International Review of Business Research Papers
Vol. 7. No. 1. January 2011. Pp. 211 - 230

Banking Intermediation to Promote Real Sector Development in Indonesia

Gantiah Wuryandani*

This study utilizes system dynamic to investigate the behavior of banks in credit allocation, particularly to real sector in Indonesia. The model is able to replicate the mechanism of bank's credit allocation to real sector. The simulation of the model performs by decreasing some variables of income tax, real sector risk, reserve requirement, monetary policy instrument rate, provision regulation, and adding supervision fee. The result indicates that independent policy by different authorities does not have significant positive impact in promoting real sector, economic growth, and banks profitability. Integrated coordination policies among authorities in fiscal, financial system and real sector, has a more positive impact on real sector financing, economic growth, and banks profitability. The best simulation result is coordination policies in income tax incentive, improving real sector risk information and abolishing performing loan provision regulation

Keywords: System dynamic, Banking intermediation, Real sector

JEL Classification: G17, G18, G21

1. Introduction

In the long-term plan up to 2025, the government of Indonesia has an objective to achieve an equal welfare to developed countries, with 5 percent maximum of unemployment rate and poverty rate. To achieve these goals, economy should develop by industrial sector as the main engine with the orientation of global competition. In the financial system, government set the target to have a financial system that support economic stability, able to finance economic growth and has high resilient to the crisis. Moreover, Free Trade Agreement has been realized which brings opportunities as well as threats to the economic sustainability and financial stability.

Banks hold around 80% in financing economy activity. This reflects that financial system in Indonesia has a bank-based industry. Consequently, banking system has a pivotal role in developing economy. Therefore, sustained banking stability, banking efficiency, and effectiveness have become the most important aspects for banking authority and government.

In banking intermediation, credit crunch occurred during post crisis 1998 for almost 6 years with the loan to deposit ratio at only around 30-50%. By the end of 2009, loan to deposit ratio has achieved 76%. Yet, the credit ratio of real sector[1] accounted around

* Gantiah Wuryandani, Centre for Central Banking Studies and Education, Central Bank of Indonesia. Email: gantiah@bi.go.id . Special thanks to Niken Kusumawardhani and Mirzaldy Andhoni for helping the research, particularly in data collection. I also thank A. Herani Rusland and Komala Dewi for constructive comments.

69% with a declining trend, whilst the rest 31% went to consumer loan with an increasing trend (chart 1. in appendix 1). Currently, banks incline to promote consumer loan, as it is more profitable with less risk compare to other loan. Asymmetric information of risk in real sector has made it less alluring and unprofitable for the banks. This condition encourages banks to allocate the fund to a less risky asset such as monetary instrument and government bond, besides consumer loan.

Declining financing ratio in real sector has become the main issue in supporting economic growth sustainability. Most of the studies in banking intermediation do not focus specifically on real sector financing. The objective of this study is to understand the behavior of banks in credit allocation. How does the behavior of banks in intermediation, particularly in real sector? How could banks improve real sector financing to support economic growth? How could banks reduce real sector risk and asymmetric information? Do credit insurance, debtors, and real sector information affect the real sector risk in banking financing decision? What do policy makers have to do to improve banks' financing in real sector with the ultimate objective of economic growth? All of these questions will become the main driven in exploring this study. This study is expected be able to disclose all the questions aforementioned.

Next section in this paper reviews the literature relate to the subject of the research, and the focus group discussions notes. Section 3 explains the methodology and the research design in system dynamic. Section 4 describes empirical result and simulation of the model. Eventually, section 5 concludes the research.

2. Literature Review and Focus Group Discussion

2.1 Financial Intermediation and Economic Growth

Some studies revealed the connection of economic growth and financial system development. This study began since nineteenth century by the classical economist. Bagehot (1873) exposed explicitly about the connection between financial development and economic growth. It was then Schumpeter (1911) viewed the role of financial intermediation by banks at the center of economic development. Schumpeter (1936) reviewed and developed his view that the relation between credit creation by banks and financial innovation is fundamental to the understanding of the capitalist engine. Empirical research by Cameron (1961) and Gerschekron (1962) proved that credit associated to economic development in France. Goldsmith (1969) analyzed data from 35 countries over a period from 1860 to 1963. He discovered positive correlation between financial development and economic growth. Empirical study by Shaw (1973) in some emerging countries showed that financial deepening speed up economic growth since banking structure and financial system play an important role in intermediation by providing loan. Diamond (1984) noted that bank has a role as financial intermediary between surplus and deficit fund parties. The intermediary function of bank eliminates inefficiency between borrower and lender by resolving the asymmetric information. All of these studies affirmed there is a mutual connection between financial

system and economic growth in a country. To accelerate economic growth in developing country needs a well-developed financial system. Among others is by way of financial deepening, as financial structure plays a critical role in intermediation.

In the modern growth theory, Becsi and Wang (1997) showed the relationship between finance and economic growth through efficiency. Financial intermediaries improve investment efficiency by identifying and channeling resources toward high-return projects and by disciplining corporations. Economic growth varies with the level of financial efficiency. In turn, financial efficiency depends on economies of scale, development, and innovation in financial sector. King and Levine (1993) concluded that financial services stimulate economic growth by increasing the rate of capital accumulation and improving the efficiency. Study by Rajan and Zingales (1998) argued that the fundamental role of financial sector is to reallocate fund from individual with excess capital towards firms with shortage capital.

Aziz and Duenwald (2002) proved a positive correlation between financial system and economic growth in China. However, research by Boyreau and Debray (2004) using generalized method moment (GMM) indicated that financing by government owned banks has negative impact on economic growth in China provinces. This happened since banks had to finance inefficient government owned enterprises. On the other hand, province with diversified banking sector supported acceleration in regional economic growth. Utilizing pooled mean group, study by Ranciere (2003) concluded positive dynamic correlation between economic growth and banking intermediation in the long run whilst negative correlation in the short run, particularly during crisis period. This tendency appeared as the adjustment process to the long run equilibrium. Gupta (2003) applied ordinary least square and vector auto regression in 209 countries data to study factors that affect the decision of banks financing. The result suggests that GDP, liquidity liability, assets, capital market, inflation, overhead cost, spread, and deposit interest rate have an effect on loan. In addition, tight monetary policy has a negative effect on loan and increase the interest rate spread.

Study by Bossone (2004) indicated a complement function between bank and non-bank institution in supporting economic development. Historically, bank has a comparative advantage in its functions and specialties compare to other institutions. This is particularly in the payment system and financing functions of banks. Yet the comparative advantage of banks tends to depreciate as the competition, information technology, and institution are burgeoning. Nonetheless, based on money, production, and investment impact, Bossone said that bank is special in providing claims of loan and public accepts this claim as money for investment and production.

