BULLETIN OF MONETARY ECONOMICS AND BANKING

Volume 15, Number 1, July 2012

QUARTERLY ANALYSIS:
THE PROGRESS OF MONETARY, BANKING AND PAYMENT SYSTEM
Quater II, 2012
Author Team of Quarterly Report, Bank Indonesia

EARLY WARNING INDICATORS STUDY OF BANK RUNS IN INDONESIA: MARKOV-SWITCHING APPROACH
Iskandar Simorangkir

META-ANALYSIS OF MONEY DEMAND IN INDONESIA
Galih Riyandi

INTERMEDIATION CHARACTERISTICS AND FUNCTIONS OF BANKING IN INDONESIA
Reni Hidayati Suroto

DOES THE LOCAL ECONOMIC GOVERNANCE IN INDONESIA PERFORM AN IMPROVEMENT?
Haryo Kuncoro
BULLETIN OF MONETARY ECONOMICS AND BANKING

Department of Economic Research and Monetary Policy
Bank Indonesia

Patron
Board of Governor Bank Indonesia

Editorial Board
Prof. Dr. Anwar Nasution
Prof. Dr. Miranda S. Goeltom
Prof. Dr. Insukindro
Prof. Dr. Iwan Jaya Azis
Prof. Iftekhar Hasan
Dr. M. Syamsuddin
Dr. Perry Warjiyo
Prof. Masaaki Komatsu
Dr. Iskandar Simorangkir
Dr. Solikin M. Juhro
Dr. Haris Munandar
Dr. Andi M. Alfian Parewangi

Editorial Chairman
Dr. Perry Warjiyo
Dr. Iskandar Simorangkir

Executive Director
Dr. Andi M. Alfian Parewangi

Secretariat
Arifin M. Suriahaminata, MBA
MS. Artiningsih, MBA

The Bulletin of Monetary Economics and Banking (BEMP) is a quarterly accredited journal published by Department of Economic Research and Monetary Policy Bank Indonesia. The views expressed in this publication are those of the author(s) and do not necessarily reflect those of Bank Indonesia.

We invite academician and practitioners to write on this journal. Please submit your paper and send it via mail to: paper.bemp@gmail.com. See the writing guidance on the back of this book.

This journal is published on; January – April – August – October. The digital version including all back issues are available online; please visit our link: http://www.bi.go.id/web/id/Publikasi/Jurnal+Ekonomi/. If you are interested to subscribe for printed version, please contact our distribution department: Publication and Administration Section – Department of Economy and Monetary Statistics, Bank Indonesia, Building Sjafruddin Prawiranegara, 2nd Floor - Jl. M. H. Thamrin No.2 Central Jakarta, Indonesia, Ph. +62-21-3818202, Fax. +62-21-3802283, Email: tsubandoro@bi.go.id.
BULLETIN OF MONETARY ECONOMICS AND BANKING

Volume 15, Number 1, July 2012

QUARTERLY ANALYSIS: The Progress of Monetary, Banking and Payment System, Quarter II - 2012
Author Team of Quarterly Report, Bank Indonesia

Early Warning Indicators Study of Bank Runs In Indonesia: Markov-switching Approach
Iskandar Simorangkir

Meta-Analysis of Money Demand in Indonesia
Galih Riyandi

Intermediation Characteristics and Functions of Banking In Indonesia
Renniawaty Siringoringo

Does The Local Economic Governance In Indonesia perform an Improvement?
Haryo Kuncoro

BANK INDONESIA
QUARTERLY ANALYSIS:
The Progress of Monetary, Banking and Payment System
Quarter II – 2012

Author Team of Quarterly Report, Bank Indonesia

During the increasing uncertainty of the global economy, Indonesia is still able to grow by 6.4% (yoy). The main source of the economic growth is domestic demands, which are the increasing household consumptions and investments. The high household consumption is in accordance with the consumers’ confidence and stable consumers’ purchasing power, as indicated from the high sales of retailer. The high consumption and conducive business climate lead to the increase of investment. This condition is supported by business agents’ optimism. Meanwhile, the export growth slowed rapidly as the impact of the slowing down global economy that leads to decreasing demand of the main trading partner country and the low price of commodities. On the other hand, import increase along with the increase of investment activities, particularly machinery and conveyance equipment investment. In the future, the prospect of Indonesian economy would remain strong by 6.3-6.7% in 2012; even several factors of risk should be monitored.

The performance of Indonesia’s balance of payments (BOP) experienced a deficit of US$ 2.8 billion during the quarter II 2012, which was higher than the previous quarter. The condition was triggered by the increase of current transaction deficit as the impact of the weakening global demands and the decreasing export price commodities, while the domestic demands remained high. Even though the capital and the financial transaction recorded a significant surplus, the amount was not sufficient to offset the current transaction deficit, hence put a depreciation pressure on rupiah. Meanwhile, the foreign exchange reserve was US$ 106.5 billion at the end of quarter II 2012 or equivalent to 5.7 months of import and government foreign debt disbursement.

Rupiah exchange rate experience depreciation pressure with stable volatility supported with stabilization policy by Bank Indonesia. Rupiah by point-to-point, depreciated by 2.56% (qtq) to Rp 9,277 per US Dollar. The weakening of Rupiah is generally in accordance with the exchange rate depreciation in other Asia regions. The pressure on rupiah exchange rate was triggered by both external and domestic sides. Externally, the pressure was influenced by the dynamics of the crisis in Europe that encouraged the increase of foreign exchange demand related to the portfolio rebalancing of non-resident agents. From domestic side, the increase of domestic foreign exchange demand is along with the high import. Bank Indonesia keeps
maintaining the stability in foreign exchange market and monetary instrument to support the stabilization of rupiah along with its fundamental and the movement of regional currency in Asia.

