s and 1990s, many researchers have concentrated on financial assets in order to indicate the linkages between financial intermediary and economic growth. Williamson (1987) provides the evidence of positive correlation between real output and the real quantity of intermediated credit (as financial assets). He also finds that credit leads output in the sense of Granger causation. Hence, he shows the business cycle growth model could be caused by monetary shocks especially in an environment with imperfectly informed economic agents. He also proves the important role of monitoring cost incurred by financial intermediary in propagating the real shocks. These results are inconsistent with the findings of real business cycles that explain that real output fluctuation is caused by stochastic disturbances to production technologies¹.

Furthermore, Gertler (1988) has showed that some of the researchers have proved the significant relationship between credit and output. Then, macroeconomists have emphasised on the important role of financial intermediaries in the economy, particularly commercial banks, where their liabilities entered the money supply (in the credit supply process). He, further, discusses the consequences of Modigliani and Miller's proposition (1958) that real economic decisions are independent of financial structures. By using the business cycle model and the existence of

¹ These disturbances are propagated through agents' willingness to substitute intertemporally between leisure and working hours that will directly affect the employment and real output.

'lemons' problem in financial market², he finds the linkages of financial structure and output (economic performance) in many countries.

At the micro-level, Gertler and Gilchrist (1994) present evidence that credit constraints may impact on cyclical behaviour of firms. The impacts are likely to bind across a wider cross section of small firms in recessions than in booms. Indeed, the tightening of monetary policy during recessions has decreased the growth rate of sales and inventories of small firms rather than large firms. Similarly, Holmstrom and Tirole (1997) also show that since intermediaries and firms are capital constrained, therefore, all forms of capital tightening including a credit crunch, a collateral squeeze and saving squeeze hit heavily on poorly capitalised firms. In addition, they also find that interest rate effects and the intensity of monitoring depend on relative changes in the various components of capital.

The relationship between financial intermediation and economic growth has also been extended to examine the linkages of financial intermediation to economic growth and distribution of income. For instance, Greenwood and Jovanovic (1990) believe that a pre-requisite to develop financial structure, which in turn, allowed for higher growth since investment could be more efficiently undertaken. They find the evidence that as income level rise, financial structure becomes more extensive, economic growth becomes more rapid and income inequality across the rich and poor widens. But, in maturity stages of development, the economy has a fully developed financial structure, has higher growth rate and attains a stable distribution of income across people. They also show the importance of savings to generate economic growth and distribution of income.

However, other models show that financial assets other than credits (loans) also can be used to prove the greater impact of financial system on long run economic growth. King and Levine (1993) construct an endogenous growth model to prove the strong linkages of financial development to economics growth. Thus, they suggest that financial system also affects the entrepreneurial activities that led to productivity improvement. It can be seen through the role of financial intermediary in evaluating prospective entrepreneurs and choose the most promising projects. In addition, the financial intermediary also allow the investors to diversify the risk associated with uncertain innovative activities and reveal the potential rewards to engaging in innovation relative to continuing to make existing products with existing techniques.

² He illustrates how the asymmetric information between buyers and sellers about product quality can cause a financial market to malfunction.

King and Levine (1993) also produce several indicators of financial development that can be linked to economic growth across country. Ratios such as liquid liabilities to gross domestic product, ratio of total bank deposits to total assets of banks plus total assets of central bank, ratio of total credits to private sector over total credits to private sector plus total credits to federal and state governments, ratio of currency held outside of bank to total bank deposits and real interest rate are the proxies that have been used as financial development indicators. They conclude that these indicators could stimulate the economic growth by accelerating the rate of productivity enhancement.

Based on the theoretical arguments above, indeed, many of the researchers have provided the evidence of a relationship between financial intermediation and the real sector. Some models have indicated that the efficient financial intermediary will offer a broad range of services to its customer (especially the entrepreneur or borrowers) that directly encourages the output production and increases the economic performance. Here, we should realise the important of financial intermediary development that can directly generate a stable economic. Table 1 provides the evidence for our hypothesis that an increase in the intensity of financial intermediation led to stronger economic performance. The ratio of intermediary assets to annual output is one of the standard measures of the importance of intermediaries financing real activities. From the Table, we can summarise that the development of financial intermediary (based on the ratio of commercial banks assets (CBA) over gross domestic product (CBA/GDP) and ratio of total loans (LOAN) over GDP (LOAN/GDP) is greater than money (ratio of monetary base (MMB) over GDP, (MMB/GDP). Consequently, our analysis will distinguish between the impact of intermediation and money to the output (GDP). Also, we will examine the linkages of financial intermediation and money to output in long-run and short-run and also its causal linkage. In doing so, we can identify the main determinant of output fluctuations in Indonesia.