2.2 Determinant of Loan Interest Rate

There are some factors determine loan interest rate. By means of optimization (Kuhn-Tucker) and time series regression, Slovin and Suskha (1983) examined variables contribute to the level of loan interest rate based on financial intermediation and

imperfect market structure. Imperfect market provides opportunity to banks to determine loan interest rate. The optimization approach indicated that commercial paper, international interest rate, production gap and reserve requirement, affect loan interest rate. On the other hand, time series regression showed that factors determine loan interest rate significantly are mortgage rate, international interest rate, commercial paper, credit demand and risk cycle in production gap. Research by Bank Indonesia (2009) through the survey suggested that cost of loanable fund, overhead cost, profit margin, reserve requirement, risk premium, and deposit insurance establish loan interest rate. Nevertheless, there are variations among banks in setting the loan interest rate. Using error correction model, study by Ndung'u and Ngugi (2000) revealed that deposit interest rate, Treasury bill, money market rate, and spread influence loan interest rate.

2.3 Tax and Economic Growth

Bringing into play data consumption, investment, money supply, and demand equations research by Sugiyanto (1995) showed that tax in Indonesia inclined to hamper the economic growth during 1970-1994. Therefore, government expenditure should balance the negative impact of tax. Similarly, Barro and Redlick (2009) studied fiscal incentive effectiveness in boosting up US economy. The result indicates that government expenditure has less effectiveness than fiscal incentive in accelerating GDP. Fiscal incentive by decreasing 1 % tax will improve total output of economy by 0.6%. On the other hand, increasing government expenditure by one value will only increase GDP growth less than one value. Alike this result, study by Romer and Romer (2007) in the impact of tax in the US economic activity post word-war II showed that tax increase has a negative effect on GDP, specifically on investment and consumption. The study applied ordinary least square and vector auto regression on tax regulations during 1947 -2006. Panel data study by Broda and Parker (2008) has a similar result that tax incentive in US stimulates household consumption of non-durable goods, particularly in the low-level income. This stimulus is able to lessen the recession and induce the economic growth. The regression model indicated that increasing tax by 1% will decrease GDP by 3%. However, VAR model came out with less impact to GDP declining by only 1.8%.

2.4 Focus Group Discussion

To obtain up to date information of banking circumstances, this study explored focus group discussions for the bank and business sector. Banks are profit-oriented business with the main objective of high yield business. However, real sector is not always a high yield business for banks. Therefore, banks allocate loan prudentially as every business sector has different risks in variation. Banks prefer to allocate fund to the asset with minor risk and attractive yield such as consumer loan. Consumer loan has low transaction cost, sufficient collateral, and huge market in Indonesia. Ordinarily, banks have two obstacles to cope with in allocating fund to the real sector, internal and external. Internally, banks have insufficient expertise and knowledge in real sector.

Consequently, banks consider real sector as a high-risk segment. There is no institution provides comprehensive information of real sector for the banks. Furthermore, existing credit insurance institutions has no credibility and adequate capital to safeguard real sector financing. In the regulation scope, banks cope with constriction in loan provision and accounting rules. Externally, banks have to deal with regional and national policies, which inhibit real sector development such as legal aspect, infrastructure, multiplicity of regional regulation. In addition, exchange rate volatility has a potential contribution to the risk borne by banks in real sector financing.

For business sector, the required collateral by bank that usually has more than 100% of loan value has become burdensome. Moreover, in determine real sector risk premium, banks include factors that outreach business sector control such as labor union, smuggling, tax, and foreign competitor. Diversified and pioneer businesses have more difficulties in obtaining banks financing. Macroeconomic circumstance such as energy cost, minimum wage, interest rate, infrastructure, and exchange rate volatility affects repayment capacity of business sector.

3. Methodology and Research Design

3.1 Data and Hypotheses

This research used secondary data of annual aggregate data of banks during the period of 2000 to 2009. The selection of data period based on the complete available data in banks' balance sheet and profit/loss reports in Central Bank's database. Since there was a period of banking crisis during 1997-1998 and its direct impact in 1999, therefore this study used data sample for the period of 2000 to 2009. The micro data of bank includes credit, securities (SBI-central bank securities and SUN-government bond), other sources, non-performing loan, performing loan, deposits, interest income, interest expense, earning before tax, earning after tax, capital, capital loan, and dividend. Macroeconomic data includes gross domestic product (GDP), monetary policy (BI rate), and government bond yield. Additional information is banking regulation and income tax. Furthermore, this research used primary data from focus group discussion with banks and business sector.

The hypotheses of this research are: 1) Real sector risk, banking regulation, fiscal policy, and monetary policy affect the behavior of bank's intermediation in financing real sector to support economic growth and gain profitability; 2) improving credit insurance facility, real sector, and debtor information could reduce real sector risk and asymmetric information. The design of system dynamic model and its simulation will test all of these hypotheses.

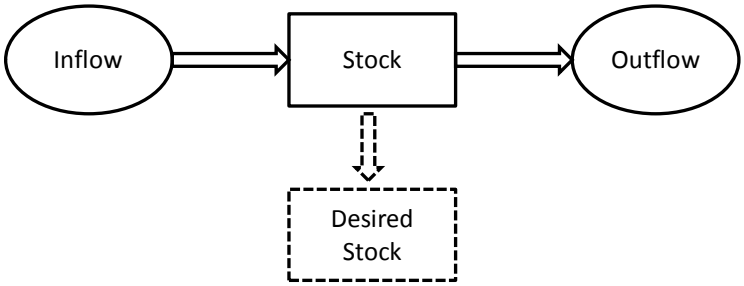
3.2 Methodology

This study applied system dynamic methodology in building a complex system of banking behavior. System dynamic is an approach to understand dynamic behavior of a complex system over time. It deals with feedback, loop, stock, and flow, which display non-linearity in the system. These elements differentiate the system with other approaches. Forrester (1940) developed system dynamic approach originally for the military purpose and enhanced the utilization of the system to the other fields such as production and business management. Sterman (2001) defined system dynamics as a comprehensive modeling approach that has the ability to build complex simulation of the system in order to take more effective policy action. Model in system dynamic replicates the behavior and dynamic relationship in a system. There are some characteristics of system dynamics:

1. Involve math groundwork in developing a model
2. Begin with the network of all elements in a system
3. As a tool to prepare policy in addressing an important issue
4. Could be implemented in any field
5. Help modeler to observe a problem as a holistic issue
6. Need system thinking to analyze a system as a complex network of elements
7. Problem solution in system dynamic usually is a linkage of some fields such as mechanics, social, economy, and ecology, considering that the real world is the interaction of elements in all fields.

Two principles in the system dynamic are: i) stock, flow, feedback, and delay concepts that determine the behavior of a dynamic system, and ii) limited rationality. Stock is cumulative material or information of an element in a system, whilst flow is material or information in terms of inflow to or outflow from a stock in the system. Stock in the next period is the accumulation of stock in the last period and the net flow between inflow and outflow. The algorithm of the stock equation is as represent in equation (1) and (2).