The CPI Inflation pressure remained relatively low in quarter II. CPI inflation rate in quarter II 2012 was recorded by 0.90% (qtq) then it was recorded by 4.53% annually (yoy). Fundamentally, the inflation is well maintained indicated in a low core inflation of 4.15% (yoy) along with the decrease of global commodities price and better expectation. Meanwhile, the price of food increased due to the shock of supplies. On the other hand, the administered prices inflation was minimum along with the absence of the government price regulation on strategic goods and service. In the future, the inflation pressure is estimated to be moderate within its target range of 4.5% + 1% in 2012 and 2013.

Along with the stable macroeconomic performance the financial system also remains stable. Banking industry recorded a more solid performance as reflected by the Capital Adequacy Ratio (CAR) that is far above the minimum requirement of 8% and by the stable gross Non Performing Loan (NPL) below 5%. Meanwhile, the banking intermediation remained improving reflected from the credit growth by 26.3% (yoy) at the end of May 2012. The high credit distribution was contributed by the growth of investment and working capital credit that are expected to increase the economic capacity. Investment credit, working capital credit, and consumption credit grew by 29.3% (yoy), 28.9% (yoy), and 20.3% (yoy) respectively.

The solid economic performance of Indonesia is not apart from reliable payment system. In economic activities, the main strategic role of the payment system is to guarantee the process of payment transaction for both society and business activities. During quarter II 2012, the payment system showed positive performance. Both transaction value and transaction volume of the payment system kept highly growing during quarter II 2012 along with the solid economic activities. Besides that, the rapid development of the transaction payment system was also supported by Bank Indonesia’s policy to ensure an efficient, quick, safe, and reliable payment system. In money distribution, the fiat money still plays a vital role as a medium of exchange for society. It is reflected from the high growth of distributed fiat money (UYD) during quarter II 2012, along with the solid development of the economic activities.
EARLY WARNING INDICATORS STUDY OF BANK RUNS IN INDONESIA: MARKOV-SWITCHING APPROACH

Iskandar Simorangkir

Abstract

A run on a particular bank can lead to a banking crisis if it spreads to other banks (contagious effect). In the case of Indonesia, bank runs have also recurred time and again. In 1992, bank runs affected several national banks, subsequently precipitating the liquidation of one bank. Then in 1997/1998, bank runs developed into the worst banking crisis ever witnessed in the banking history of Indonesia. Considering the extent of losses attributable to bank runs and the banking crisis, extensive studies on the early warning indicators of bank runs are urgently required to prevent future bank runs and banking crises. This paper aims to comprehensively analyse the early warning indicators of bank runs for all banks in Indonesia, both during the sample period of 1990-2005 as well as during the banking crisis in 1997-1998. The study of early warning indicators of bank runs uses the Markov-Switching model. To calculate the transition probability from a tranquil state to a state of bank run uses the Markov-Switching process through an auto-regressive approach. The change in deposits held at each bank is used as a variable of bank runs. The results of Markov-Switching (MS) show that the MS model is robust as an early warning indicator of bank runs. This is reflected by testing, which was performed on the actual incident of 102 banks, showing that the MS model only produced false signals an estimated 0.69% - 2.08% of the time.

Keywords: Bank Runs, Early Warning Indicators, Markov-Switching

JEL Classification: C22, G21

1 Director / Head of Economic Research Group Bank Indonesia. The authors would like to thank the participants of the International Conference on Economic Modelling-Ecomod 2012, Seville, Spain, held July 4 to 6, 2012. Also thank you to Professor Rustam Didong, Dr. Muliaman D. Hadad and Dr. Sugiharso Safuan for their valuable comments. The views of this paper represent the personal opinions of the author and do not reflect the opinions of BI.
I. INTRODUCTION

Bank runs occur because of vulnerability to the withdrawal of bank customers. The vulnerability is related to the business activities of banks that transforms short-term liabilities, such as demand deposits, savings deposits and assets into the longer-term liabilities, such as credit. Under these conditions, banks are faced with the problem of *maturity mismatch* which makes it vulnerable to a massive with drawal of funds (bank runs) by customers due to limited liquid assets owned by customers. The withdrawal of massive public deposits is mainly due to the decline of public confidence in the banks. Decline in confidence in the bank point to internal factors, such as the decline in bank performance, as well as other external factors, such as the deterioration of the economy resulting in a contagion effect.

Empirical evidence suggests that the impact of bank runs can negatively affect the country’s economy especially if widespread resulting in a banking crisis. A banking crisis stemming from bank runs leads to a disconnection of intermediation financing and brings a business to a standstill. Cessation of funding sources can result in business activity or production halted and eventually lead to contraction or slowdown and rising unemployment. From the fiscal side, a banking crisis will lead to higher cost recovery for bank restructuring. All these recovery costs will ultimately be borne by the tax payer or the public.

The experience of the 1997/1998 Asian crisis showed that the banking crisis was one of the main factors that resulted in the severe economic contraction in Asian countries. The Indonesian economy was an economy that contracted the most high, reaching -13.1% in 1998. Meanwhile, economic growth in Thailand, Malaysia, South Korea and the Philippines in the same year contracted by 10.5%, 7.4%, 6.9% and 0.6%, respectively. Also, the cost of restructuring from the banking crisis reached 45% of gross domestic product for Indonesia, 15% to 12% for Korea and Malaysia (Lindgren et. All. 1999).

Given the incidence of bank runs can be repeated and harm the economy, its impact will require in-depth study on the development of models of early indicators to prevent bank runs. In general, research on early warning indicators (EWI) uses two main models, namely the signal extraction model and econometrics model.