Table 1: Ratios of Commercial Bank Assets (CBA), Bank Loans (LOAN), and Monetary Base (MMB) to Output (GDP)

Year	CBA/GDP	LOAN/GDP	MMB/GDP
1966-1970	0.08	0.06	0.07
1971-1975	0.18	0.15	0.10
1976-1980	0.18	0.18	0.11
1981-1985	0.25	0.19	0.11
1986-1990	0.40	0.29	0.11
1991-1995	0.59	0.48	0.11
1996-2000	0.83	0.48	0.12
2001-2002	0.72	0.28	0.12

Source: Central Bank of Indonesia, Annual Report

The main purpose of this paper is to develop a model featuring the causal linkages between financial intermediation and real sector in Indonesia, as suggested by Rousseau and Wachtel (1998). In addition, there have been very few papers that have investigated this relationship in less sophisticated financial market, and then compared this finding over a number of countries that are quite sophisticated financially.

The rest of the paper is organised as follows. Section 2 will discuss the data and methodology that is used for this analysis. Section 3 presents the results from analysis of stationarity, cointegrating relationships and vector error correction models (VECMs) test. Section 4 concludes.

2. Methodology

A glance at graphs of the time series data suffices to reveal the invalidity of assumption for means and variance that are constant over time. Therefore, the vector autoregressive (VAR) framework is used to test the timing and direction of causal links between financial intermediation, money and economic performance. In addition, this study will also examine the ability of financial intermediation to explain output fluctuations that cannot be attributed to movement in money. In this section, we will first determine whether VARs is in level or first difference in unit root test for every time series of GDP, CBA, LOAN and MMB. Furthermore, we will identify the long-run relationship between financial intermediation and output in cointegration test. Then, we develop the VECM test that relates the change in GDP to the change in financial intermediation and money and its assess the 'equilibrating' error in the previous period that need to adjust the short-run disturbances (disequilibrium) in GDP. Also, we provide evidence of causality between financial intermediation and output that involves the VECMs causality test. If result from unit root, cointegration and VECMs test imply the timing test of financial intermediation and output, therefore, the VECMs causality test will explain the direction of causal linkage between the variables. The result from VECMs causality test is important to identify whether financial intermediation and money are the determinants to the output fluctuations in Indonesia.

Unit Root Test

The time series of GDP, CBA, LOAN and MMB are in fact, the examples of non-stationary time series, that is generated by random process, and can be written as follow:

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

where ε_t is the stochastic error term that follows the classical assumptions, which means, it has zero mean, constant variance and is non-autocorrelated (such an error term is also known as white noise error term) and Y is the time series. Since we need to use the stationary time series for the next cointegration test and we also need to solve this unit root problem, therefore, we will run the regression of unit root test based on the following equation:

$$\Delta Y_t = \mu + \gamma Y_{t-1} + \delta_1 \Delta Y_{t-1} + \varepsilon_t \quad (2)$$

where we add the lagged difference terms of dependent variable Y to the right-hand side of equation (2). This augmented specification is then used to test:

$$H_0: \gamma = 0 \quad H_1: \gamma < 0$$

Therefore, both the Augmented Dickey-Fuller (ADF) and Philip-Perron (PP) statistics are used to test the unit root as the null hypothesis.

Cointegration Test

Under the unit root test, the results show that the variables of financial intermediation, money (MMB) and output are stationary at the first difference [I(1)]. Continuously, all the variables will be tested in cointegration test, by using the Johansen test statistics, imply that if financial intermediation and output are cointegrated, so there is a long term equilibrium relationship between these variables.