Figure 1. Stock and Flow

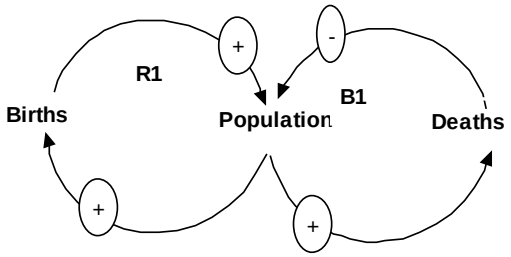


$$Stock_t = Stock_{t-1} + dt(Inflow_{t-1} - Outflow_{t-1}) \quad (1)$$

or $$Stock_t = \int(Inflow_{t-i} - Outflow_{t-i})dt + Stock_{t-i} \quad (2)$$

Feedback is the transmission mechanism when an output of past event becomes an input of future event in a system. This mechanism turns into a looping process as a cycle. Reinforcing is a positive feedback, whilst balancing is a negative feedback. In addition, time delay is a lag period between action and reaction in a system. Causal loop diagram describes the causal effect of feedback in system dynamic. As an illustration of causal loop diagram, figure 2 describes the network among population, death, and birth elements. There are reinforcing and balancing feedbacks in the system. Reinforcing feedback (R1) happens as population increases, the death and birth inclines to increase as well. Likewise, as the birth increases, the population tends to increase. In contrast, balancing feedback (B1) occurs as the death increases, the population tends to decrease.

Figure 2. Causal Loop Diagram in a System

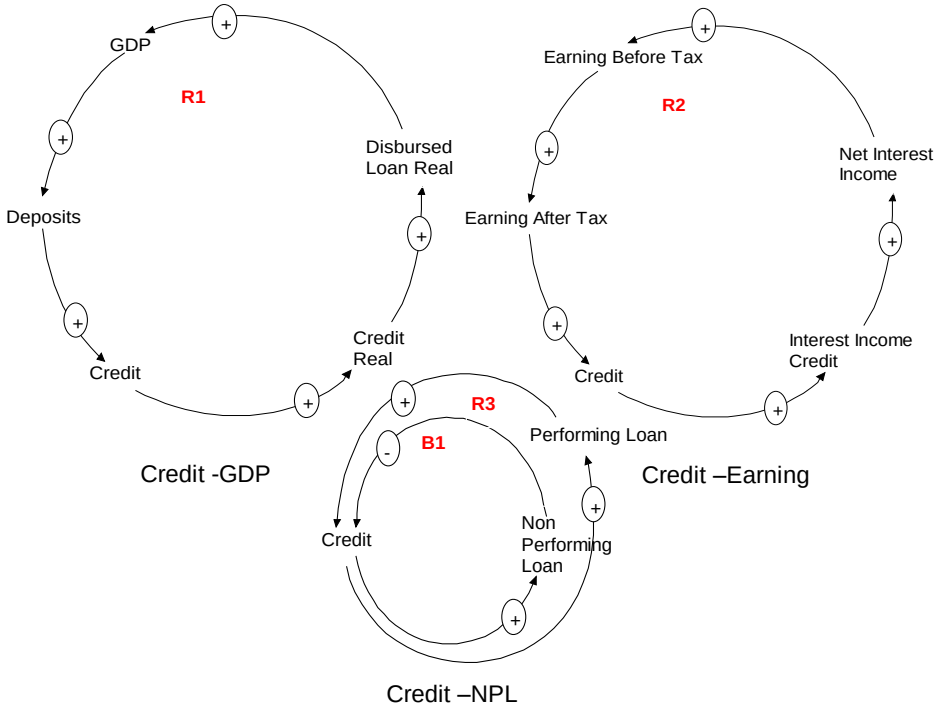


3.3 Research Design

The model in this study has the purpose to understand the behavior of banks' intermediation in the real sector, which represent by loan to deposit ratio and credit ratio statistics. The design of the model derived from the accounting system, banking regulation, and macroeconomic theory. All of these rules and the notes of focus group discussion support the equation construction in system dynamic model. The banking regulation in the model includes provision, loan collectibility, reserve requirement, capital adequacy ratio, and risk weighted asset. Macroeconomic aspect includes tax policy, monetary policy rate (SBI rate), and government bond yield (SUN). This study limits the scope of model specifically in the micro behavior of banks in intermediation.

Figure 3 illustrates causal loop diagram of some sub-systems in the model. The credit-GDP cycle is a reinforcing feedback (R1), which describes the cycle from credit - credit real - disbursed loan real – GDP – deposit – credit. The credit-earning cycle (R2) is reinforcing feedback of the cycle from credit – interest income credit – net interest income – earning before tax – earning after tax – credit. Credit-NPL cycle consists of 2 cycles R3 and B1. R3 is reinforcing feedback that represents a cycle from credit – performing loan – credit, whilst B1 is balancing feedback that explains the cycle from credit – non performing loan – credit.

