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**Financial Development and Economic Growth:
an Empirical Analysis of Indonesia**

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Abstract

This paper empirically investigates the relationship between financial development and economic growth in Indonesia. A vector autoregressive model using time series data between 1968 and 2009 presents this dynamic relationship. Financial depth, the role of commercial banks, and credit to private sectors are three measurements of financial development used in this paper. However, differing from much empirical research in developed countries in which financial systems are well-behaved, the results of this research suggest that financial development in Indonesia does not have a significant positive impact on economic growth. The main factor in the failure of financial development in promoting growth is lack of fundamental factors in the financial system. These factors are lack of credibility of the monetary regulator, weaknesses in financial regulations and supervision, lack of a legal system and an ignorance of good corporate governance in the financial sector. In particular, there is no evidence that financial liberalization will promote economic growth if it is done without the development of a strong financial system.

Keywords: financial development, economic growth, vector autoregressive (VAR).

1. Introduction

The relationship between financial development and economic growth has been studied extensively in recent years. However, many researchers have recently turned to two contradictory conclusions about whether financial development has a positive impact or not. As reported by the World Bank (WB) and International Monetary Fund (IMF) (2005), the experience of many countries demonstrates that financial liberalization has two opposite effects in the economy. On the one side, development of the financial sector can encourage economic growth, but on the other side, the fragility of the financial sector can create an economic crisis and hamper growth. Furthermore, Zagha et al. (2006) claim that several countries gained an increase in saving rate and more access to credit, accordingly, increase investment and encourage economic growth. However, liberalization of the financial sector in many developing countries which started in the late 1980s and 1990s also created traditional macroeconomic problems, such as government and private debt problems, volatile exchange rate and unsustainable fiscal policy.

Like many developing countries, Indonesia also moved to liberalize the financial sector in the 1980s. As expected, initially, financial liberalization in Indonesia had a positive impact on the economy. The banking sector was able to accumulate funds from the public then distributed credit to

investors. The overall impact was growth of 7 percent annually on average during the 1980s to 1990s and Indonesia was included in the Asian Miracle countries. However, consistent with Demirguc-Kunt and Detragiache (2001), financial liberalization without prudent policy and inadequate institutional structure will increase the probability of a financial and an economic crisis. Their prediction became reality in 1997 where the Asian financial crisis hit Indonesia and shrank the Indonesian economy with growth of almost minus 15 percent.

In general, the empirical research on the relationship between financial liberalization and economic growth can be divided into two approaches. The first is in terms of bank-based financial system and the second is in terms of market-based financial system. As noted by Chakraborty and Ray (2006), with a market-based system, the financial market allows debtors to obtain funds directly from lenders in the form of financial instrument transactions such as in the stock or bond markets. In contrast, in a bank-based market, the banking system plays a dominant role as intermediaries between lenders and borrowers. Furthermore Thangavelu et al. (2004) point out that in the bank-based system, financial intermediaries influence economic activity by increasing the saving rate, providing liquidity, and mobilizing funds to the most efficient investors in the economy. On the other hand, a well-developed capital and bond market can create better allocation and diversify risks.

Similar to many developing countries, the economy and financial system in Indonesia is dominated by the banking system as the intermediary institution. As noted by Beck et al. (2000), on average, in the period 1981-1990 and 1991-2000, the deposit money bank assets / GDP was 26.67 percent and 50.49 percent respectively, whereas in the same period the capital market capitalization / GDP was only 0.66 percent and 22.61 percent respectively. In addition, according to Rosser (2002) until 1977, the capital market in Indonesia was inactive as a result of President Soekarno's policy to nationalize Nederland-owned companies and stop the operation of the Jakarta Stock Exchange. Until the 1990s, the capital market grew slowly due to the regulation that foreigners were prohibited from involving in the transactions on the Jakarta Stock Exchange. Therefore, in this study, the empirical research on the relationship between financial liberalization and economic growth is limited to bank-based market approach.

There are several indicators of financial development in the literature. In this study, following Ang and McKibbin (2007) and King and Levine (1993a), financial liberalization is measured by M2 to Gross Domestic Product (GDP) ratio, commercial bank assets to total bank assets ratio, and the ratio of private credit to GDP. Economic growth is measured by real GDP per capita. Nominal interest rate of credit is used as a measurement of interest rate level, and

price level is measured by consumer price index (CPI).

The idea that financial liberalization has a positive impact on economic growth is found by Schumpeter (1934), who argues that the development of the financial sector is an important aspect for economic development via technological innovation. Furthermore, Gultom (2008b) emphasizes that financial development can encourage per capita income, increase productivity and investment efficiency, and consequently have a positive impact on economic growth in the short and long term. A similar argument of the positive impact of financial development on growth is also proposed by McKinnon (1973) and Shaw (1973) who suggest that financial liberalization would increase savings, accumulate capital, encourage investment and therefore stimulate economic growth. Using a model of prediction that links development, savings, growth and income distribution, Greenwood and Jovanovic (1990) conclude that financial development can create opportunities for higher rate of return on capital, more efficient investment, and so impact positively on economic growth. Bencivenga and Smith (1991) compare the model of an economy, with financial intermediaries and without intermediaries. The comparative models show that with financial intermediaries the economy will grow higher than without financial intermediaries by decreasing the reliance on self finance and avoiding the early

liquidation of capital investment. Other theoretical frameworks of the relationship between financial development and economic growth are also developed by Levine (1991), King and Levine (1993a), and Bencivenga et al. (1995).

In their empirical research, King and Levine (1993b) use the model based on the endogenous technical change theory developed by Romer (1990) to analyze the link between financial development and growth. Using five countries data from 1974 to 1989, they point out that financial development has a positive impact on economic growth by improving efficiency, mobilizing resources, diverting and reducing risk and encouraging innovation. Murinde and Eng (1994) examine the relationship between financial restructuring and economic growth in Singapore using a supply-leading and demand-following finance approach. Their results suggest that financial development influences economic growth through a supply-leading channel. Demetriades and Hussein (1996) examine the link between financial development and growth using time series data from 16 countries with a vector autoregressive model. Their results demonstrate that in general financial liberalization has a positive effect on economic development. Levine et al. (2000) using both GMM-dynamic panel techniques and traditional cross section IV-procedures show that financial development is positively correlated with economic growth.

Several recent empirical studies on the relationship between financial development and economic performance also show the positive impact of financial liberalization on growth. For example, Thangavelu et al. (2004) investigate the relationship between economic growth and financial liberalization in Australia using a VAR model in terms of market-based and bank-based financial structure. They conclude that financial development has a positive impact on economic growth, but economic growth does not have an impact on the financial market. Hondroyannis et al. (2005) examine the link between financial liberalization and economic growth in Greece during the period 1986-99. They conclude that financial liberalization and economic performance influence each other. Ranciere et al. (2006) conclude that financial development encourages faster long-term economic growth, although there is a risk of a crisis.

Although much research in this area concludes that financial development influences economic growth, there are several empirical studies that come to a different conclusion. For instance, Ang and McKibbin (2007), using financial and macroeconomic data of Malaysia over the period 1960–2001, demonstrate that although the financial reform process can enlarge the financial system, financial development does not appear to stimulate economic growth. Elbourne and de Haan (2006) using data from central and eastern Europe, conclude that

there is still an unclear relationship between financial liberalization, monetary policy and output. Liang and Teng (2006) investigate the link between financial development and economic growth of China using data between 1952 and 2001 with a vector autoregressive model. Their results show no evidence that financial development encourages economic growth. On the contrary, their research suggests that economic growth promotes financial development. In addition, Matsumoto (2007) points out that financial liberalization without an adequate institutional structure and prudent supervision are the most important factors that create financial and economic crises.

Although considerable research has been done on the relationship between financial development and economic growth, but much less is known about the role of financial development in promoting economic growth in the country with lack of institutional structure and problematic legal system such as Indonesia. Indonesia is selected as a study case for three reasons. First, Indonesia has a long-history of financial reform. Beginning in June 1983, Indonesia started to move from financial repression to financial liberalization. The Asian financial crisis in 1997/1998 forced Indonesia to change fundamental factors in the financial system. As pointed out by Gultom (2008c), to avoid a further crisis in the financial system as a result of banking insolvency and non-performing loan

problems, the government established the Indonesian Banking Restructuring Agency (BPPN). Another fundamental change was implementing an independent monetary policy for the Central Bank. Second, during the 1980s and 1990s, Indonesia was included in the Miracle Asian countries, and one factor viewed as a driver in economic growth was liberalization in the financial sector (Visser and Herpht (1996). However, the same factor also appears to be the most important aspect that shrank the Indonesian economy after the 1997 financial crisis (Matsumoto (2007). Finally, the availability of annual data of the financial system over the period 1968-2009 is long enough to tolerate an empirical investigation using time series data.

The main question in the research is whether financial liberalization in Indonesia plays a key role in promoting economic growth, or vice versa. Another problem is to identify the factors that influence the relationship between financial development and economic growth.

The purpose of this research is to investigate the relationship between financial development and economic performance in Indonesia using annual time series data over the period of 1968-2006. This research extends the investigation to find the factors that influence the effect of financial development on economic growth. This research uses vector autoregressive (VAR) models and Granger causality tests to analyze the relationship.

In contrast to Schumpeter (1934) and King and Levine (1993b) who find that financial development has a positive impact in promoting growth, the results of this empirical research suggest that financial liberalization in Indonesia does not play a key role in economic growth. Conversely, economic performance influences the growth of credit to private sectors, but does not influence the development in monetary deepening and the role of commercial bank assets. The result also support the argument of Demirguc-Kunt and Detragiache (2001) that financial liberalization is not the most important aspect to encourage economic activities if there is lack of proper regulations and weak institutional infrastructure.