The signal extraction model uses a non-parametric approach by observing the behavior of particular variables before and after crisis. The model is widely used and is used as a reference study by Kaminsky (1998, 1999) as an early warning indicator of exchange rate and banking crises, and Kaminsky, Lizondo and Reinhart (1998) as an EWS for exchange rate crisis. Other models used to detect banking crisis are Econometric models, one of which is the logit model. Demirgüc-Kunt and Detragiache (1998) used a logit model to detect the onset of a banking crisis. In this approach, the possibility of a crisis is assumed to be a function of the explanatory variable vector, where the dependent variable is 0 if no crisis and 1 if a crisis occurs.

Research on early warning indicators (EWI) were conducted by several authors. The research of Agung et al. (2003) and Dewati et al. (2004) discussed the early warning indicators of
exchange rate crisis and the financial crisis in Indonesia using the signal extraction model. This approach has several problems, namely the value relating to the delimitation of the crisis (threshold) and duration of the crisis that was done arbitrarily. Bank Indonesia (2003a, 2003b and 2003c) research studies of EWI in the stability of the financial system used discriminant analysis and logistic regression, but did not do research on bank runs. Bank Indonesia (2004a) examined the bankruptcy prediction model of commercial banks in Indonesia by using factor analysis and logistic regression, whereas EWI bank runs were not discussed.

With this background, this study will try to develop early warning indicators to detect the possibility of bank runs using the markov-switching model. The second part of this paper discusses the theoretical foundation and some empirical results of previous studies. The third section describes the overview of the performance of national banks during the crisis and empirical models used. Empirical results of the study will be presented in the fourth section, while the final section provides conclusions and suggestions to prevent bank runs.

II. THEORY

2.1. Bank Runs and Early Warning Indicators

Early warning indicators for individual banks were built with earlier empirical studies conducted in the mid-1970s. Research by Gonzalez-Hermosillo (1999) concluded that the collapse of a bank would be due to liquidity, market and credit risk. These three factors can certainly influence the characteristics of individual banks and macroeconomic conditions. To capture the impact of different effects Gonzalez-Hermosillo (1999) estimated a regression model using several indicators of banking (as a proxy of market risk, credit risk, liquidity risk and moral hazard factor) together with regional and macroeconomic variables. The study explicitly investigated how the fall of an individual bank may be affected by the vulnerability of the financial sector as a whole (e.g., by considering contagion). Specifically, the study put the total ratio of credit to output as a measure of vulnerability of the banking sector in the regression.

In line with the research conducted by the U.S. Federal Deposit Insurance Corporation (FDIC) in the system indicators, Gonzalez-Hermosillo (1999) distinguished vulnerability indicators derived from the risk factors that lead to bank collapse. In general, an increase in non-performing loans and falling capital ratio (CAR) were signals before the banks crashed. But few think that these indicators were the main causes of the crisis in estimating the fall of banks. Some of the main points of the research allude to the higher property loans and interbank placements as the greater the likelihood for the failure of a bank. Conversely the higher the acceptance of credit and the greater the share of securities that can be traded, the smaller the risk of a bank collapse. Meanwhile, the contagion factor influenced bank collapse in some cases, and the effect was very small.
Meanwhile, Davis and Karim (2007) stated that in a study of early warning indicators (EWI) a right approach needed, among others, by using logit and signal extraction. Different methods used to produce performance indicators predicted crisis differently. The logit method is considered more feasible for use on a global early warning system (EWS), while the signal extraction is more appropriate for country-specific EWS. Along with the development and liberalization of the financial sector\(^2\), the use of EWS for crisis prevention is needed.

Demirguc-Kunt and Detragiache (1999) conducted a study to predict the probability of a banking crisis that was intended as a tool to monitor the vulnerability of the banking sector. Their research used multivariate logit with panel data, using variables that reflect macroeconomic and financial sector. Variables that reflect macroeconomic conditions include: GDP growth, changes in the terms of trade, exchange rate depreciation, inflation and the budget surplus / GDP. Meanwhile, the variables that reflect the characteristics of the financial sector, namely: M2 / reserves and bank credit growth rate with a lag of two periods. In addition, they used GDP per capita as a proxy for the structural characteristics of the economy. The study results showed that a low GDP growth, high real interest rates, high inflation, and strong credit growth in the past as well as the magnitude of the ratio of M2 to reserves together have led to more banking crisis. Meanwhile, the variable exchange rate depreciation, terms of trade, and the budget surplus to GDP did not seem to be significant.

The use of probit or logit regression, and approach as an indicator of early warning signals has some disadvantages. First, the determination of the date of commencement of the crisis is an arbitrary determination which tends to be late (Von Hagen and Ho, 2003). Secondly, the early indicators of banking using the ratio deviation (noise) as a signal which was a minimum and has limitations. These limitations led to the delineation of the banking crisis index value (threshold) conducted arbitrarily. Some researchers defined different thresholds without providing a strong argument, as Eichengreen, Rose and Wyplosz (1996) who defined a crisis threshold of 1.5 standard deviations from the mean, while Kaminsky and Reinhart (1999) defined a crisis threshold for 3 standard deviations above average (mean). In addition, the threshold of the crisis also greatly depends on the amount of sampling that was taken. The addition of data or an extended period of time can change the crisis limit. The third weakness is the crisis index transformation into binary numbers may result in the loss of relevant information.