Figure 3. Causal Loop Diagram of Some Sub-Systems in the Model

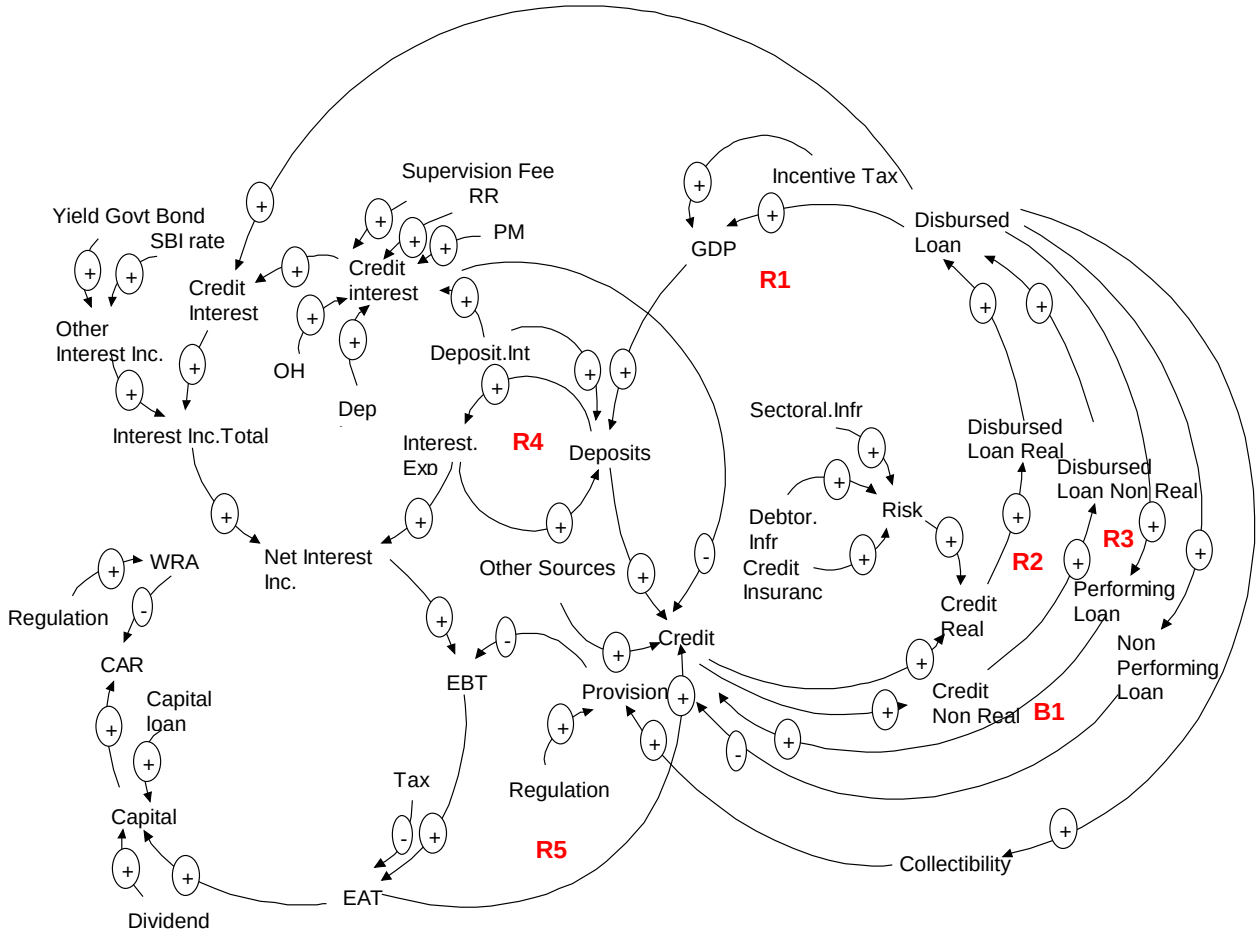


Integrating all sub-systems into one causal loop diagram in figure 4 describes the network framework of all variables in the system. It has 5 cycles of reinforcing feedback (R) and 1 cycle of balancing feedback (B). Each cycle explains the following flows:

1. R1 (reinforcing , +) : credit – credit real – disbursed loan real – disbursed loan total – GDP – deposits - credit
2. R2 (reinforcing, +) : credit – credit non real - disbursed loan real – disbursed loan total – GDP – deposits - credit
3. R3 (reinforcing, +) : disbursed loan total – performing loan – credit – disbursed loan
4. R4 (reinforcing, +) : deposit – deposit interest –deposit
5. R5 (reinforcing, +) : EAT – credit – disbursed loan –interest income credit- EBT – EAT
6. B1 (balancing, -) : disbursed loan – non performing loan– credit –disbursed loan

Risk variable contains real sector information, debtor information, and credit insurance with the scale from zero to one. The higher the scale, the higher the risk that bank should bear. The arrows in the causal loop diagram indicate the flows to the variables. The positive sign near the spearhead arrow explains additional impact to the variable. On the other hand, the negative sign near the spearhead arrow explains reduction impact to the variable. Not all arrows that connect the flows of variables create cycles. The equation of each flow determines changes value of each variable. Comprehensive stock and flow diagram of the system dynamic model illustration is in the appendix 2.

Figure 4. Causal Loop Diagram of the Model



Based on the causal loop diagram of the model, equations which represent the flows to the stock of variables are as the following.

1. Deposit is marginal propensity to save (MPS) from gross domestic product (GDP) and an additional of deposit interest that is not withdrawn.

   Deposit = (MPS GDP) + deposit interest value*

2. Total fund available for credit is the ratio of fund exclude reserve requirement (RR), securities, and cash liquidity, to the summation of deposits, other sources, earning after tax (EAT), performing loan (PL), non-performing loan (NPL).

   Credit = (1- RR- securities – cash liquidity)(deposits + other sources + EAT + PL – NPL)*

3. The definition of credit to real sector (disbursed loan real) is a perceived risk in real sector by the banks with the expectation of gaining profit to the fund

available for credit. Credit to non-real sector has similar calculation with different value of risk. The perception of risk determines the ratio to the fund available for credit between real sector and non-real sector.

*Credit to real sector = perceived risk in real sector * total credit*

4. Perceived risk in real sector consists of debtor information, real sector information, and credit insurance. Information from focus group discussion of bankers forms the assumption of risk value.

   Perceived risk in real sector= debtor information + real sector information + credit insurance

5. Credit interest rate is the accumulation rate of cost of loanable fund, profit margin, overhead cost ratio, risk premium, and supervision fee. Cost of loanable fund (COLF) is the value of deposit interest rate and cost of other fund divided by the residual ratio of 1 from the accumulation of reserve requirement (RR), deposit insurance, and cash liquidity ratio.

   Credit interest rate = COLF + profit margin target + overhead cost + risk premium + supervision fee

   $$COLF = \frac{\text{deposit interest rate + cost of other fund}}{\text{1- (RR + deposit insurance + cash liquidity)}}$$

6. Provision is the summation of each ratio in the collectibility classification of loan based on regulation. Collectibility classification of loan consists of performed, less performed, doubtfull loan, special surveillance, and bad debt.

   *Provision = Σ each ratio (based on regulation) * value of each loan*

7. Earning before tax (EBT) is the total value of interest and non-interest income minus interest and non-interest expenses, and provision.

   EBT = (interest income + non-interest income) – (interest expense + non interest expense – provision)

8. Earning after tax (EAT) is earning before tax (EBT) minus tax

   EAT = EBT – corporate tax

9. Capital is the accumulation of capital loan and the residual of earning after tax and dividend payment. Capital adequacy ratio (CAR) is the ratio of capital to weighted risk asset based on regulation in credit, market, and operational risks.

*Capital= capital loan + ((1- dividend ratio) * EAT)*
Capital adequacy ratio (CAR) = Capital /(credit + market + operational) risks

10. Gross domestic product (GDP) is the ratio of disposable income (residual ratio of 1 from income tax) times the ratio of disbursed loan (real sector and non-real sector) that deliver value added to GDP based on historical data.

    *GDP = (1- income tax) * disbursed loan * ratio*

The result value of disbursed loan to real sector, deposit, and total credit contribute to the calculation of real sector loan to deposit ratio and real sector credit ratio as indicators of development in real sector financing by banks.

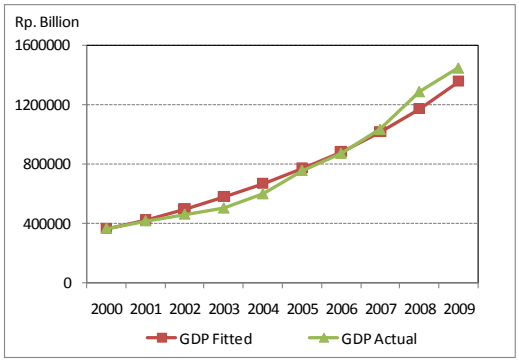
4. Discussion of Findings

4.1 Empirical Result

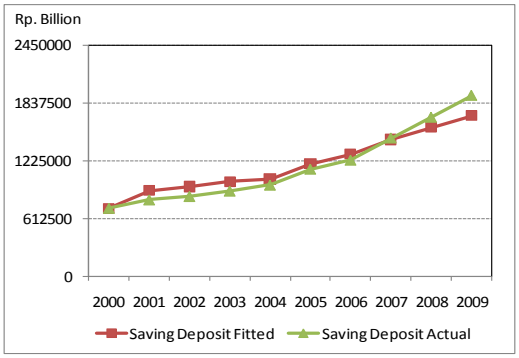
Based on the framework of causal loop diagram in figure 4, the system dynamic model is able to replicate banking behavior in intermediation, particularly to the real sector during the period of 2000 to 2009. The fitted graphs of main variables such as GDP, saving/deposit, disbursed loan real, disbursed loan non-real, earning after tax, capital, capital adequacy ratio (CAR), loan to deposit ratio of real sector, and credit real ratio have similar movement and trend to actual data during the period of 2000 to 2009, as illustrated in chart 1. The gap between the fitted and actual data graph of each variable is small.