The remainder of this paper is structured as follows. Section 2 presents the theoretical framework. Data are presented in Section 3. Section 4 presents methodology. Section 5 presents the results, followed by an analysis of the results. Finally, the conclusions and policy implications are presented in Section 6.

2. Theoretical Framework

There are many theories about the relationship between the financial sector and the real sector. Theoretically, output and price level will respond to a change in money supply, change in bank assets and credit. Friedman and Schwartz (1963) argue that, if money supply increases, initially, money in the hand of customers will increase and make them

feel richer, so they will be encouraged to increase spending. Firms that produce goods and services will respond to the rise in demand by selling more products. To increase production firms need more raw materials, more labor, and other inputs. This cycle will boost aggregate consumption and production, and stimulate economic growth. However, Schwartz (1987) points out that if the money persists to increase and economic growth has reached a limit, prices will rise, and the public starts to expect a higher price level, and finally, an increase in money supply only creates inflation. Conversely, Samuelson and Nordhaus (2005) maintain that if output increases, income or return of factor productions also increases, and the public needs more money. As a result, central bank should increase money supply to fulfill the increase in money demand.

Commercial banks as financial intermediaries play a key role in economic activity. According to Levine (2001), commercial banks facilitate saving mobilization, capital accumulation, and efficient allocation of funds from savers to borrowers. Consequently, the increase in the capability of banks will increase investment and boost growth. Conversely, Samuelson and Nordhaus (2005) show that bank assets are influenced by savings and time deposits, while savings are influenced by income and economic activity.

King and Levine (1993b) claim that banking credit to the private sector

will be used in the most efficient way since the objective of the private sector is maximizing profit. The increase in efficiency will encourage productivity and output. Conversely, financial intermediaries also want to ensure profitability of their credit. Consequently, when they give credit to borrowers, the amount of credit and interest rate should be adjusted with the prospect and the risk of the creditors' project. Since the level of economic activity influences the success of an investment, economic growth will have an impact on the credit distributed to private sectors by the banking system.

3. Variables and Data

The selection of variables as indicators of financial development is important in empirical studies related to financial development or financial liberalization. According to the World Bank (WB) and International Monetary Fund (IMF) (2005), there are several indicators of financial development in the literature. The first indicator of financial development is financial depth, where the ratio of M1 or M2 to GDP is used as a measurement of financial deepening. This indicator seems to be a poor measurement of financial development since it is based on monetary aggregates, which do not indicate the ability of the financial system to distribute funds from savers to borrowers. However, this indicator is widely used in empirical researches because of the availability of data.

The second indicator of financial development is the ratio of commercial bank assets to total bank assets (commercial plus central bank assets). As proposed by King and Levine (1993a), this measurement indicates the role of commercial banks in the financial system. This indicator assumes that the commercial bank will maximize profits by allocating credit to the most efficient project. So, the larger the relative importance of the commercial banks in the overall banking system, the higher the level of financial development of the country.

The ratio of private sector credit to GDP is the third indicator of financial development. The World Bank (WB) and International Monetary Fund (IMF) (2005) point out that this ratio indicates properly the role of intermediaries in distributing funds from savers to borrowers. Furthermore, this indicator is based on the assumption that the private sector always tries to act efficiently in allocating and using capital.

Hence, in this study, we use the ratio of M2 to GDP as an indicator of financial deepening, the ratio of commercial bank assets to total bank assets as an indicator of the role of the commercial banking sector, and the ratio of private sector credit to GDP as an indicator of an efficient allocation of funds in the economy. Then, real GDP per capita is used as an indicator of economic growth. Furthermore, following Lago-González and Salas-Fumás (2005), one possible channel for financial development in influencing

economic growth is through interest rates where, theoretically, a decrease in interest rates will encourage investment and economic growth. So, to capture this channel, the interest rate and price level are included in the vector autoregressive model.

Most of the data come from the international financial statistics (IFS), covering annual data for Indonesia during the period 1968 to 2009. Some data between 1968 and 1970 are obtained from the Asian Development Bank, UN statistics, Indonesian Central Bureau of Statistics, and the Bank of Indonesia. All data but interest rate are transformed into natural log.

4. Methodology

Based on this theoretical framework, we model the relationship between financial development and economic growth as:

$$\begin{bmatrix} x_{1t} \\ x_{2t} \\ \vdots \\ x_{nt} \end{bmatrix} = \begin{bmatrix} A_{10} \\ A_{20} \\ \vdots \\ A_{n0} \end{bmatrix} + \begin{bmatrix} A_{11}(L) & A_{12}(L) & \cdots & A_{1n}(L) \\ A_{21}(L) & \cdot & \cdot & \cdot \\ \cdot & \cdot & \cdot & \cdot \\ A_{n1}(L) & \cdot & \cdot & A_{nn}(L) \end{bmatrix} \begin{bmatrix} x_{1t-1} \\ x_{2t-1} \\ \vdots \\ x_{nt-1} \end{bmatrix} + \begin{bmatrix} \varepsilon_{1t} \\ \varepsilon_{2t} \\ \vdots \\ \varepsilon_{nt} \end{bmatrix} \quad (2)$$

Where A_{i0} s are the parameters that represent intercepts, and $A_{ij}(L)$ s are the polynomial in the lag operator of L with $a_{ij}(1)$, $a_{ij}(2)$, $a_{ij}(3)$,... are $A_{ij}(L)$'s individual coefficients. The terms ε_{it} s represent white-noise disturbances that might be correlated. Furthermore, choosing the appropriate lag length is important for the determination of the

(1)

$$FD_t = f(Y_t, I_t, P_t)$$

Where FD_t refers to financial development indicators, Y_t refers to the level of economic growth, and I_t refers to interest rate and P_t refers to price level. However, when we use macroeconomic variables, endogeneity can be a problem. So, according to Enders (2004) treating each variable symmetrically is a common extension of transfer function analysis. In this case, a vector autoregressive framework will encounter the problem by assuming all variables involved in the model are endogenous. Furthermore Sims (1980) maintains that a VAR model will capture dynamic analysis, resolve identification problems and a VAR model is better for policy and forecasting analysis. Following Enders (2004), an n -equation VAR can be modeled as:

variables included in the VAR system. Following Enders (2004), although it is possible to determine each lag length for each variable, it is common to use the same lag length for all variables in order to preserve a symmetric system. But, there is a trade-off between misspecifications and degree of freedom problems. If lag length is too long it will

sacrifice degree of freedom, but if too short it might create misspecifications. So, to determine the appropriate lag length we use likelihood ratio tests or alternative criteria such as the Akaike information criterion (AIC) or Schwartz Bayesian criterion (SBC). The Granger causality tests enable us to

relationship between variables included in the VAR system. Enders (2004) shows that in a multivariable case of (2), variable j does not Granger cause variable i if and only if all coefficients of $A_{ij}(L)$ are equal to zero. Often, we need to investigate causality among the variables in the system, for example, if we have the multivariate VAR as

determine the

$$\begin{bmatrix} x_{1t} \\ x_{2t} \\ x_{3t} \\ x_{4t} \end{bmatrix} = \begin{bmatrix} a_{10} \\ a_{20} \\ a_{30} \\ a_{40} \end{bmatrix} + \begin{bmatrix} a_{11} & a_{12} & a_{13} & a_{14} \\ a_{21} & a_{22} & a_{23} & a_{24} \\ a_{31} & a_{32} & a_{33} & a_{34} \\ a_{41} & a_{42} & a_{43} & a_{44} \end{bmatrix} \begin{bmatrix} x_{1t-1} \\ x_{2t-1} \\ \cdot \\ x_{nt-1} \end{bmatrix} + \begin{bmatrix} \varepsilon_{1t} \\ \varepsilon_{2t} \\ \cdot \\ \varepsilon_{nt} \end{bmatrix}, \quad (3)$$

If we define $z_t = x_{1t}$ and $x_t = (x_{2t} \ x_{3t} \ x_{4t})'$ and the test that $x_t \neq \xrightarrow{GC} z_t$ is a standard F-test with restrictions of all coefficients in x_t are zero in the first equation.

However, the test that $z_t \neq \xrightarrow{GC} x_t$ involves restrictions on three equations of $x_{2t} \ x_{3t} \ x_{4t}$. Under $H_0 : \alpha_{21} = \alpha_{31} = \alpha_{41} = 0$, the Granger causality test is the likelihood ratio test (LR) = $\text{dofc}[\ln|\Omega_R| - \ln|\Omega_{UR}|]$, where dofc is the number observations minus the number of variables involved in the unrestricted model and $|\Omega|$ is the determinant residual covariance of the maximum likelihood estimation (MLE). Under the null hypothesis, the LR test is distributed as a χ^2 with degree of freedom the number of restrictions.

5. Results and Analysis

In this study, four variables (economic growth, indicator of financial development, interest rate and price) are used in each model. Since there are three indicators of financial development, the ratio of M2 to GDP (M), the ratio of commercial bank assets to total bank assets (BA) and the ratio of private credit to GDP (PR) are used for estimation purposes. Whereas real GDP per capita (Y), nominal interest rate (I) and consumer price index (P) are used as the proxy of economic growth, interest rate level and inflation rate respectively. So, there are three main models in the relationship between financial development and economic growth as presented in

Table 1.

Table 1 Three main models	
Model	Variable
1	Y, M, I, P
2	Y, BA, I, PR
3	Y, PR, I, P

Following Enders (2004), unit root test using the Augmented Dickey Fuller (ADF) Test is the first step in testing to determine the order of integration. By definition, cointegration requires each variable included in the model to be

integrated of the same order and the order must be greater or equal to one. The results of the test presented in Table 2 suggest that except for interest rate, other variables are integrated of the order one

Table 2 Unit Root Test

Variable	I(0)		I(1)	
	ADF Test	5 % critical value	ADF Test	5 % critical value
M	-0.58	-3.52	-5.41	-3.52
BA	-1.88	-3.52	-5.06	-3.52
PR	-1.83	-3.52	-4.01	-3.52
Y	-2.38	-3.52	-4.22	-3.52
I	-6.40	-3.52	-7.26	-3.52
P	-2.46	-3.52	-5.44	-3.52

Following Granger (1988), to investigate the relationship between economic growth and financial development, the Granger causality tests are performed. The summary of optimal lag length, and VAR

stationary is presented in Table 3 and the main result of Granger causality is presented in Table 4, Table 5, and Table 6 (detailed data are presented in Appendix A and Appendix B).