In line with weaknesses using the probit / logit approach and the arbitrary use of the boundary (threshold) crisis, there is growing use of the Markov-Switching models in studying the exchange rate crisis and the banking crisis. The use of this model is not only limited to be used to identify periods of crisis but also to estimate when the banking crisis could happen. The use of Markov-Switching in analyzing or detecting the occurrence of banking crises has several

\(^2\) Liberalization of the financial sector according to Karim and Davis (2007) is the freedom given to a financial institution from market mechanisms to remove barriers from the Government.
advantages. First, the crisis index limit value (threshold) is an endogenous variable or in other words the crisis period and the duration of the crisis is part of the estimated results. In this approach, the economy is assumed to be in a tranquil state or state crisis. Thus, the second state is not observed directly, and both are latent variables. However, both these state indicators can be observed directly by looking at their behavior in the economy. Both states are different, with the crisis state having higher fluctuating values than the tranquil state (normal time). The transfer of values from one state to another state depends on transition probability. In accordance with the characteristics of Markov, the value of which will come in a state will depend on the current state. Thus, this model allows for the possibility of a state in crisis that can remain in a state of crisis.

The second advantage of the Markov switching model allows the use of a continuous dependent variable. The use of third-party funds or change the index to avoid the loss of information when data is transformed in the form of dummy variable. The third advantage of this model is its use to capture dynamic information of the crisis. Thus, this model can interpret the trend duration of the crisis period and the transition probabilities. The fourth advantage is the model can be used for non-linear behavior.

The use of Markov-Switching to detect exchange crisis and a banking crisis in recent years has increasingly developed because of the growing occurrence of flaws in the signal approach, i.e. the determination of the arbitrary threshold of crisis. Abiad (2003) using a Markov-Switching approach examined early warning systems for possible exchange rate crisis in Asia. Based on these studies it was found that this model works well in detecting the exchange rate crisis in Asia. The model was able to detect two-thirds of the crisis period in the sample and resulted in fewer the false signals compared to the signal approach model. Research by Alvarez-Plata and Schrooten (2003) and Ho (2004) also produced good results (robust) using the model in detecting the exchange rate crisis in Argentina and Asia, respectively.

Meanwhile, the use of Markov-Switching models applied to banking crisis using aggregate data was done by Ho (2004). The results showed that the model can detect a banking crisis in Asia. For Research in Indonesia, Agung et. al. (2003) developed an Early Detection System for predicting the exchange rate crisis and the banking crisis, by modifying the signal extraction model of Kaminsky, Lizondo, and Reinhart (1999). Modifications include trying to capture the abnormal behavior of the indicators used, not individually, but by using aggregate index. This is done since before the crisis indicators usually will move in the same direction. The variables used are: macroeconomic indicators (real appreciation of the domestic currency, foreign exchange M2/reserves) to predict the exchange rate crisis, and micro indicators of aggregate banking (net interest margin) to predict the banking crisis. The results showed that the signals generated from an early detection system showed relatively satisfactory results, i.e. the probability of accuracy of 67% and 90%, respectively.
2.2. Development of the Banking Crisis

At first the crisis that hit the Indonesian economy since 1997 is mainly triggered by the exchange rate. Pressure depreciation of the rupiah which is mainly derived from the contagion factor from Thailand Baht exchange rate crisis in July 1997. Effect of contagion is not only Indonesia but also struck quickly spread to other Asian countries, including the Philippines, Malaysia and South Korea. In order to prevent the national economy from deeper crisis as a result of the pressure of depreciation and capital outflow, the Government issued a package of economic policy in September 1997. Furthermore, the program expanded to stabilization and economic reform program supported by the IMF, World Bank and ADB formally in November 1997. As a manifestation of the implementation of the reform program in the financial sector in order to nourish the banking system, then on 1 November 1997 by 16 private banks were closed.

Closure of 16 banks led to bank runs on banks by the public perception quite unhealthy. Bank closure policy is supposed to nourish national banks the opposite result in massive withdrawals in banks and not the government. Massive withdrawal of funds is due the collapse of public confidence in the banking system due to the closure of the bank. The more widespread bank runs are also due to the weak financial performance of the bank, such as an increase in bad loans and declining rentability of the bank, due to business management that is not fully follow the healthy nature of corporate governance (Warjiyo, 2001 and Bank Indonesia, 1998). In addition, the rapid depreciation of the rupiah resulted in ballooning bank debt denominated in dollars. This condition is further aggravated the absence of the guarantee program. In the midst of yet the presence and absence of a guarantee program information about the condition of banks (asymmetric information), bank customers, particularly customers’ private bank, withdraw the funds on a large scale and are expected to shift to healthier banks and into safer assets (currency).

One month since the closure of 16 banks mentioned above (December 1997), the number of third-party funds contained in the national private commercial banks (BUSN) decreased by Rp 22.9 trillion (11.94%). Generally begin withdrawing funds from bank closures and the withdrawal of the highest peak in December 1997 and January 1998. The recall was dropped since the government guarantee (blanket guarantee) in January 1998. However, in the event of social unrest in May 1998, the number of banks that experienced bank runs increased again.

Based on data from monthly reports (LBU) bank submitted to Bank Indonesia, massive withdrawals (bank runs) more common in non-foreign BUSN, frozen bank activities and frozen bank operations. Peak mass recall on Non forex BUSN in December 1997, January 1998 and May 1998. As an illustration, in December 1997, from 45 Non forex BUSN, 25 banks decreased
third party funds up to 10%, 17 banks funding decreased by 20%, 13 banks has decreased by 40 funds, 11 funds a bank has decreased by 60%, and 6 banks of funds decreased to 80% of the total funds in the previous month.