Vector Error Correction Model (VECMs)

The cointegration test is used to prove the cointegrating relationship between financial intensity and output in the long run. However, they offer no information about the adjustment speeds of the variables to deviations from their common stochastic trend. Indeed, in the short run there may be disequilibrium. Therefore, we need the error term as the 'equilibrium error' which can correct gradually the deviations from long run equilibrium through a series of partial short run adjustment. Here, the vector error correction mechanism will correct for the disequilibrium. A VECMs is a restricted VAR that has cointegration restriction built into the specification. The VECMs can be written as follow:

$$\Delta x_{1,t} = \mu_1 + \sum_{i=1}^{k-1} \alpha_{1,i} \Delta x_{1,t-i} + \sum_{i=1}^{k-1} \beta_{1,i} \Delta x_{2,t-i} + \gamma_1 (\alpha x_{1,t-1} + \beta x_{2,t-1}) \quad (3)$$

where x_1 is output (GDP) and x_2 is a measure of the financial intensity or money. The last component of equation (3) is the error correction term (ECT), which is formed with the elements of the cointegrating vector and enters the model at a single lag. Since the cointegration test have proved the long run relationship between financial intensity and output, therefore, the sign and size of the coefficient on the ECT reflect the direction and speed of adjustments in the dependent variable to temporary deviations from this relationship. A negative loading on the intermediation measure in the cointegrating vector coupled with negative and significant coefficients on the ECT equation in equation (3) would imply that output rises in response to fluctuations that depress the value of the stationary combination. The sign of the loading would also be consistent with a role for increased intermediary activity as a source of these negative deviations.

VECMs Causality Test

Even though the cointegration and VECMs test will identify the cointegrating relationship between financial intensity and output, but these tests do not imply the causation. Therefore, we will establish the causality test by using VECMs causality test to develop a leading role for the variable in the fluctuations of another. Under this causality test, we can examine the existence of unidirectional causality or bilateral (feedback) causality from financial intermediation and money to output and vice versa.

3. The Results

In conducting this research, we construct the measure of intermediation which will include the assets of commercial banks (CBA), the total loans of commercial banks (LOAN), and the monetary base (MMB), that acts as a proxy to variable money. Also, we serve aggregate output (gross domestic product at market price or GDP) as our measure of general economic performance. By using, several data on the measurement of financial intermediation and GDP, this paper will provide detail argument on causal linkage between financial intermediation and economic performance that has implications for policymakers and economists. The data for GDP, CBA, LOAN and MMB are collected for the periods of 1966-2002.

Table 2 presents the results of both unit root tests for the output (GDP) and measure of financial intermediation and money for Indonesia in levels and first differ-

ence. The ADF tests fail to reject the null hypothesis at the 5% level for all variables in level. Similarly, the PP tests also fail to reject the null hypothesis for all variables in level. However, the ADF and PP test reject the null hypothesis for all variables in the first difference at 5% level. Since all variable are stationary at first difference, therefore, it is an I(1) stochastic process. The finding implies that it is reasonable to proceed with test for cointegrating relationship among combination of these series under the premise of non-stationarity.

Table 2: *Augmented Dickey-Fuller (ADF) and Philip-Perron(PP) Statistics for GDP and Measures of Financial Intermediation and Money*

Indonesia 1966 – 2002		
Level	ADF	PP
	k=1	k=3
ln GDP	-3.406**	-6.229*
	k=1	k=3
ln CBA	-6.322	-6.494*
	k=1	k=3
ln LOAN	-1.678	-1.415
	k=1	k=1
ln MMB	-3.158	-2.422
1st Difference	ADF	PP
	k=1	k=3
ln GDP	-7.793*	-5.804*
	k=1	k=3
ln CBA	-5.736*	-3.634*
	k=1	k=3
ln LOAN	-4.647*	-4.293*
	k=1	k=1
ln MMB	-3.738*	-3.252**

Note: The ADF and PP statistics were generated by model with constant and trend. k is the lag length and was determined by Akaike info criterion and Schwarz criterion for the ADF test. The PP test use the automatic lag length suggested by Newey-West. All variables were tested in log form.

* denotes rejection of the null at 5% level

**denotes rejection of the null at 10% level

The parameter estimates of the cointegrating model are reported in Table 3. The Johansen test rejects the null hypothesis at 5% which proves the existence of cointegrating relationship between financial intermediation and output, and also money and output, in the long term. However, the Johansen test result for LOAN also rejects the null hypothesis that at least exist one cointegrating vector between LOAN and GDP. Therefore, this result indicates two cointegrating equations at 5% significant level for LOAN variable.