Table 3 **Lag length and VAR Stability Condition**

Variable	Optimal lag	Criterion	VAR Stability	Explanation
Y, M, I, P	1	AIC, BSC,LR, FPE	Stable	AIC, LR, FPE
Y, BA, I, P	1	AIC, BSC,LR, FPE	Stable	AIC, LR, FPE
Y, PR, I, P	1	AIC, BSC,LR, FPE	Stable	AIC, LR, FPE

Money Supply and Output

In contrast to Friedman and Schwartz (1971) and Sims (1992), there is no evidence that increasing money supply in Indonesia will have a positive impact on output. The Granger causality tests presented in **Error! Reference source not found.** suggests that money supply does not influence interest rates and economic growth. Furthermore, the impulse response analysis (Appendix C)

indicates that output does not respond immediately to the shock in money supply. The effect of money supply shock increases in the second period, but after that, the impact declines toward zero. In addition, the impulse response analysis (Appendix C) shows that neither the lower nor upper confidence band appears to be jointly positive. Therefore we conclude that overall, there is no significant impact of change in money supply on economic growth

Table 4 **GC Test of Money, Output, Interest Rate and Price**

GC Test	F or LR test	5 % c.v	Result	Conclusion
Money GC others	-0.804	7.815	Do not Reject H0	$M \not\rightarrow^{GC} Y, I, P$
Others GC Money	0.034	2.874	Do not Reject H0	$Y, I, P \not\rightarrow^{GC} M$
Output GC Others	0.211	7.815	Do not Reject H0	$Y \not\rightarrow^{GC} M, I, P$
Others GC Output	1.014	2.874	Do not Reject H0	$M, I, P \not\rightarrow^{GC} Y$
Output, Money GC Interest, Price	0.916	9.488	Do not Reject H0	$Y, M \not\rightarrow^{GC} I, P$
Output, Price GC Interest, Money	1.956	9.488	Do not Reject H0	$Y, P \not\rightarrow^{GC} M, I$

GC Test	F or LR test	5 % c.v	Result	Conclusion
Output, Interest GC Price, Money	-2.756	9.488	Do not Reject H0	$Y, I \neq \xrightarrow{GC} P, M$
Conclusion	Money Supply does not GC Economic Growth. Economic Growth does not GC Money Supply.			

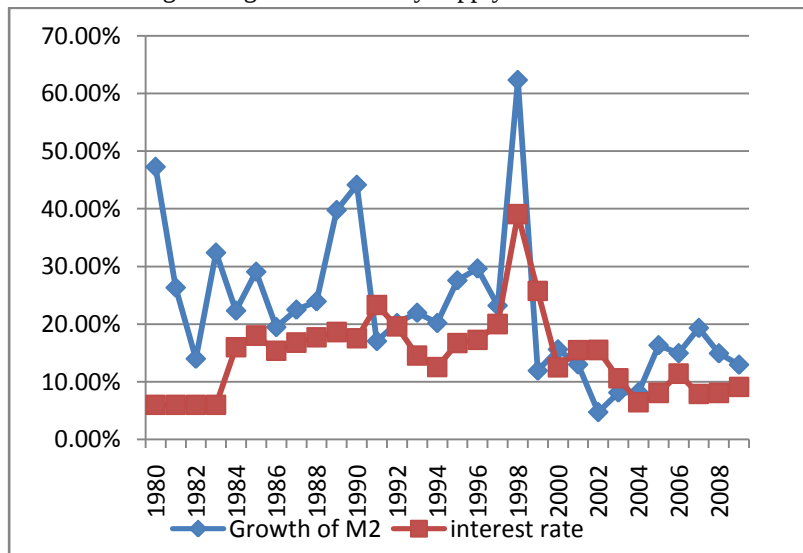
Three factors cause ineffectiveness of money supply policy in influencing economic activities in Indonesia. The first factor is the failure of the money supply instrument as a tool to influence the interest rate. Theoretically, as proposed by Ohanian and Stockman (1995) and Hoover (1995) with their liquidity effect hypothesis, the Central Bank should be able to reduce the short term interest rate that can boost economic growth via investment. However, as shown in the impulse response analysis (Appendix C), there is no significant response of interest rates due to the shock on money supply changes. Consequently, without capability of decreasing interest rate, there is no channel for money supply to

influence economic activities which lead to an increase in economic growth. The economic crisis in 1997-1998 gave additional evidence of the ineffectiveness of money supply manipulation. Although the Central Bank doubled money supply in nine months, it could not prevent a fall in economic growth of about minus 15 percent.

This condition was worsened by the misperception of the Central Bank about the specific economic relationship between monetary policy and its effect on economic behavior. Following McLeod (2002), the Central Bank held the view that an increase in money policy would decrease interest rates and boost economic activity. But, the data in

Figure 1 do not support this view

Figure 1 growth of money supply and interest rate



Source: International Monetary Fund, 2008. 'International Financial Statistics', <http://www.imfstatistics.org/imf/> (02/04/2008).

Conversely,

Figure 1 shows that, the pattern of interest rates follows the direction of money supply growth. For example, when the money supply growth increased from 20 percent in 1994 to 28 percent in 1995, the interest rate also increased from 13 percent to 17 percent. The same pattern also happened in 1997-1998 where an increase in money supply growth was followed by an increase in

the interest rate. Finally, when money growth increased from 8 percent in 2004 to 16 percent in 2005, the interest rate also increased by 2 percentage basis points. One possible reason for this anomaly is the inflation expectation of the public. Indonesians are still traumatic by hyperinflation of more than 1000 percent at the end of Soekarno's presidency in the 1960s which destroyed the economy. As Mohamed (2000) claims, the most important factor contributing to hyperinflation was due to money printing by the Central Bank to finance the government's deficit. Consequently, the rise of money supply was noticed as the beginning of the increase in inflation. Furthermore, following McLeod (2002), the rise in inflation is viewed as a decrease in purchasing power and for this reason, economic agents need compensation by increasing income from deposits. On the other hand, borrowers realize there is an increase in the real future value of their debt, so they are agreeable to pay a higher interest rate.

Second, the improper system of indirect monetary policy cannot absorb over-liquidity in the market. Gultom (2008c) points out that after eliminating interest rate and credit control, the Central Bank adopted an indirect monetary policy using open market operations. The Central Bank set out the operational target of base money (M0) and intermediate target of narrow money (M1) and broad money (M2). However, as pointed out by Sabirin (2003), until 1993, the Central Bank introduced the

'cut-off rate' (COR) system in the auction of the Bank Indonesia certificate (SBI) as the money market instrument used in open market operations. Different to the 'stop out rate' system (SOR) in which quantity is predetermined and the interest rate follows money market equilibrium, in COR, the Central Bank sets the SBI rates (prices) and then the money market determines the quantity of SBIs traded. The predetermined interest rate in the COR system cannot attract the market to buy SBIs since the interest rate does not represent market equilibrium. As a result, the quantity of SBIs sold are not as much as targeted, the over liquidity could not be absorbed, and the base money targeted, and hence M1 and M2 could not be achieved. This condition was worsened by the lack of transparency in the auction system in which only limited parties in the money market were involved, so there was no competitive auction system. The predetermined interest rate that did not represent market price and uncompetitive markets created inefficiency in the money market. This inefficiency led to the failure of the money supply instrument to manipulate the interest rate and therefore could not influence investment and economic activities.

The lack of credibility of the Central Bank and its personnel is the third factor that influences the failure of the money supply in promoting economic growth. As argued by Tanuwidjaja and Choy (2006), credibility is important since the effect of

monetary policy depends on public expectations. So, if the Central Bank lacks credibility, the public responds differently to the expectation targeted by the policy. The credibility of the Central Bank in Indonesia is not good because of several corruption scandals and political pressure. For example, as noted by the Indonesian Commission against Corruption (KPK) (2006) several governors and other executives of the Central Bank were prosecuted in court related to corruption. First, based on the investigation by the Audit Board of the Republic of Indonesia (BPK), Sudrajat Djwandono (the Central Bank's Governor 1993-1998) was prosecuted related to fraud in the allocation Rp 138 trillion liquidity credit of bank of Indonesia (BLBI) for 48 banks. Second, the Bank Bali scandal on account receivable factoring caused Syahril Sabrin (Governor 1998-2003) to be put on trial. This case also involved the Minister of Finance, Bambang Subianto and a politician, AA Baramuli. Recently, Burhanuddin Abdullah (Governor 2003-2008) and three executives were also accused in the case of bribery. Many corruption scandals and mismanagement in the Central Bank diminished the confidence of the public in the Central Bank. As a result, when the Central Bank releases a policy, the public often responds negatively, and the objective of the policy cannot be achieved or it needs additional costs to reassure the public.

An important result of this study related to monetary policy is that independence of the Central Bank does

not increase the effectiveness of money supply in influencing economic growth. This finding is contrary to the argument of the Indonesian House of Representatives (1999) and Pohan (2008). They claim that the position of the Central Bank under the government before 1999 caused ineffectiveness of monetary policy, since the Central Bank could not independently use its tools, such as monetary policy to achieve its objectives. In addition, as stated by the Central Bank Act No. 23 / 1999, independence of the Central Bank is necessary to implement an effective monetary policy in order to maintain and improve economic development. However, the data give a different conclusion. Including a dummy variable of 1 for the period after 1999 in the model (Appendix B) shows that the independence of the Central Bank does not increase the effectiveness of money supply policy on economic growth. The Granger causality test indicates that with independence, the money supply is still ineffective as monetary instrument to influence economic activity. Consistent with Swasono (2002), independence without credibility and transparency not only fails as a guarantee to implement effective and efficient policy, but can also create the opportunity of moral hazard of central bank's personnel that can dampen economic activity.