As in non forex BUSN, bank runs occurred in banks with frozen business activities (BBKU) and banks with frozen bank operations (BBO). Biggest withdrawal occurred in November 1997 until January 1998, and March through May 1998. For example, in November 1998, from 40 BBKU banks decreased by 26 third-party funds up to 10% of the total deposits in the previous month, 14 banks of funds decreased by 20% compared to the previous month’s total funding, and the two banks has decreased funding to 40% compared to the previous month. Bank runs in BBO is also not much different from BBKU. In January 1998, out of 10 BBO, 6 banks of third-party funds decreased to 20% and 4 banks decreased by 40%

In the period November 1997 to January 1998, seven state banks no deposits decreased by 10%. On the contrary, third-party funds to the government banks have increased by 9.6% in November 1997. Withdrawal of funds from foreign banks is also not much different from the government bank. In November 1997, only one bank that declined a third party fund. Meanwhile, in December 1997 to January 1998 there were no third-party withdrawals of less than 10%. Even otherwise showed an increase of 6.8% in November 1997.

With these developments, the share of third-party funds owned banks and foreign banks increased respectively by 42.8% and 7.2% in December 1997 to be respectively 47.7% and 9.3% at the end of January 1998. In contrast, the share of third-party funds and Non forex BUSN BUSN Foreign exchange decreased from respectively 43.2% and 2.2% in December 1997 amounted to 36.9% and 1.5% in January 1998 (Table 3.4). These developments indicate the presence of the diversion of funds from private banks to state banks and foreign banks.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Public Banks</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. National Bank</td>
<td>36.0</td>
<td>42.8</td>
<td>47.7</td>
<td>47.0</td>
<td>46.6</td>
</tr>
<tr>
<td>2. National Private Foreign Exchange Bank</td>
<td>49.7</td>
<td>43.2</td>
<td>36.9</td>
<td>37.1</td>
<td>37.6</td>
</tr>
<tr>
<td>3. National Private Non-Foreign Exchange Bank</td>
<td>5.5</td>
<td>2.2</td>
<td>1.5</td>
<td>1.9</td>
<td>2.3</td>
</tr>
<tr>
<td>4. Regional Development Bank (BPD)</td>
<td>2.8</td>
<td>2.2</td>
<td>2.6</td>
<td>1.7</td>
<td>1.6</td>
</tr>
<tr>
<td>5. Mixed Banks</td>
<td>1.7</td>
<td>2.7</td>
<td>3.0</td>
<td>3.0</td>
<td>2.8</td>
</tr>
<tr>
<td>6. Foreign Banks</td>
<td>4.1</td>
<td>7.2</td>
<td>9.3</td>
<td>9.3</td>
<td>9.2</td>
</tr>
<tr>
<td><strong>BBR</strong>*)</td>
<td>0.5</td>
<td>0.4</td>
<td>0.3</td>
<td>0.3</td>
<td>0.3</td>
</tr>
</tbody>
</table>

Note: *) Share of the Commercial Banks
Source: Bank Indonesia
In addition to third-party transfer of funds to banks categorized as healthy (flight to quality), there is also a transfer of funds to the currency (currency), as reflected in the increase of currency in January 1998 of 31.8% (U.S. $ 9.045 trillion) compared to the month before. The increase was outside the normal pattern of demand for currency, which is based on data two years prior to the crisis, the average currency growth of 9.5% in just a idea.

The banking crisis further exacerbated by the depreciation of the rupiah is very large. In January 1997, the rupiah against the U.S. dollar (U.S.) in the position of Rp 2396. The position of the exchange rate continues to decline. In July 1997 the exchange rate was recorded in the position of Rp 2599 per U.S. dollar, and in December 1997 to Rp 4650 per U.S. dollar. In 1998 the position of the exchange rate has decreased dramatically, reaching the position of Rp 10,525 per U.S. dollar in May 1998 and continued to weaken to a peak in June 1998 in the position of Rp 14,900 per U.S. dollar. From the position of the rupiah strengthened to begin in December 1998 in the position of Rp 8025 per U.S. dollar.

Withdrawal of bank funds on a large scale by the customer and the depreciation of the rupiah exchange rate put pressure on bank balance (balance sheet). These conditions resulted in the overall performance of the national banking system worsened. Banking performance degradation occurs in all aspects of bank finance, which includes the capital, asset quality, profitability, and liquidity. Performance capitalization (CAR) declined sharply since the crisis, as reflected in the drop all the bank’s CAR of 9.19% at the end of December 1997 amounted to -15.68% at the end of December 1998. Similarly, the performance of asset quality (KAP), which is measured from the ratio of earning assets classified as non-current assets by total earning assets, increased from 4.80% at the end of 1997 amounted to 42.39% at the end of 1998, before decreased to 12.74% at the end of 1999 as a result of the transfer of troubled bank loans to IBRA.
In line with the worsening of KAP, the performance of profitability, as measured by the ratio of income to average assets (ROA), decreased from 1.37% in 1997 to -18.76% in 1998 and -6.14% in 1999. Losses experienced by almost all the banks due to the high cost of funds incurred bank, with one-month deposit rate reached 70% in September 1998. While on the other side of KAP increased and decreased the number of loans in line with the economic contraction (13.1% in 1998) and increased business risk due to social instability, political, and security. In line with the decline in credit, the loan to deposit ratio (LDR) of the banks also fell sharply by 86.42% at the end of 1997 amounted to 72.37% at the end of 1998 and only amounted to 26.16% at end of 1999.

III. METHODOLOGY

Markov Switching Models in this paper uses a latent variable that follows the first derivative of the two-state markov pathways, ie \( s_t = 1 \) is a crisis state and \( s_t = 0 \) is a state of calm (tranquil state). Although in this model \( s_t \) not observed directly, the behavior of the dependent variable \( y_t \) is free of \( s_t \) and denoted as follows:

\[
y_t | s_t \sim N(\mu_{s_t}, \sigma_{s_t}^2)
\]  

(1)

Dependent variable \( y_t \) is used as an early warning indicator of bank runs is the percentage change in third-party bank funds from 1990-2005. Thus the model of Markov-Switching (MS) uses only univariate models. We choose the percentage change in bank third-party funds, since bank runs by definition is a massive withdrawal of funds to third parties. The signal of a persistence decrease of third-party funds, it is known the occurrence of bank runs on a bank.