Table 3: *Johansen Test Statistics for Cointegration Between Log Levels of Output and Measures of the Intensity of Intermediation*

	Trace Statistics		Max. Eigen		Normalized Cointegrating Vector	
	$r=0$	$r \leq 1$	$r=0$	$r \leq 1$	CE_{GDP}	CE_r
Indonesia 1966 - 2002						
$k=2$						
CBA	17.686*	2.230	15.453*	2.234	1.000	-1.133
$k=9$						
MMB	19.261*	4.887*	14.374*	4.887*	1.000	-0.928
$k=9$						
LOAN	15.785*	5.059*	10.726	5.059*	1.000	-0.939

Note: k = is the lag length. The column labeled $r=0$ test a null cointegration, while $r \leq 1$ column test a null of at one one cointegrating vector. *denote rejection of the null the 5% level with critical values from Oswald-Lenum (1992)

To examine the short-term adjustment process to deviations from the long-term equilibrium relationship, the parameters of the error correction models of equation (3) are estimated and presented in Table 4. The results of cointegrating vector show that short run changes in financial intermediation and money have significant effects on GDP. Thus, it implies the existence of cointegration between the variables in the short run. Given the negative sign on the financial intermediation measure in the cointegrating vector, increases in this measure could provide the impulses that drive the upward adjustments in output, though downward movements in past output would also reduce the value of the stationary combination. However, the negative and significant coefficient on the ECT in the output equation indicates a rapid response of output to deviations from its long run relationship with financial intermediation measure and money. In particular, negative deviations from the stationary relationship are 'corrected' by increases in output. In general, the findings of VECMs

test suggest that there is cointegrating relationship in short term between financial intermediation and money with GDP.

Table 4: *Vector Error Correction Model for Log Output and Measure of Financial Intensity*

Intensity Measure (Cointegrating Vector)	VECM	
	ECT	R ²
CBA	-1.412	0.312
	(30.023)*	
MMB	-0.857	0.519
	(6.742)*	
LOAN	-1.232	0.264
	(9.979)*	

Note: figures in parentheses refer to t-statistics

*denotes rejection of the null at 5% level

Finally, Table 5 presents the result of VECMs test for each variable. From the Table, we cannot prove the existence of bilateral causality from financial intermediation to GDP and from GDP to financial intermediation. Similarly, the results also indicate the existence of unidirectional causality from money (MMB) to GDP. Overall, the findings from causality test suggest that the financial intermediation would not affect the output fluctuation.

Table 5: *Vector Error Correction Model, Causality Test*

	Chi-Squre		Direction	
	Direction			
	1	2		
$\Delta \ln \text{GDP} - \Delta \ln \text{CBA}$	2.488	1.674	No Causality	
$\Delta \ln \text{GDP} - \Delta \ln \text{MMB}$	8.133*	0.464	MMB causes GDP	
$\Delta \ln \text{GDP} - \Delta \ln \text{LOAN}$	0.850	0.63	No Causality	

*denotes rejection of the null at 5% level

Conclusions

This paper, first, examines the nature of linkages between financial intermediary development and the real sector (economic growth). We use two econometric approaches. The first, we test the stationarity of each time series in order to estimate the cointegrating relationship in the long run and short run. The findings have identified that all time series are stationary at the first difference in the Augmented Dickey-Fuller and Philip-Perron test. Consequently, the Johansen cointegrating test shows that the financial intermediation and money are cointegrated with output in the long run. Similarly, the VECMs test also has proved that there are also cointegration relationships between financial intermediation and money with output in the short run through the significant and negative error correction term of each variable. Therefore, overall findings from cointegration test in this paper suggest the existence of cointegrating relationships between financial intermediation and money to output in the short run and long run. Next, we investigate the causal links between financial intermediation and money to output by using VECMs causality test. The reported findings show the non-existence of bilateral causality (feedback effect) between financial intermediary and money to output. This result implies that financial intermediation cannot cause the output fluctuations. Overall, the finding suggests that financial intermediation development is significant to affect the output fluctuations, either in short run or long run. Therefore, these findings are consistent with those by Rousseau and Wachtel (1998). Future work should substantially broaden and deepen our understanding of the determinants of the relationships between financial intermediation and output by adding other measures of financial intermediary development.

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Abstract

This paper examines the nature of the links between the maturity of financial intermediation and real sector that operated in Indonesia over the 1966-2002 period. It presents evidence on both the short- and long-run effects of the maturity of financial intermediaries on economic growth by resorting to recent developments in the theory of cointegrated process. An attempt is also made in this study to examine the Granger causality test to prove the leading role of the intermediation variables in the real sector activity. The results suggest an important role of financial intermediaries in the rapid transformation of the Indonesian economy.

JEL Classification: C12; G21; O4

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