Interestingly, there is one important finding in the case of Indonesia's economy. Differing from Schwartz (1987), the increase in money supply does not induce an increase in

price level. As shown in **Error! Reference source not found.** and in the impulse response analysis (Appendix C), the price did not respond immediately to the shock in the money. The price only responded in the second period, but it was not statistically significant and then, the effect diminished until zero at period 6. One possible explanation for this is the existence of a price control policy through a price ceiling and subsidies for important goods such as rice and petrol. Although criticized by many scholars because the price stabilization program neglects the efficiency of resource allocation, but, as pointed out by Mangkusuwondo (1973) the price

Table 5 shows that the growth of commercial bank assets does not have a significant impact on economic growth. Conversely, the increase in economic activity does not play a significant role in the growth of commercial bank assets.

stabilization program succeeded in solving hyperinflation in the 1960s and encourage economic activity at the end of the 1960s. Furthermore Cummings et al. (2006), state that even after Soeharto's presidency era, price stabilization was still an important policy for political and social reasons, especially related to food availability. As a result, the effects of increasing the money supply on boosting inflation were dampened by price stabilization policy.

Bank Assets and Output

The Granger causality test presented in

Furthermore, the impulse response analysis suggests that, overall, there is no significant and immediate impact of economic output, interest rate and price level due to the shock on commercial bank asset growth.

Table 5 GC Test of Bank Assets, Output, and Interest Rate, Price

GC Test	For LR test	5 % critical value	Result	Conclusion
Bank assets GC others	4.298	7.815	Do not Reject H0	$BA \neq \xrightarrow{GC} Y, I, P$
Others GC Bank assets	0.274	2.874	Do not Reject H0	$Y, I, P \neq \xrightarrow{GC} BA$
Output GC Others	3.180	7.814	Do not Reject H0	$Y \neq \xrightarrow{GC} BA, I, P$
Others GC Output	1.495	2.874	Do not Reject H0	$BA, I, P \neq \xrightarrow{GC} Y$
Output, Bank assets GC Interest, Price	6.371	9.488	Do not Reject H0	$Y, BA \neq \xrightarrow{GC} I, P$
Output, Price GC Interest, Bank assets	6.891	9.488	Do not Reject H0	$Y, P \neq \xrightarrow{GC} BA, I$
Output, Interest GC Price, Bank assets	0.86	9.49	Do not Reject H0	$Y, I \neq \xrightarrow{GC} P, BA$
Conclusion	Bank assets does not GC Economic Growth. Economic Growth does not GC Bank assets.			

In contrast to Gultom (2008a), development of the financial sector as represented by the banking system does not have positive effect on economic growth. Three possible reasons cause ineffectiveness of growth in commercial bank assets in promoting economic activities. The first is the blanket guarantee of the Central Bank to prevent systemic failure of banking industries. This implicit guarantee creates moral hazard of banking management in transferring credit risk to the Central Bank. Banking industries tended to get excessive loans from foreign countries and gave credit to high-risk investments. As a result many banks had huge assets but poor performance. Fane and McLeod (2001) suggest that a possible reason for the relatively poor performance of the large banks is the confidence of those banks that they were “too large to be allowed to fail” due to the political and social impact of the large bank liquidation. The data presented by Suta and Musa (2003) support the argument of Fane and McLeod (2001). For instance, the liquidity credit of the Central Bank (BLBI) was given when a bank faced a problem of insolvency or liquidity and data in June 1997 demonstrated that the seven biggest debtors of BLBI that received 15.6 percent of total BLBI were the large banks with total assets on average of more than Rp 5 trillion. At the same time, total BLBI received by seven small categorized banks was only 0.40 percent of the total BLBI. The chronic problem

in the banking sector diminished the capability of preventing the banking crisis that led to a financial crisis and eliminated the opportunity to promote growth. So, the evidence indicates that larger assets of a bank without an increase in performance increase the probability of insolvency and larger costs for bailing out, hence have a negative impact on the economy.

Second, most commercial banks were unable to accomplish their normal function as intermediary institutions. Djiwandono (2005) notes that in the period before the 1997 crisis, many large banks tended to get excessive foreign-denomination loans from foreign financial institutions and allocated the credit to their own groups. As a result, large assets without prudent banking management and good corporate governance increased the level of non-performing loans. After the financial crisis, the commercial banks were still unable to improve their functions as efficient intermediary institutions. But, the reason was the low capability of the real sector to absorb credit from the banking system and anxiety about the high-risk credit. As noted by Sunarto (2007) the loan to deposit ratio (LDR) of commercial banks in 1999-2003 were only between 45 percent and 56 percent on average. Commercial banks tended to invest the liquidity surplus in Bank Indonesia certificates (SBI), inter-bank lending, and government bonds. For example, in October 2002, from available deposits of about Rp 821

trillion, the commercial banks invested more than Rp 400 trillion in government bonds. Low capability of distributing credit is one reason for the ineffectiveness of growth in bank assets to boost economic activity.

The third possible reason is that the process of banking reform in Indonesia was a more intricate process in political terms rather than based on economic and efficiency considerations. For example, Rosser (2002) states that in 1967 the government tried to boost economic growth by banking sector deregulation that enabled private foreign and domestic banks to give credit. However, the deregulation did not eliminate financial repression such as credit and interest rate control. Pangestu (1996) demonstrates that although the credit from private foreign and domestic banks grew significantly between 1974 and 1978, the state bank still dominated almost 90 percent of the total credit. Furthermore Rosser (2002) points out that the main problem of this domination was in the process of credit allocation where politicians and bureaucrats involved in the decisions on what level of interest rate subsidies and which groups and sectors would be qualified for the subsidized credit. Consequently, the control of politico-bureaucrats led to moral hazard and rent-seeking activities. Further banking reforms implemented in 1983 could not improve the fundamental condition of the banking sector as the anchor of financial stability. The involvement of bureaucrats and the family and conglomerates affiliated with

Soeharto's cronies often influenced the decisions of major financial transactions. This condition was worsened by the lack of banking supervision and inadequate human resources in the banking sector. As a result, many deregulations of the banking sector failed to increase efficiency and encourage economic growth.

Another important aspect that contributes to the ineffectiveness of commercial bank assets in promoting economic growth is the failure of growth in commercial bank assets in influencing interest rate. As indicated by the impulse response analysis (Appendix C), the interest rate responds negatively on the shock of bank assets in the first and second periods, but in general the response is not statistically significant. Theoretically, as argued by Lago-González and Salas-Fumás (2005), large banks have more flexible alternatives to choose the best debtors and the most prospective projects because they have more capital and more bargaining power than the small banks. Consequently, better opportunities induce efficiency and enable large banks to adjust their interest rate. However, differing from Lago-González and Salas-Fumás (2005), larger assets and market power of Indonesia's commercial banks fail to decrease interest rates. Moral hazard, lack of banking supervision, and ignorance of prudent banking management cause inefficiency in the banking sector. So, although the large banks have more choices to allocate credit in the most efficient way, these

three factors prevent the banking sector to cut the interest rate. Failure of the interest rate adjustment causes failure of promoting investment which hampers the ability of Indonesia's banking sector to play a key role in promoting economic growth.

Private Credit and Output

Table 6 demonstrates that at 5 percent significance level, the test statistic does not reject the null hypothesis that private credit does not Granger cause economic growth. Moreover, the impulse response analysis

Differing from many empirical results such as McCaig and Stengos (2005) and Thangavelu et al. (2004), the growth credit of the private sector does not have a positive impact on economic growth in Indonesia. The result of the Granger causality test presented in

(Appendix C) shows that overall, there is no significant impact of output as a response to the shock in private credit growth. Conversely, the private credit sector has a positive significant response with the lag of one period on the shock of output, before diminishing in period 6.

Table 6 GC Test of Private Credit, Output, Interest rate and Price

GC Test	For LR test	5% critical value	Result	Conclusion
Private credit GC others	-0.848	7.815	Do not Reject H0	$PR \not\rightarrow^{GC} Y, I, P$
Others GC Private credit	10.27	2.874	Reject H0	$Y, I, P \rightarrow^{GC} PR$
Output GC Others	16.03	7.815	Reject H0	$Y \rightarrow^{GC} PR, I, P$
Others GC Output	0.661	2.874	Do not Reject H0	$PR, I, P \not\rightarrow^{GC} Y$
Output, Private credit GC Interest, Price	0.656	9.488	Do not Reject H0	$Y, PR \not\rightarrow^{GC} I, P$
Output, Price GC Interest, Private credit	20.21	9.488	Reject H0	$Y, P \rightarrow^{GC} PR, I$
Output, Interest GC Price, Private credit	15.82	9.488	Reject H0	$Y, I \rightarrow^{GC} P, PR$
Conclusion	Private credit does not GC Economic Growth. Economic Growth GC Private credit.			

Three main factors influence the ineffectiveness of private credit growth to encourage economic activities. The

first is an aggressive credit expansion with fundamental weaknesses of the banking sector. As Gultom (2008a)

points out, the weaknesses consist of the lack in banking supervision, human resource management and the moral hazard of conglomerate-owned banks in violating legal limit lending to their own group. For example, according to Suta and Musa (2003), 92 sample banks that represent 85 percent of total assets in the banking system surveyed in June 1997 related to insolvency problems. From these banks, only 14 were categorized as sound and healthy. This indicates that there were systemic problems in the banking system mainly due to the lack of bank supervision and human resource management. In addition, violation of the legal lending limit worsened the condition of the banking sector in which from seven major banks involved in the liquidity credit of the Central Bank (BLBI), six were conglomerate-owned banks. These conditions led to an escalation in non-performing loans (NPL) averaging more than 10 percent during 1994-1996. Increasing large NPL in the banking sector worsens the condition of banks by reducing their profits, weakens their capability to offer other credit, decreases investment and hampers economic growth.