In MS the model, the average value (mean) and variance of \( y_t \) can be changed according to the regime. The density of the conditional \( s_t \) can be formulated as follows:

\[
f(y_t | s_t) = \frac{1}{\sqrt{2\pi\sigma_{s_t}}} \exp\left(\frac{-(y_t - \mu_{s_t})^2}{2\sigma_{s_t}^2}\right)
\]  

for \( s_t = 0, 1 \)

(2)

Latent variable for regime switching, \( s_t \), is obtained from the transition matrix probability \( P_t \) as the following:
where $\mathbf{p}_{ij}$ is the possibility of displacement of state $i$ in period $t-1$ to state $j$ in period $t$ and $F$ is the normal cumulative distribution function cdf component of the vector $kx_1$ and $x_{t-1}$, the early warning indicator that can affect the probability of transition (transition probabilities).

To run this model requires the initial value, i.e. $p_{i1}^1 = \Pr(s=1)$ which is an unconditional probability to the result in state 1 for period 1. The treatment of these values depends on whether or not $x_t$ is stationary. If $x_t$ is stationary then the long-term probability $p_{i1}^1$ is $s_1=1$ and is a function of $(\beta_0^*, \beta_1^*)$. In the meantime, if $x_t$ is not stationary then $p_{i1}^1$ is an additional parameter that must be estimated. In practice, if time series data are long enough, the likelihood function will not be affected whether performed by calculating the functions of $(\beta_0^*, \beta_1^*)$ separately or by setting its value - it still does not make a difference.

Estimation procedure is used to maximize the likelihood function. The likelihood function is calculated using iterations as shown by Hamilton (1990). By using the information available up to period $t$, we can form $\Pr(s_t = j \mid \Omega_t ; \Theta)$, the conditional probability (filtered) from observationi which comes from the regime $j$, where $j=1,2,\ldots,N$ the state, which in this study used $N=2$. Furthermore, the conditional probabilities are collected in a vector $(N \times 1) \xi_t^l$.

Predictions can also be done through a conditional probability (forecast) regime $j$ for period $t+1$ with information until the period $t$, which can be denoted $\Pr(s_{t+1} = j \mid \Omega_t ; \Theta)$, for $j=1,2,\ldots,N$. Estimation of probabilities is collected in a vector $(N \times 1) \xi_{t+1}^l$. Lastly, $\eta_t^l$ denoted as a vector $(N \times 1)$ with components that have as many as $j$ is a conditional density function of equation (2). Probability has been filtered and calculated for each period $t$ by iteration of the following equations:

$$
\xi_{t+1}^l = \mathbf{P}_{t+1}^l \xi_t^l
$$

where $\mathbf{P}_{t+1}^l$ is the probability of transition of the system from state $i$ in period $t$ to state $j$ in period $t+1$.
where $P_t$ is the matrix size $N \times N$ of the transition probabilities of the period $t-1$ until period $t$ as expressed in the equation (4) and $o$ is the notation multiplication of each element. Equation (5) calculated by $Pr(s_i = j | W_t; Q)$ is the joint distribution ratio $f(y_t, s_i = j | W_t; Q)$ for the marginal distribution $f(y_t = j | W_t; Q)$. Marginal distribution is obtained by summing the joint distribution of the two states. Equation (5) suggests that the best estimate available for the time of the current state position, we simply multiply the transformation matrix $P$ of the transition probabilities to obtain estimates of the probability of each state in the next period.

IV. RESULTS AND ANALYSIS

As outlined in the section 4, to calculate the probability of transition from quiet state (tranquil) to states of bank runs the Markov-Switching model (MS) is used with auto regressive approach, using the estimation process of equation (6) to equation (41). A variable was used to estimate the percentage change in third party funds individual banks $(y)$. To ensure the data is stationary, smoothing of the data will be done by the Kalman filter method. Testing the validity of the MS models as an early indicator of bank runs were performed on each individual bank types by comparing the actual occurrence of bank runs.

a. National Bank (NB)

Signal the occurrence of bank runs on the model of Markov-Switching (MS) seen from the values of the transition probabilities of a quiet state (no bank runs) to a state where bank runs occur. A probability value greater than 0.5 means the possibility of a bank run is greater than 50% and a value of 1 means the possibility of bank runs to reach 100%. Conversely, if the value is 0, then the possibility of bank runs 0%. MS model results to the government banks showed very infrequent signals found in bank bank runs (Table 2). Reflecting the value of the transition probabilities from a quiet state to a bank run state occurs in almost every month just by 0. Of the 147 months observed at each individual bank there were only 16 months for the incidence of bank runs as indicated by BP1, BP2 for 7 months, 5 months to BP3, BP4 and 4 months to 5 months to BP5, with a probability value in the range 0.7 to 1. However, the bank run signals were not persistent (continuous), as reflected in the declining value of the transition probability occurrence of bank runs ranging 0.7 to 1 then to 0 in the following months.