Chart 1. Fitted Graphs of Main Variables

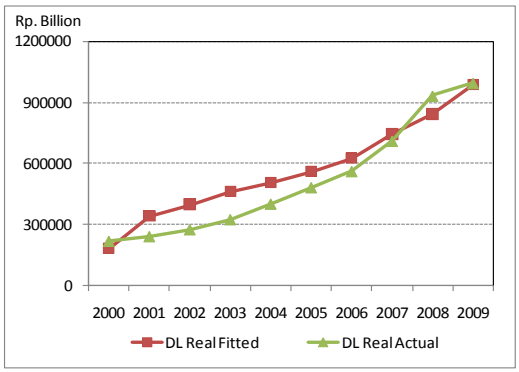
GDP



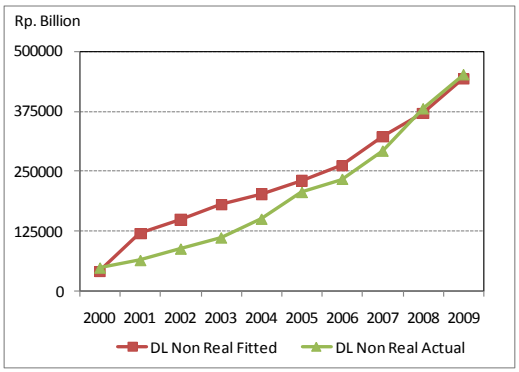
Saving, Deposit



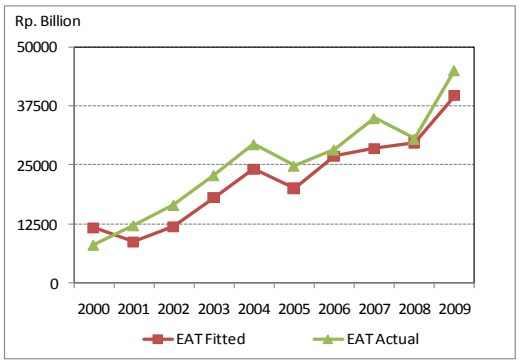
Disbursed Loan Real



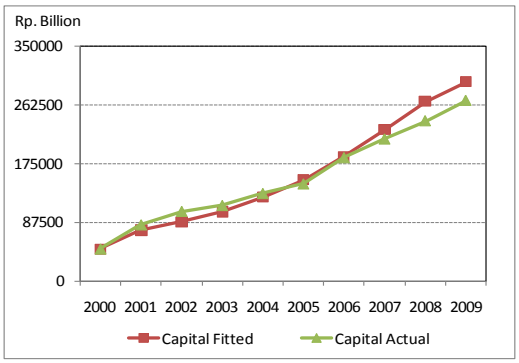
Disbursed Loan Non-Real



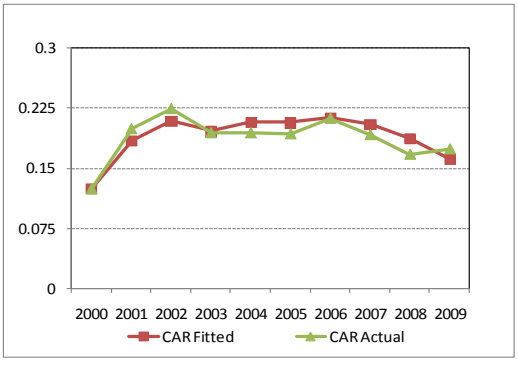
Earning After Tax



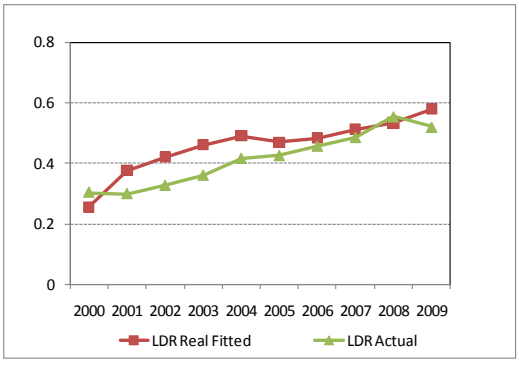
Capital



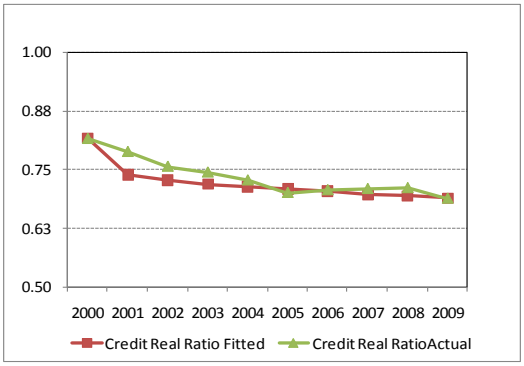
Capital Adequacy Ratio



Loan to Deposit Ratio Real Sector



Credit Real Ratio



Utilizing Kalman Filter, Theil Inequality Coefficient, and R-squared test statistics, the validation test in table 1 confirmed that the model is robust. Theil inequality statistics (TIC) in average is below 8%, while Kalman Filter is around 50%, and R-squared is mostly around 90%. Credit real ratio has the lowest TIC statistic while disbursed loan to non-real and earnings after tax have the highest. The highest Kalman Filter statistic is in capital and the lowest is in saving deposit. GDP has the highest R-squared statistic whilst loan to deposit ratio has the lowest. GDP variable has the best test statistics in robustness, following by capital. Loan to deposit ratio and credit real ratio have also good test statistics.

Table 1. Validation

Variable	Theil Inequality	Kalman Filter	R Squared
GDP	0.03	0.43	0.99
Saving, Deposit	0.04	0.38	0.97
Disbursed Loan Real	0.07	0.42	0.94
Disbursed Loan Non Real	0.08	0.44	0.96
Earning After Tax	0.08	0.43	0.93
Capital	0.04	0.59	0.99
Capital Adequacy Ratio	0.03	0.50	0.79
Loan to Deposit Ratio	0.07	0.50	0.74
Credit Real Ratio	0.01	0.44	0.83

Goodness of fit of the model based on the test statistics and fitted graphs indicate that the model is good enough. Concluding validation test, the framework in the causal loop diagram mimics the behavior of banking in intermediation particularly to real sector. The result of the model shows that GDP and deposit interest rate influence saving/deposit stock. Loan collectibility, profitability, reserve requirement, securities, and cash liquidity determine the allocation of fund to credit. The preference to allocate credit to real sector depends on the real sector risk information collected by bank. Real sector risk consists of debtor information, credit insurance, and real sector information. Furthermore, disbursed loan and income tax influence GDP development. Deposit interest rate, other cost of fund, deposit insurance, cash liquidity, risk premium, overhead ratio, profit

margin, and reserve requirement establish credit interest rate. This might explain the stickiness of high credit interest rate.