Second, lack of law enforcement and business certainty dampened the effect of private credit in promoting economic growth. Consistent with the empirical results of Djankov et al. (2006), a strong legal system and law enforcement will protect both creditors and debtors. Then, certainty in the business environment will improve efficiency by reducing default risk,

attracting investment, and promoting economic growth. However, the weak legal system and poor decisions from legal institutions in Indonesia increase the risk of default, and create a high-cost economy due to inefficiency. For instance, as claimed by a prominent foreign business, James Castel (cited in Athukorala (2002), the case of Dharmala-Manulife insurance shows that there is almost no legal security for doing business in Indonesia. This case was controversial since without legal and rational reasons, the supreme court of Indonesia declared the bankruptcy of Manulife insurance related to the legal suit from Dharmala Corporation. In addition, this case created uncertainty for foreign investment, and increased the cost and default risk in Indonesia's banking system due to the poor decision from the legal institution. An increase in default risk encourages creditors to increase interest rates, increases the cost of accessing debtors' information and consequently creates additional inefficiency. As a result, increasing private credit without reducing the cost of capital due to high default risk dampens productivity and economic growth.

The third factor that plays a key role in ineffectiveness of private credit is the failure of the Central Bank and the government to recognize the fundamental weaknesses of the banking sector. This condition is worsened by the irresponsiveness of these institutions to take corrective action to improve banking conditions. For example, Suta

and Musa (2003) note that several years before crisis, there was an aggressive and sharp increase in outstanding credit. However, the credit was allocated to the private sector in domestic currency, but the source of credit was obtained from foreign creditors in the foreign currency. This condition was aggravated by the fact that the liabilities side of the banking sector was dominated by short-term loans, while the assets side was mostly made up of middle and long-term credits. However, the policy makers did not realize this and did not respond and act properly to overcome the risk. Since the government still implemented full financial liberalization with a fixed exchange rate policy, the banking sector continued to obtain funds from overseas without control and hedge position, and therefore increased exchange rate risk. Consequently, when the financial crisis hit Indonesia, the rupiah depreciated sharply and the asset-liabilities ratio of the banking sector decreased significantly toward insolvency. On December 1998 almost all banks in Indonesia suffered huge losses of up to 12 percent of GDP. When the banking sector collapsed, the capability of allocating credit was eliminated, and the real sector went bankrupt since the working capital was no longer available. This condition decreased productivity and impeded economic growth.

6. Conclusions and Policy Implications

Differing from empirical research in developed countries, where

the financial systems are well-behaved, the empirical test results using all three financial development indicators (financial in-depth, commercial bank assets and credit allocated to private sector) suggest that financial development in Indonesia does not play a key role in promoting economic growth. Many factors influence this failure, but the most important aspect is the failure of the financial system to adjust the interest rate as one channel in promoting investment and economic growth. This failure is mainly due to fundamental weaknesses in Indonesia's financial system. These weaknesses are lack in the credibility, lack of the regulation, lack of law enforcement and weak implementation of good corporate governance.

First, lack in the Central Bank's credibility diminishes the public confidence related to the policy objectives. Inconsistency of implementing and achieving target and involvement of several ministers and governors of the Central Bank in several banking scandals decreases significantly the trust of public in the monetary policy. The loss of confidence creates irresponsiveness of the public and they ignore central bank announcements and policy actions. As a result, a monetary policy such as an increase in money supply does not have a positive impact on the economy. Lack of credibility also encourages commercial bank personnel to disobey the prudent principles both in obtaining funds and allocating credit. They are confident that the monetary

regulator will not give sanctions or penalties for rule violations.

Second, lack of the financial regulation decreases the effectiveness of banking supervision. Transactions and operations in the banking sector change rapidly, but the Central Bank often does not adjust the regulation immediately to follow the development in the banking sector. The inability to take corrective action accurately and timely tends to encourage banks and financial institutions to disregard prudential regulations and sound management. Implementing the blanket guarantee without sufficient supervision and allowing banking sectors in pre-crisis 1997 to borrow funds without hedging were evidences of insufficient supervision and irresponsible regulation.

Third, lack of law enforcement creates uncertainty in business and financial transactions. Inexistence of penalties related to violation of legal limit lending by conglomerate-owned banks increased non-performing loans that reduced banks' profits significantly. The inability of the legal system to protect debtors in the case of default increases default risk and the banking sector compensates the risk by increasing interest rate which hampers economic growth.

Finally, weak implementation of good corporate governance both in the financial and real sector diminishes the function of the banking sector as an intermediary institution. This decreases productive assets of banks and increases the risk of defaults and bankruptcy.

Consequently, the growth of commercial bank assets is not in accordance with the health of banks and cannot encourage economic activities. An increase in credit allocated to the private sector cannot promote economic growth due to weaknesses in the managerial capability of the banking sector and operational ability of the real sector.

Lacks of fundamental factors in the financial system are the main reasons for the ineffectiveness of financial development in promoting economic growth. So, there are several implications for monetary and financial policy. First, strengthening law enforcement will give a certainty to business environment and improve the credibility of regulatory institutions such as the Central Bank. Law enforcement can protect creditors by decreasing the default risk and prevent moral hazard of debtors. With a good legal system creditors can obtain their right to sell credit collateral to repay unpaid loans. This is not easy one because it involves not only the financial sector but also the judicial system, the government and general awareness of the public. However, the financial sector can improve this condition by increasing cooperation with Indonesian Commission against Corruption (KPK). Supporting data for corruption cases and knowing bank customers are two examples of action that can be taken by the financial sector.

Second, implementing the policy consistently can improve the Central Bank's credibility. For example, after

announcing the inflation target and communicating the policy to the public, the Central Bank should consistently try to achieve the target. If there is failure of the target, and the Central Bank cannot provide evidences that it is not its responsibility, there should be penalties to the management of central bank, such as resignation. Another factor that can improve credibility is increasing the transparency process of implementing the Central Bank's policy. For instance, establishing the independent commission to evaluate and supervise the Central Bank performance is one tool to prevent moral hazard of the Central Bank personnel. This commission cannot intervene to the monetary policy of the Central Bank, but it must ensure that the Central Bank implements its policy properly.

Third, improvement in banking regulations is important to prevent moral hazard and mismanagement in the banking sector. Many banks ignored the lending rule, so the Central Bank should improve the standards, procedures, and transparency of the lending process. In particular, a blanket guarantee should not be given automatically to all banks, but it must be considered on a case-by-case basis. For example, banks that want to get a blanket guarantee are obligated to send data on a specific loan-by-loan basis. Then, only the credit allocated in proper manner that can be included in the guarantee. Next, the Central Bank should strengthen the bank supervision by increasing the quality and integrity of supervisors, improving transparency and

efficiency in supervision process, and taking corrective action and enforcement for violation of regulation.

Finally, to implement good corporate governance, more transparent financial reports of banks as creditors and firms as debtors is important. In the banking sector, the clear disclosure of risky and long term investment such as credit to its own group and to the real estate sector will enable stakeholders to monitor the banking condition. The full disclosure of non-performing loans, including its major debtors and the amount of loans can prevent moral hazard of banking personnel and debtors. The data of non-performing loans also enable the Central Bank as banking supervisor to take corrective action timely and properly. Similarly, an obligation to provide full disclosure of financial reports for borrowers will enable banks to evaluate and give credit only for feasible project. Furthermore, improvement in accounting and auditing procedures is another instrument to increase the transparency of debtors. Together with a good legal system, adequate financial statement disclosures will decrease the default risk and consequently will be beneficial to the real sector in the form of lower interest rate.

Although this study uses a comprehensive measurement of financial development and its relationship to economic growth, there are some limitations. Unavailability of longer and more detail data of financial development is the major limitation in

this study. Including development in the capital market as another important source of obtaining fund in the economy is another improvement to study comprehensively about the relationship between financial development and growth. However, since the capital market in Indonesia was inactive before 1990 there is no data to be compared for

deeper analysis. Another possible study for enrichment in this area is finding the factors that influence economic growth in Indonesia. Preliminary research (Appendix D) by the author of this paper indicates that international trade and foreign direct investment play an important role in promoting growth in Indonesia.