Meanwhile, in the banking crisis period 1997-1998, the model MS did not find a signal for bank runs for government banks as reflected in the value of the transition probabilities from a quiet state to a bank run state at 0 for the period. In test results on real events particularly in the period 1997-1998, the models of MS was accurate for detecting bank runs. From the observation period (January 1988-March 2000) of the five state-owned banks, only 6 months (0.82%) gives a wrong signal for bank runs (type 2 error)\(^6\).
b. Private Banks - Foreign Exchange (PBFX)

Based on the analysis of 26 private banks, foreign exchange (PBFX) using a model of MS suggested that bank runs were visible signals at seven banks (Table 3). This was reflected in the value of the transition probabilities from quiet state to bank run state on each of the banks in the range of 0.8 to 1 and the figure is likely persistent in a few months. Based on the study of

<table>
<thead>
<tr>
<th>No</th>
<th>Bank</th>
<th>Months of Bank Runs</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>NB2</td>
<td>Apr &amp; Dec-91, Oct Nov 92, Dec-99, Jan &amp; Feb-00</td>
</tr>
<tr>
<td>3</td>
<td>NB3</td>
<td>Mar &amp; Apr-91, Oct, Nov &amp; Dec-99</td>
</tr>
<tr>
<td>4</td>
<td>NB4</td>
<td>Mar, Apr &amp; Dec-91, Sept-94</td>
</tr>
<tr>
<td>5</td>
<td>NB5</td>
<td>Aug-89, Mar, Apr, May &amp; Jul-90</td>
</tr>
</tbody>
</table>

6 Frozen Bank operations (BBO) is a bank temporarily suspended its operations. Signal size is correct for banks experiencing bank runs and banks facing liquidity problems due to the withdrawal of clients. Value of 0.82% of the total signal obtained one month divided by the total in 5 bank, which is 6 divided by 735.

<table>
<thead>
<tr>
<th>No</th>
<th>Bank</th>
<th>Months of Bank Runs</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>PBFX5</td>
<td>Aug-90, Sep-91, Aug, Sep &amp; Dec97, Jan, Feb &amp; Mar-98, Aug &amp; Dec-00, Nov &amp; Dec-00, Jan, May, Jul &amp; Aug-02, Aug-03, Sep-04</td>
</tr>
</tbody>
</table>
actual events especially during the banking crisis of 1997-1998, the seven banks suffered bank runs. In the period before and after 1997-1998, the seven banks also often showed signs of bank runs with the transition probability value for bank runs in the range of 0.7 to 1.

Meanwhile, the MS also showed that there were 12 banks that never showed signs of bank runs, as reflected in the value of the transition probability of 0. PBFX signaled a bank run only a few times, but the signal was not persistent for a few months. From a total of 216 months (January 1988 - December 2005) and 26 banks, found only 57 months of total (1.01%) gave a wrong signal.

c. Private Banks- Non-Foreign Exchange (PBNFX)

Based on the observations of 31 private non-bank foreign exchange (PBFX), the MS signaled the occurrence of bank runs in 20 banks, with a probability value of the occurrences for bank runs ranging from 0.8 to 1 (Table 4). Based on the analysis of the actual events of 1997-1998, the 20th PBNFX faced a heavy problem in bank runs. Before experiencing bank runs in 1997-1998, all the banks were showing signs for bank runs that tended to be persistent, as seen from the value of the transition probability of bank runs in the range of 0.9 to 1. The same signal continued until 2000, as the frequency of bank runs signals tended to decrease, with transition probabilities in the range of 0.8 to 1.

The 11th PBNFX also showed bank runs signals, but not as much as the 20th PBNFX above. In addition, the value of the transition probability of 11 eleven banks were also lower, with values in the range of 0.6 to 1. In the banking crisis of 1997-1998, the eleventh bank does not face problems of bank runs. Based on the comparison with the actual events, the MS results gives the wrong signal for 94 months (1.4%). Thus, MS is still shows relatively accurate results when used to detect the occurrence of bank runs.

<table>
<thead>
<tr>
<th>No</th>
<th>Bank</th>
<th>Months of Bank Runs</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>PBFX2</td>
<td>Dec-88, Jul, Oct &amp; Dec-93, Feb, Apr, Jul &amp; Sept-95, Nov-Dec-97, Jan-98</td>
</tr>
<tr>
<td>5</td>
<td>PBFX9</td>
<td>Mar, Jul, Nov &amp; Dec-88, Jan-90, Apr-92, Jul-93, Dec94, Apr &amp; Sept-95, Nov &amp; Dec-97, Feb-99</td>
</tr>
</tbody>
</table>
d. Foreign Banks (FB)

Markov-Switching (MS) results showed that there were 4 of 6 foreign banks observed frequently showing signs of bank runs with a transition probability value from quiet state to bank runs state in the range of 0.6 to 1 (Table 5). In the period of the banking crisis in 1997/1998, the MS model showed the four banks experiencing bank runs. Meanwhile, two other banks never gave signals for bank runs, which was reflected by the transition probability values for bank runs at 0. Actual events showed that the two banks were never subjected to bank runs.

<table>
<thead>
<tr>
<th>No</th>
<th>Bank</th>
<th>Months of Bank Runs</th>
</tr>
</thead>
</table>
On a whole, for the period January 1988 to December 2005, the observed data for the MS gave an incorrect signal totaling 27 months or 2.08% of the total of 6 banks over 216 months observed. Thus, the signal from the MS model in foreign banks is sufficiently accurate to monitor the possibility of a bank run on one bank.

Table 5.
Markov-Switching Results for Foreign Banks

<table>
<thead>
<tr>
<th>No</th>
<th>Bank</th>
<th>Months of Bank Runs</th>
</tr>
</thead>
</table>

### e. Mixed Banks (MB)

MS results of the observed signals for a mix of nine banks (MB) indicated the occurrence of banking crisis bank runs in the period 1997-1998, with a transition probability value of 1, which means 100% like lihood of bank runs. These results are consistent with the actual events, where the 9 banks suffered the occurrence of bank runs. Meanwhile, judging from the frequent occurrence of bank run signals, there were 4 banks that were experiencing bank runs (Table 6) with a probability occurrence value of ranging from 0.7 to 1.