Securities income depends on the movement of monetary policy rate (SBI rate) and government bond yield (SUN yield). Provision requirement and institution tax reduce bank's profitability. Loan collectibility and provision regulation determine the provision requirement as a cost for bank. Dividend and capital loan construct the level of capital, whilst risk weighted asset regulation establish CAR (capital adequacy ratio). In this issue, risk weighted asset regulation consists of credit, market and operational risks. This result provides evidence of the hypothesis that real sector risk, banking regulation, fiscal policy, and monetary policy affect the behavior of bank's intermediation to real sector in supporting economic growth.

4.2 Simulation of the Model

Forward looking simulation scenarios of policy intervention for the period of 2011-2025 is on fiscal, real sector, and banking system policies. The intervention policy includes tax income incentive, reserve requirement, monetary policy rate, supervision fee, provision requirement, and real sector risk information. The simulation performs by reducing the rate and level of risk, except for the supervision fee. The combination of simulation scenarios using combination formula n!/(r!(n-r)! achieves 33 scenarios.

Table 2. Policv Scenario

Policies	Related Factors	Scenario	Explanation
Fiscal Policy	Income tax incentive	15%	Government control over income which effects GDP and flow of fund to the banking system
Banking Policy	Performed loan provision regulation abolished Supervision fee	0% 0.03%	Banking regulation effects profitability and credit decision
Real Sector Policy	Real sector risk consists of debtor information, real sector information, and credit insurance facility	0.1,0.2,0.2	Real sector authority could influence the value of real sector risk which in turn effect real sector loan allocation
Monetary Policy	Monetary policy rate (SBI rate) Reserve requirement	5% 5%	Central bank control over banking system liquidity

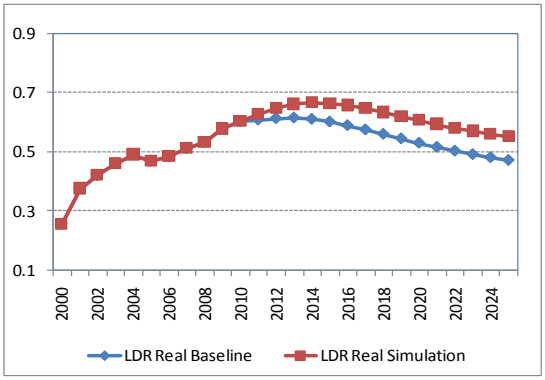
The simulation of policies scenario and their combinations have dynamic effect to each variable. Since it is not possible to show all time series simulation of variables, the simulation results in 2025 as the final target period (table 2) demonstrate that independent individual policy intervention among authorities has insignificant impact to economic growth, real sector financing, and bank's profitability concurrently. Decreasing

reserve requirement and monetary policy rate incline to reduce bank's profitability and capital. The best combination of policy intervention is coordination policies in income tax incentive, real sector risk decreased, and provision regulation abolished. In this case, the scenario includes reducing income tax around 5 percent, abolishing 1 percent provision regulation for performing loan, and improving information infrastructure of real sector by expanding current debtor information system, enhancing credit insurance capital, and building real sector information center. The simulation of these policies could improve loan to deposit ratio (LDR) and credit ratio of real sector significantly, as well as increase GDP and bank's profitability as illustrates in chart 2. The simulation of real sector loan to deposit ratio is higher than baseline scenario. Additionally, simulation of real sector credit ratio has a positive trend compare to the baseline with negative trend. Therefore, coordinated policies intervention could improve real sector financing by switching the trend of credit ratio from negative towards a positive trend. This encourages significant change in economic growth and banks' profitability. However, despite having a negative trend, capital adequacy ratio simulation is still better than the baseline.

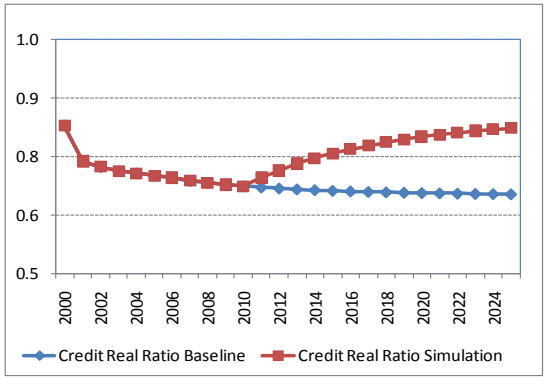
Simulation result confirms the acceptance of research hypotheses that real sector risk, banking regulation, fiscal policy, and monetary policy affect the behavior of bank's intermediation. Furthermore, improving credit insurance facility, information of debtor and real sector verify the hypotheses in improving real sector risk and diminishing asymmetric information.

Chart 2. The Best Simulation Scenario
(Income tax incentive, abolished performing loan provision, reduce real sector risk)