Appendices

Appendix A. Lag Length Test, VAR Estimates, and its Stability

A.1. Money Supply, Output, Interest Rate and Price

VAR Lag Order Selection Criteria
Endogenous variables: DLM DLY DI DLP
Exogenous variables: C
Date: 10/28/10 Time: 13:23
Sample: 1968 2009
Included observations: 37

Lag	LogL	LR	FPE	AIC	SC	HQ
0	4.019640	NA	1.17E-05	-0.001062	0.173092*	0.060336*
1	21.52746	30.28380*	1.09E-05*	-0.082565*	0.788201	0.224420
2	28.96545	11.25749	1.79E-05	0.380246	1.947626	0.932821
3	37.78502	11.44161	2.87E-05	0.768377	3.032370	1.566541
4	49.14120	12.27695	4.38E-05	1.019395	3.980000	2.063147

* indicates lag order selected by the criterion

LR: sequential modified LR test statistic (each test at 5% level)

FPE: Final prediction error

AIC: Akaike information criterion

SC: Schwarz information criterion

HQ: Hannan-Quinn information criterion

Vector Autoregression Estimates Date: 10/28/10 Time: 13:27 Sample(adjusted): 1970 2009 Included observations: 40 after adjusting endpoints Standard errors in () & t-statistics in []					Roots of Characteristic Polynomial Endogenous variables: DLM DLY DI DLP Exogenous variables: C Lag specification: 1 1 Date: 10/28/10 Time: 13:28	
	DLM	DLY	DI	DLP	Root	Modulus
DLM(-1)	0.222820 (0.16030) [1.39005]	0.051041 (0.04934) [1.03448]	-12.93158 (10.5780) [-1.22250]	0.046494 (0.23687) [0.19629]	0.326025 0.198498 -	0.326025 0.267038
DLY(-1)	0.073131	0.326764	61.12597	-0.428458		

	(0.56387) [0.12969]	(0.17356) [1.88267]	(37.2100) [1.64273]	(0.83323) [-0.51421]	0.178628i 0.198498 + 0.267038 0.178628i <u>-0.255314 0.255314</u>
DI(-1)	0.000613 (0.00239) [0.25664]	-0.000491 (0.00074) [-0.66750]	0.261768 (0.15762) [1.66072]	0.002347 (0.00353) [0.66499]	No root lies outside the unit circle. VAR satisfies the stability condition.
DLP(-1)	-0.020379 (0.11599) [-0.17569]	0.046290 (0.03570) [1.29652]	-9.932701 (7.65441) [-1.29764]	-0.343647 (0.17140) [-2.00490]	
C	0.033219 (0.03569) [0.93076]	0.016505 (0.01099) [1.50239]	-1.292877 (2.35520) [-0.54895]	0.185627 (0.05274) [3.51970]	
R-squared	0.054589	0.154254	0.200579	0.109913	
Adj. R-squared	-0.053458	0.057597	0.109217	0.008189	
Sum sq. resids	0.464584	0.044017	2023.124	1.014466	
S.E. equation	0.115212	0.035463	7.602865	0.170249	
F-statistic	0.505233	1.595896	2.195427	1.080498	
Log likelihood	32.35229	79.48367	-135.2279	16.73281	
Akaike AIC	-1.367615	-3.724183	7.011396	-0.586640	
Schwarz SC	-1.156505	-3.513073	7.222506	-0.375530	
Mean dependent	0.043310	0.038220	-1.273000	0.123750	
S.D. dependent	0.112251	0.036531	8.055478	0.170950	
Determinant Residual Covariance		2.08E-05			
Log Likelihood (d.f. adjusted)		-11.46264			
Akaike Information Criteria		1.573132			
Schwarz Criteria		2.417571			

A.2. Bank Assets, Output, Interest Rate and Price

VAR Lag Order Selection Criteria

Endogenous variables: DLB DLY DI DLP

Exogenous variables: C

Date: 10/29/10 Time: 16:02

Sample: 1968 2009

Included observations: 38

Lag	LogL	LR	FPE	AIC	SC	HQ
0	20.95293	NA	4.82E-06	-0.892260	-0.719882*	-0.830929*
1	39.26375	31.80299*	4.29E-06*	-1.013882*	-0.151994	-0.707229
2	45.83960	10.03683	7.26E-06	-0.517874	1.033524	0.034102
3	55.83393	13.15044	1.08E-05	-0.201786	2.039121	0.595512

* indicates lag order selected by the criterion

LR: sequential modified LR test statistic (each test at 5% level)

FPE: Final prediction error

AIC: Akaike information criterion

SC: Schwarz information criterion

HQ: Hannan-Quinn information criterion

Vector Autoregression Estimates Date: 10/29/10 Time: 16:05 Sample(adjusted): 1970 2009 Included observations: 40 after adjusting endpoints Standard errors in () & t-statistics in []					Roots of Characteristic Polynomial Endogenous variables: DLB DLY DI DLP Exogenous variables: C Lag specification: 1 1 Date: 10/29/10 Time: 16:06	
	DLB	DLY	DI	DLP	Root	Modulus
DLB(-1)	-0.006734 (0.16399) [-0.04106]	0.111338 (0.07133) [1.56083]	-39.35577 (14.4513) [-2.72333]	-0.311905 (0.34506) [-0.90391]	0.281131 - 0.178489i 0.281131 + 0.178489i -0.303840 -0.134586	0.333006 0.333006 0.303840 0.134586
DLY(-1)	0.062063 (0.40600) [0.15286]	0.246782 (0.17660) [1.39741]	88.72501 (35.7775) [2.47991]	-0.229344 (0.85428) [-0.26846]		
					No root lies outside the unit circle. VAR satisfies the stability condition.	

DI(-1)	-0.000809 (0.00167) [-0.48566]	-0.000407 (0.00072) [-0.56152]	0.229135 (0.14684) [1.56046]	0.002000 (0.00351) [0.57056]
DLP(-1)	-0.042968 (0.08054) [-0.53348]	0.045573 (0.03503) [1.30083]	-9.779217 (7.09749) [-1.37784]	-0.345347 (0.16947) [-2.03780]
C	0.020719 (0.02401) [0.86280]	0.019613 (0.01045) [1.87768]	-2.108414 (2.11616) [-0.99634]	0.187421 (0.05053) [3.70920]
R-squared	0.023891	0.185115	0.312191	0.129260
Adj. R-squared	-0.087665	0.091985	0.233585	0.029747
Sum sq. resids	0.224158	0.042411	1740.664	0.992415
S.E. equation	0.080028	0.034810	7.052181	0.168389
F-statistic	0.214160	1.987713	3.971560	1.298923
Log likelihood	46.92816	80.22711	-132.2204	17.17232
Akaike AIC	-2.096408	-3.761356	6.861019	-0.608616
Schwarz SC	-1.885298	-3.550246	7.072129	-0.397506
Mean dependent	0.018728	0.038220	-1.273000	0.123750
S.D. dependent	0.076735	0.036531	8.055478	0.170950
Determinant Residual Covariance		7.37E-06		
Log Likelihood (d.f. adjusted)		9.339298		
Akaike Information Criteria		0.533035		
Schwarz Criteria		1.377475		

A.3. Private Credit, Output, Interest Rate and Price

VAR Lag Order Selection Criteria

Endogenous variables: DLPR DLY DI DLP

Exogenous variables: C

Date: 11/01/10 Time: 08:34

Sample: 1968 2009

Included observations: 38

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-9.991969	NA	2.45E-05	0.736419	0.908797*	0.797750
1	17.61812	47.95437*	1.34E-05*	0.125362*	0.987249	0.432015*
2	26.39093	13.39008	2.02E-05	0.505740	2.057138	1.057716
3	33.26999	9.051389	3.53E-05	0.985790	3.226697	1.783088

* indicates lag order selected by the criterion

LR: sequential modified LR test statistic (each test at 5% level)

FPE: Final prediction error

AIC: Akaike information criterion

SC: Schwarz information criterion

HQ: Hannan-Quinn information criterion

Vector Autoregression Estimates Date: 11/01/10 Time: 08:39 Sample(adjusted): 1970 2009 Included observations: 40 after adjusting endpoints Standard errors in () & t-statistics in []					Roots of Characteristic Polynomial Endogenous variables: DLPR DLY DI DLP Exogenous variables: C Lag specification: 1 1 Date: 11/01/10 Time: 08:40	
	DLPR	DLY	DI	DLP	Root	Modulus
DLPR(-1)	0.183243 (0.10473) [1.74963]	-0.006714 (0.02617) [-0.25651]	-6.509803 (5.54111) [-1.17482]	-0.018713 (0.12391) [-0.15102]	0.404476 -0.268638 0.143412 - 0.183920i 0.143412 + 0.183920i	0.404476 0.268638 0.233224 0.233224
DLY(-1)	2.844484 (0.71699)	0.328780 (0.17917)	71.29975 (37.9339)	-0.410228 (0.84830)	No root lies outside the unit circle. VAR satisfies the stability condition.	

	[3.96725]	[1.83496]	[1.87958]	[-0.48359]	
DI(-1)	-0.005931 (0.00299) [-1.98472]	-0.000534 (0.00075) [-0.71495]	0.256811 (0.15811) [1.62425]	0.002283 (0.00354) [0.64582]	
DLP(-1)	-0.062834 (0.14513) [-0.43294]	0.044712 (0.03627) [1.23281]	-10.24091 (7.67851) [-1.33371]	-0.346171 (0.17171) [-2.01600]	
C	-0.082138 (0.04321) [-1.90072]	0.019440 (0.01080) [1.80015]	-1.906423 (2.28634) [-0.83383]	0.188500 (0.05113) [3.68679]	
R-squared	0.545793	0.130030	0.198068	0.109513	
Adj. R-squared	0.493883	0.030605	0.106418	0.007743	
Sum sq. resids	0.725033	0.045278	2029.481	1.014921	
S.E. equation	0.143928	0.035967	7.614799	0.170287	
F-statistic	10.51433	1.307823	2.161146	1.076087	
Log likelihood	23.45081	78.91888	-135.2907	16.72383	
Akaike AIC	-0.922541	-3.695944	7.014533	-0.586192	
Schwarz SC	-0.711431	-3.484834	7.225643	-0.375082	
Mean dependent	0.038815	0.038220	-1.273000	0.123750	
S.D. dependent	0.202311	0.036531	8.055478	0.170950	
Determinant Residual Covariance	2.83E-05				
Log Likelihood (d.f. adjusted)	-17.55101				
Akaike Information Criteria	1.877550				
Schwarz Criteria	2.721990				

Appendix B. Granger Causality Test

B.1. Relationship Between Money, Output, Interest Rate and Price

GC Test	F or LR test	5 % c.v	Result	Conclusion
Money GC others	-0.804	7.815	Do not Reject H0	$M \neq \xrightarrow{GC} Y, I, P$
Others GC Money	0.034	2.874	Do not Reject H0	$Y, I, P \neq \xrightarrow{GC} M$
Output GC Others	0.211	7.815	Do not Reject H0	$Y \neq \xrightarrow{GC} M, I, P$
Others GC Output	1.014	2.874	Do not Reject H0	$M, I, P \neq \xrightarrow{GC} Y$
Interest GC Others	-2.188	7.815	Do not Reject H0	$I \neq \xrightarrow{GC} M, Y, P$
Others GC Interest	2.636	2.874	Do not Reject H0	$M, Y, P \neq \xrightarrow{GC} I$
Output, Money GC Interest, Price	0.916	9.488	Do not Reject H0	$Y, M \neq \xrightarrow{GC} I, P$
Output, Price GC Interest, Money	1.956	9.488	Do not Reject H0	$Y, P \neq \xrightarrow{GC} M, I$
Output, Interest GC Price, Money	-2.756	9.488	Do not Reject H0	$Y, I \neq \xrightarrow{GC} P, M$
Conclusion	Money Supply does not GC Economic Growth. Economic Growth does not GC Money Supply.			