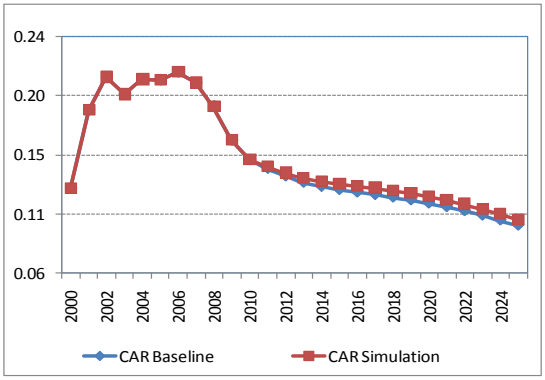
Loan to Deposit Ratio-Real Sector



Credit Ratio-Real Sector



Capital Adequacy Ratio



Earning After Tax

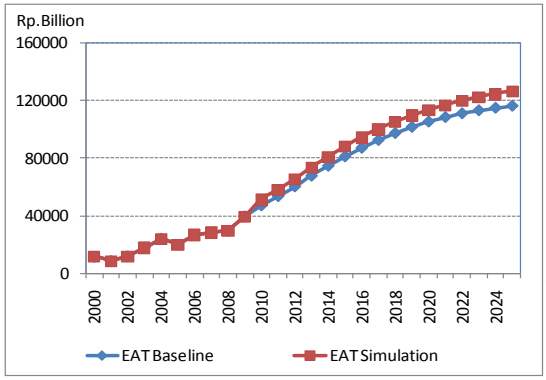


Table 3. Simulation Scenarios in 2025

Policy	GDP	Disbursed Loan Real	DL Total	EAT	Capital	CAR	LDR Real Sector	Saving, Deposit	Credit Real Ratio
Income Tax 15%	12,388,463	7,371,753	11,007,179	97,267.94	1,539,853	0.09	0.45	16,267,844	0.67
Monetary Policy Instrument (SBI rate) 5%	11,726,813	7,271,671	10,857,055	114,191.30	1,563,865	0.09	0.47	15,405,196	0.67
Performing provision 0%	11,765,419	7,304,739	10,906,657	150,448.80	1,808,036	0.11	0.48	15,354,030	0.67
Real Sector Risk *	11,738,302	8,883,706	10,868,937	118,775.50	1,621,352	0.10	0.58	15,397,288	0.82
Reserve Requirement (RR) 5%	11,730,130	7,271,711	10,857,116	108,560.80	1,562,701	0.09	0.47	15,411,662	0.67
Supervision fee 0.03%	11,736,102	7,277,470	10,865,754	116,023.90	1,605,557	0.10	0.47	15,401,159	0.67
Income Tax 15% dan Performing provision 0%	12,417,218	7,397,094	11,045,190	129,267.30	1,727,243	0.10	0.46	16,225,930	0.67
Income Tax 15% dan RR 5%	12,379,799	7,363,817	10,995,274	86,946.17	1,480,966	0.09	0.45	16,281,849	0.67
Income Tax 15% dan SBI rate 5%	12,376,289	7,363,770	10,995,204	92,706.34	1,482,431	0.09	0.45	16,274,909	0.67
Income Tax 15%, RR 5%, SBI rate 5%	12,367,634	7,355,843	10,983,313	82,395.93	1,423,610	0.09	0.45	16,288,896	0.67
Performing provision 0% and RR 5%	11,757,218	7,296,821	10,894,780	140,166.50	1,749,107	0.10	0.47	15,368,489	0.67
Performing provision 0% and SBI rate 5%	11,753,904	7,296,790	10,894,733	145,829.70	1,750,345	0.10	0.47	15,361,994	0.67
Real sector risk and income tax 15%	12,388,463	9,000,005	11,007,179	97,267.94	1,539,853	0.09	0.55	16,267,844	0.82
Real sector risk and RR 5%	11,730,130	8,873,761	10,857,116	108,560.80	1,562,701	0.09	0.58	15,411,662	0.82
Real sector risk and SBI rate 5%	11,726,813	8,873,710	10,857,055	114,191.30	1,563,865	0.09	0.58	15,405,196	0.82
Real sector risk, Performing provision 0%	11,765,419	8,915,438	10,906,657	150,448.80	1,808,036	0.11	0.58	15,354,030	0.82
RR 5% and SBI rate 5%	11,718,649	7,263,799	10,845,248	103,987.90	1,505,280	0.09	0.47	15,419,552	0.67
Income Tax 15%, Performing provision 0%, RR 5%	12,408,524	7,389,121	11,033,230	118,877.50	1,668,078	0.10	0.45	16,240,018	0.67
Income Tax 15%, Performing provision 0%, SBI rate 5%	12,405,017	7,389,083	11,033,174	124,670.50	1,669,617	0.10	0.46	16,233,049	0.67
Performing provision 0%, RR 5%, SBI rate 5%	11,745,711	7,288,881	10,882,870	135,558.70	1,691,482	0.10	0.47	15,376,435	0.67
Real sector risk, income tax 15%, and RR 5%	12,379,799	8,989,990	10,995,274	86,946.17	1,480,966	0.09	0.55	16,281,849	0.82
Real sector risk, income tax 15%, SBI rate 5%	12,376,289	8,989,931	10,995,204	92,706.34	1,482,431	0.09	0.55	16,274,909	0.82
Real sector risk, Performing provision 0%, and income tax 15%	12,417,218	9,031,983	11,045,190	129,267.30	1,727,243	0.10	0.56	16,225,930	0.82
Real sector risk, Performing provision 0%, and SBI rate 5%	11,753,904	8,905,408	10,894,733	145,829.70	1,750,345	0.10	0.58	15,361,994	0.82
Real sector risk, RR 5%, and SBI rate 5%	11,718,649	8,863,777	10,845,248	103,987.90	1,505,280	0.09	0.57	15,419,552	0.82
Income Tax 15%, Performing Provision 0%, RR 5%,SBI rate 5%	12,396,331	7,381,119	11,021,227	114,292.20	1,610,518	0.10	0.45	16,247,119	0.67
Real sector risk, income tax 15%, Performing provision 0%, and RR 5%	12,408,524	9,021,921	11,033,230	118,877.50	1,668,078	0.10	0.56	16,240,018	0.82
Real sector risk, income tax 15%, RR 5%, SBI rate 5%	12,367,634	8,979,927	10,983,313	82,395.93	1,423,610	0.09	0.55	16,288,896	0.82
Real sector risk, Performing provision 0%, income tax 15%, SBI rate 5%	12,405,017	9,021,874	11,033,174	124,670.50	1,669,617	0.10	0.56	16,233,049	0.82
Real sector risk, Performing provision 0%, RR 5%, SBI rate 5%	11,745,711	8,895,428	10,882,870	135,558.70	1,691,482	0.10	0.58	15,376,435	0.82
Real sector risk, income tax 15%, Performing provision 0%, RR 5%, and SBI rate 5%	12,396,331	9,011,823	11,021,227	114,292.20	1,610,518	0.10	0.55	16,247,119	0.82
Real sector risk, Income Tax 15%, Perf, prov 0%,RR 5%,SBI rate 5%,supervision fee 0.03%	12,394,050	9,009,184	11,018,090	111,567.80	1,594,998	0.09	0.55	16,250,813	0.82

*) Real sector risk: debtor information system=0.1, credit insurance=0.2, and real sector information=0.2

5. Conclusion

The model in this study is able to imitate the behavior of bank in intermediation, particularly in real sector. The result of the study indicates that income tax, GDP, and deposit interest, influence deposit flows as the bank's source of fund. Reserve requirement, cash liquidity, securities, loan collectibility, and profitability affect credit flow. Whilst the decision of allocating fund to real sector depends on real sector risk evaluation that comprises of debtor information, real sector information, and credit insurance. In addition, cost of fund, reserve requirement, cash liquidity, profit margin, risk premium, deposit insurance, and overhead ratio determine credit interest rate policy. This might explain persistence high interest rate spread between deposit and credit. Furthermore, credit collectibility and provision regulation ascertain provision cost.

Forward looking simulation of the model up to 2025 suggests that independent individual policy intervention among authorities is insignificant in boosting up economic growth, real sector financing, and bank's profitability concomitantly. The best policy is a coordination course of action amongst fiscal, real sector, and banking authorities. The model suggests an incentive income tax by 5%, abolish provision regulation for performing loan from 1% to 0%, and reduce real sector risk by expanding debtor information system, enhancing credit insurance capital, and building real sector information center.

This study still has some weaknesses and limitations, particularly as the scope of this research is in the supply side of credit derived from micro behavior of banks. Further research is required to improve this study by incorporating the demand side of credit, specifically the behavior of debtors and potential debtors.

Endnotes

1. Based on the long-term plan definition, real sector is sectors that produce goods and services by utilizing production factors such as raw material, labor, land, machine, and capital.