B.2. Relationship Between Bank Assets, Output, Interest Rate and Price

GC Test	F or LR test	5 % c.v	Result	Conclusion
Bank assets GC others	4.298	7.815	Do not Reject H0	$BA \neq \xrightarrow{GC} Y, I, P$
Others GC Bank assets	0.274	2.874	Do Not Reject H0	$Y, I, P \neq \xrightarrow{GC} BA$
Output GC Others	3.180	7.814	Do not Reject H0	$Y \neq \xrightarrow{GC} BA, I, P$
Others GC Output	1.495	2.874	Do not Reject H0	$BA, I, P \neq \xrightarrow{GC} Y$
Interest GC Others	-2.341	7.814	Do not Reject H0	$I \neq \xrightarrow{GC} BA, I, P$
Others GC Interest	4.957	2.874	Reject H0	$BA, I, P \xrightarrow{GC} I$
Output, Bank assets	6.371	9.488	Do not Reject H0	$Y, BA \neq \xrightarrow{GC} I, P$
GC Interest, Price	6.891	9.488	Do not Reject H0	$Y, P \neq \xrightarrow{GC} BA, I$
Output, Price GC	0.86	9.49	Do not Reject H0	$Y, I \neq \xrightarrow{GC} P, BA$
Interest, Bank assets				
Output, Interest GC				
Price, Bank assets				
Conclusion			Bank assets does not GC Economic Growth. Economic Growth does not GC Bank assets.	

B.3. Relationship Between Private Credit, Output, Interest Rate and Price

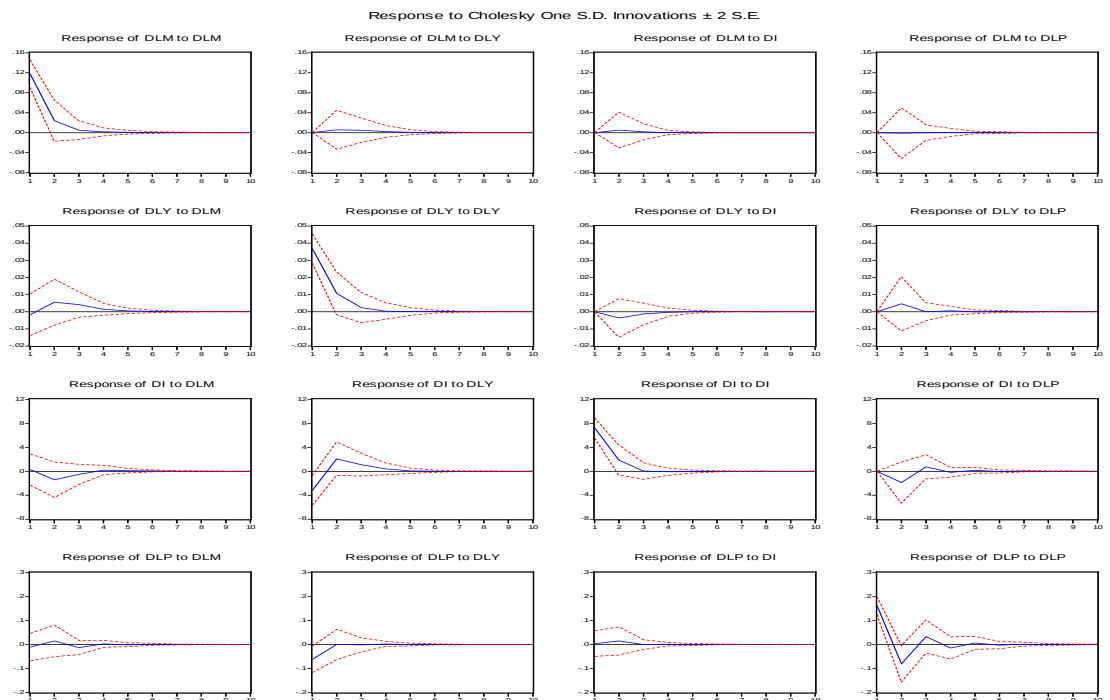
GC Test	F or LR test	5 % c.v	Result	Conclusion
Private credit GC others	-0.848	7.815	Do not Reject H0	$PR \neq \xrightarrow{GC} Y, I, P$
Others GC Private credit	10.27	2.874	Reject H0	$Y, I, P \xrightarrow{GC} PR$
Output GC Others	16.03	7.815	Reject H0	$Y \xrightarrow{GC} PR, I, P$
Others GC Output	0.661	2.874	Do not Reject H0	$PR, I, P \neq \xrightarrow{GC} Y$
Interest GC Others	0.927	7.815	Do not Reject H0	$I \neq \xrightarrow{GC} PR, Y, P$
Others GC Interes	2.591	2.874	Do not Reject H0	$PR, Y, P \neq \xrightarrow{GC} I$
Output, Private credit	0.656	9.488	Do not Reject H0	$Y, PR \neq \xrightarrow{GC} I, P$
GC Interest, Price	20.21	9.488	Reject H0	$Y, P \xrightarrow{GC} PR, I$
Output, Price GC	15.82	9.488	Reject H0	$Y, I \xrightarrow{GC} P, PR$
Interest, Private credit				
Output, Interest GC				
Price, Private credit				
Conclusion			Private credit does not GC Economic Growth. Economic Growth GC Private credit.	

B.4. Relationship Between Money, Output, Interest Rate and Price using dummy variable (BI's Independence)

GC Test	F or LR test	5 % c.v	Result	Conclusion
Money GC others	-0.270	7.815	Do not Reject H0	$M \neq \xrightarrow{GC} Y, I, P$
Others GC Money	0.125	2.883	Do not Reject H0	$Y, I, P \neq \xrightarrow{GC} M$
Output GC Others	0.096	7.815	Do not Reject H0	$Y \neq \xrightarrow{GC} M, I, P$
Others GC Output	1.275	2.883	Do not Reject H0	$M, I, P \neq \xrightarrow{GC} Y$
Money, Interest GC Output, Price	-1.582	9.848	Do not Reject H0	$M, I \neq \xrightarrow{GC} y, P$
Conclusion	With Central Bank,s Independence : Money Supply does not GC Economic Growth, Economic Growth does not GC Money Supply.			

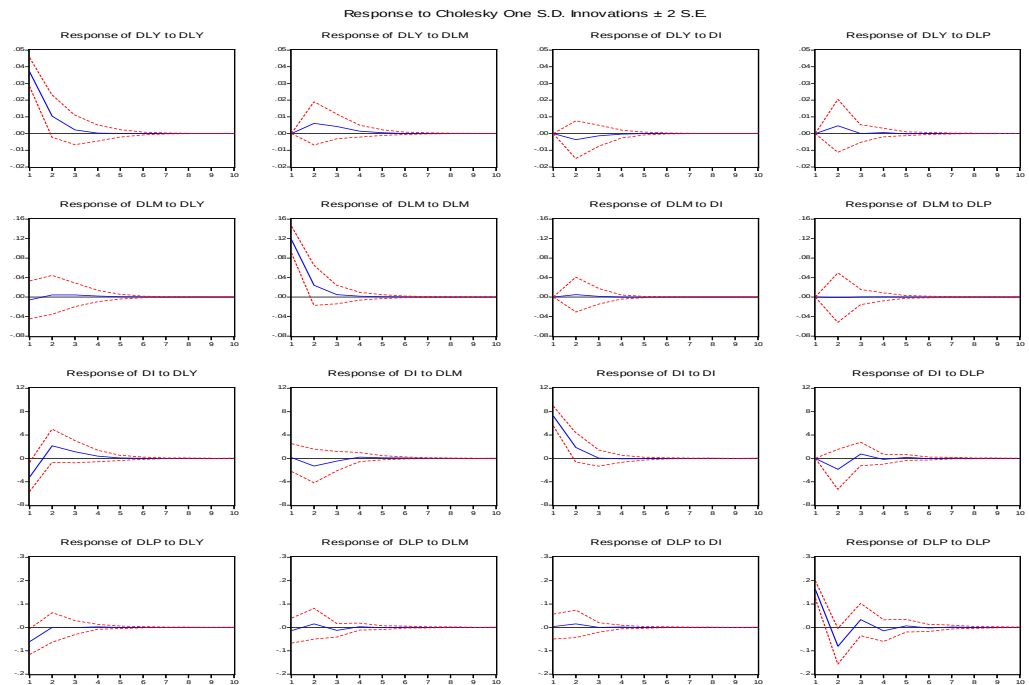
Appendix C. Impulse Response

C.1. Money Supply, Economic Growth, Interest Rate, and Price



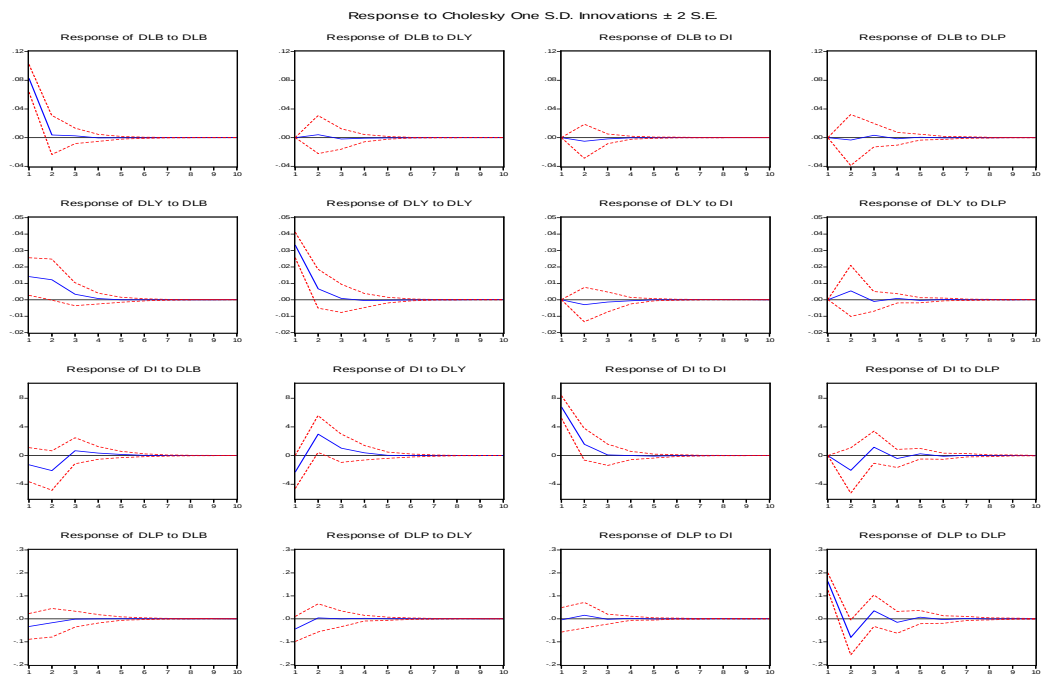
C.1.1. (DLM DLY DI DLP)

C.1.2. (DLY DLM DI DLP)

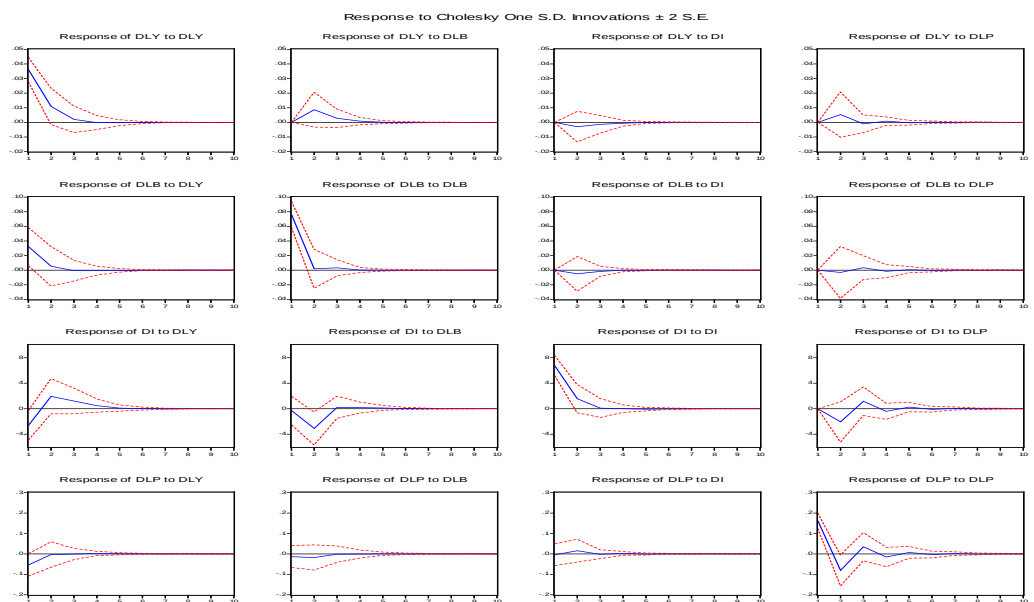


C.2. Bank Assets, Economic Growth, Interest Rate, and Price

C.2.1. (DLB DLY DI DLP)

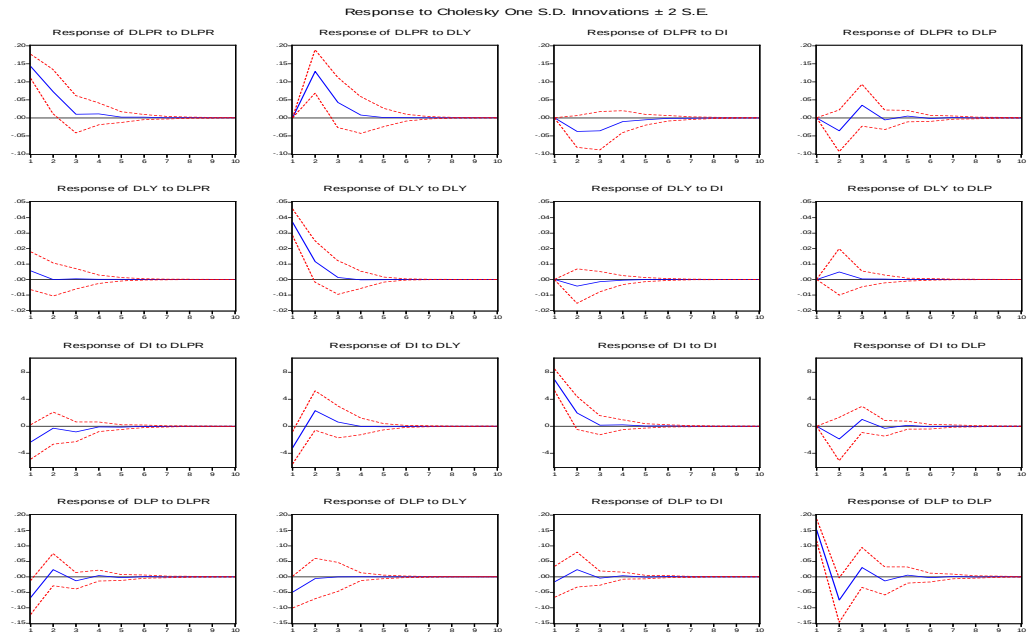


C.2.2 (DLY DLB DI DLP)

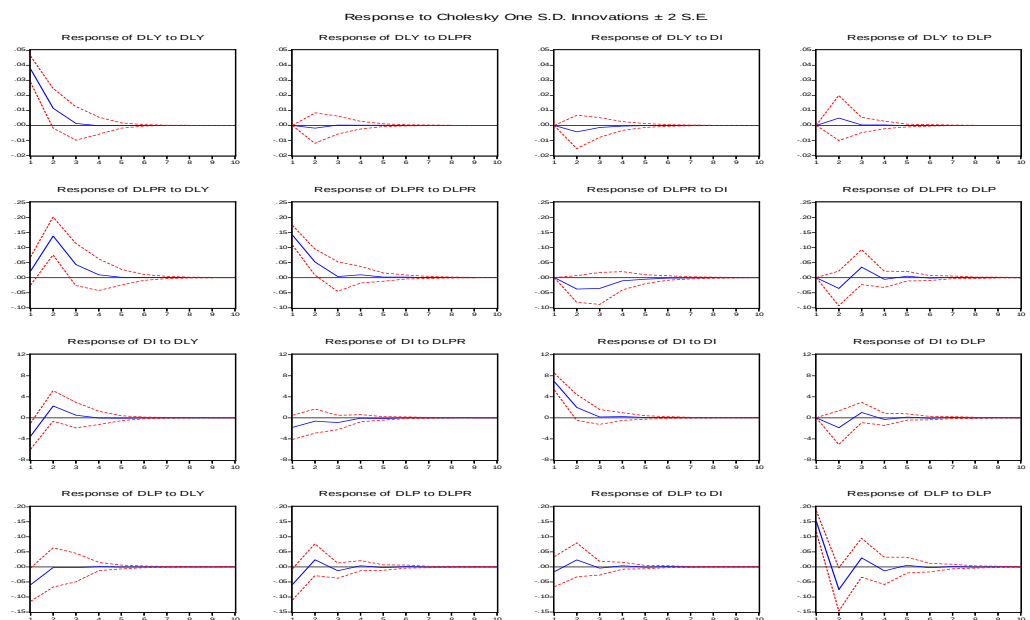


C.3. Bank Assets, Economic Growth, Interest Rate, and Price

C.3.1. (DLPR DLY DI DLP)



C.3.2. (DLY DLPR DI DLP)



Appendix D. Factors influencing economic growth in Indonesia

Exports, Total Investment, and FDI

Variable (EXP, INV, FDI, Y)	LR test	5 % critical value	10 % critical value	Result (at 10 %)	Conclusion
Export → GC → others	12.75601	16.91898	14.68366	Do not Reject H0	No
Tot. Investment → GC → others	13.96566	16.91898	14.68366	Do not Reject H0	No
FDI → GC → others	15.51591	16.91898	14.68366	Reject H0	Yes at 10 % Level, No at 5 % level

Trade and Consumption

Variable (CONS, TR, Y)	LR test	5 % critical value	10 % critical value	Result (at 10 %)	Conclusion
Trade → GC → others	5.92246	5.991465	4.60517	Reject H0	Yes at 10 % Level, No at 5 % level
Consumption → GC → others	0.178862	5.991465	4.60517	Do not Reject H0	No

Oil Exports, Agricultural, and Manufacture Production

Variable (OIL, AGR, MNF, Y)	LR test	5 % critical value	10 % critical value	Result	Conclusion
Oil Export → GC → others	0.467801	7.814728	6.251389	Do not Reject H0	No
Agricultural → GC → others	5.68555	7.814728	6.251389	Do not Reject H0	No
Manufacture → GC → others	3.70494	7.814728	6.251389	Do not Reject H0	No

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