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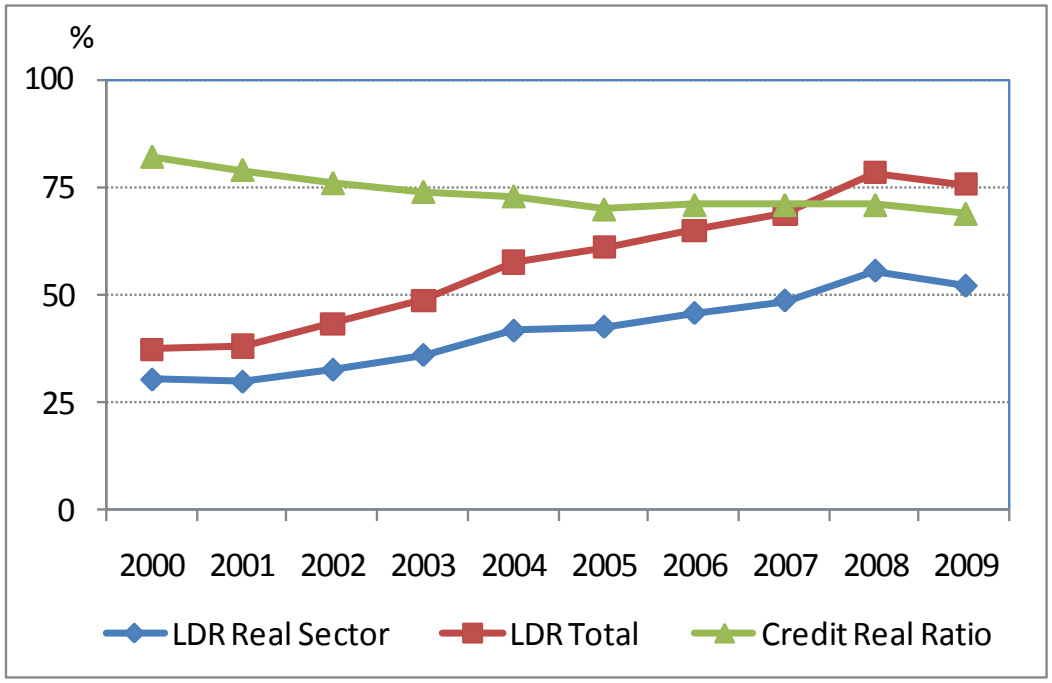
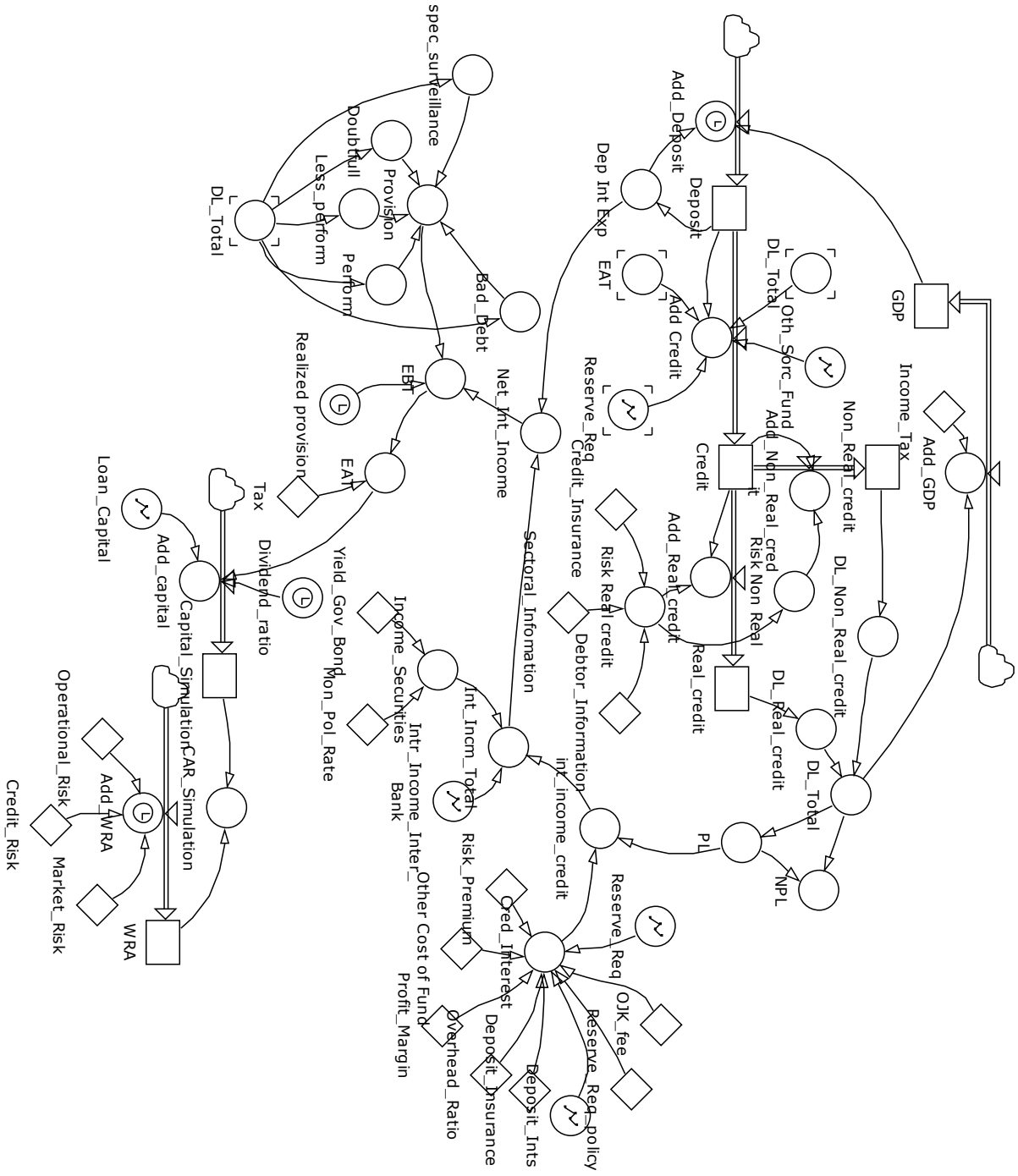
Appendix 1

**Chart 3.Loan to Deposit Ratio (LDR)
and Real Economy Credit Ratio**



Source: Bank Indonesia

Appendix 2


Stock Flow Diagram
GDP
Income_Tax
Add_GDP
Add_Deposit
Deposit
Dep Int Exp
DL_Total
Oth_Sorc_Fund
EAT
Add Credit
Reserve_Req
Credit
Add_Non_Real_cred
Non_Real_credit
Risk Non Real
DL_Non_Real_credit
Add_Real_credit
Real_credit
DL_Real_credit
DL_Total
PL
NPL
spec_surveillance
Doubtfull
Provision
Less_perform
Perform
Bad_Debt
EBT
Realized provision
EAT
Net_Int_Income
Credit_Insurance
Risk Real credit
Debtor_Information
Sectoral_Information
Income_Securities
Intr_Income_Inter_Bank
Int_Incm_Total
int_income_credit
Risk_Premium
Other Cost of Fund
Profit_Margin
Cred_Interest
Overhead_Ratio
Deposit_Insurance
Deposit_Ints
Reserve_Req_policy
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Reserve_Req
Mon_Pol_Rate
Yield_Gov_Bond
Dividend_ratio
Tax
Add_capital
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CAR_Simulation
Loan_Capital
Operational_Risk
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Market_Risk
Credit_Risk
WRA