The comparison of results that actually produced the wrong signal was as much as 18 months or 0.93% of the total banks and months observed. MS results from the mix of banks also indicated that the model is accurate enough to use MS as an early warning indicator for the occurrence of bank runs on each individual bank.
f. Banks with Frozen Business Activity (BFBA)

Of eight frozen bank business models analyzed with MS, only two did not show signs of banking crisis bank runs in the period 1997-1998, while five other banks showed signs bank runs (Table 7), with transition probabilities values for bank runs occurring in the range of 0.9 to 1. Bank run signals often occured in BFBA 2 and 3, with the transition probabilities value for the bank run in the range of 0.9 to 1. This condition is consistent with the actual events in which bank runs occurred in the period.

### Table 6.
Markov-Switching Results for Mixed Banks

<table>
<thead>
<tr>
<th>No</th>
<th>Bank</th>
<th>Months of Bank Runs</th>
</tr>
</thead>
</table>

### Table 7.
Markov-Switching Results for Banks with Frozen Business Activity

<table>
<thead>
<tr>
<th>No</th>
<th>Bank</th>
<th>Months of Bank Runs</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>BFBA1</td>
<td>Aug -89</td>
</tr>
<tr>
<td>7</td>
<td>BFBA7</td>
<td>Mar, May, Jun, Aug, Sep, Oct, Nov &amp; Dec-98</td>
</tr>
<tr>
<td>8</td>
<td>BFBA8</td>
<td>Apr, May, Sep, Oct, Nov &amp; Dec-98</td>
</tr>
</tbody>
</table>
Comparison of actual events based on the full sample, showed there were 12 months or 0.69% incidence of total observations with the wrong signal for the bank run scene. The error signal occurred in four banks. By looking at the small difference in the error between the actual results with the incidence of MS, the MS model can be used as an indicator to detect bank runs in troubled banks and individual indicator for the supervision of other banks.

g. Bankswith Frozen Operations (BFO)

MS results revealed that of the seven banks with frozen operations (BFO), six banks showed a strong signal for the occurrence of banking crisis bank runs in the period 1997-1998, as reflected in the transition probability value of 1 for bank runs. The 6th BBO also often signaled bank runs before the crisis (Table 8). One other bank (BFO6) had only signaled the occurrence of bank runs in 1993.

Test results on real events indicate that the MS is able to explain the phenomenon of bank runs on the frozen banks operating in Indonesia for the period 1997-1998. From the overall observation results, only 19 wrong signals occurred or 1.26% of the total observations.

<table>
<thead>
<tr>
<th>No</th>
<th>Bank</th>
<th>Months of Bank Runs</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>BFO4</td>
<td>Aug-90, Jan, Feb &amp; Apr-91, Jun-92, Dec-94, Dec-97, Jan-98</td>
</tr>
<tr>
<td>6</td>
<td>BFO6</td>
<td>Feb, Mar &amp; Jun-93</td>
</tr>
</tbody>
</table>

V. CONCLUSION

Markov-Switching model results (MS) showed that MS models produce results that are robust as early warning indicators of bank runs. Reflecting the results of tests on real events in 102 banks that showed the MS only gives a wrong signal in the range of 0.69% to 2.08%.

The results of early indicators for bank runs with MS models indicate that banks are experiencing bank runs or banks are in trouble when the MS produces a persistent signal for bank runs. Monthly scenarios can be developed to derive a daily model to detect the possibility of bank runs. In connection with this, it is suggested that the MS model be used to detect bank
runs on individual bank supervision cycles based on risk-based supervision in Indonesia. Research on early warning systems using the MS in the supervision cycle is parallel to the assessment of the risk profile of each individual bank, so the information on the early warning system can be optimized together with other risk assessment of banks in preventing bank runs or other problems that can harm the survival of a bank.
REFERENCES


Early Warning Indicators Study Of Bank Runs In Indonesia : Markov-switching Approach


Minsky, Hyman.


Peck, James, and Karl Shell.


APPENDIX 1

This attachment describes the process of how the estimated transition probabilities value are used as early warning indicators (EWI) of bank runs in this paper. In principle, the model estimates Markov-Switching (MS) using autoregressive models developed by Hamilton (1990). MS model estimation process is described as follows. As mentioned before the variable is used as an early warning indicator is the monthly percentage change in third-party funds ($y_t$). It is assumed $y_t$ follows the autoregressive model (3)\(^7\) with parameters that change from a quiet state denoted (no bank runs) to a state of bank runs. For example, the autoregressive model is

$$y_t = \alpha_{s_t} + \phi_{1,s_t} y_{t-1} + \phi_{2,s_t} y_{t-2} + \phi_{3,s_t} y_{t-3} + \epsilon_t$$  \hspace{1cm} (6)

With. $\epsilon_t \sim N \left(0, \sigma_{s_t}^2\right)$

This equation can be written in the form

$$y_t = x_t' \beta_{s_t} + \epsilon_t$$  \hspace{1cm} (7)

where the parameters used in this equation are

$$x_t = \left(1, y_{t-1}, y_{t-2}, y_{t-3}\right)'$$  \hspace{1cm} (8)

$$\beta_{s_t} = \left(\alpha_{s_t}, \phi_{1,s_t}, \phi_{2,s_t}, \phi_{3,s_t}\right)'$$  \hspace{1cm} (9)

The distribution function for this equation can be written as

$$p(y_t | z_t; \theta) = \frac{1}{\sqrt{2\pi} \sigma_{s_t}} \exp\left\{ \frac{\left(y_t - x_t \beta_{s_t}\right)^2}{2\sigma_{s_t}^2} \right\}$$  \hspace{1cm} (10)

The log likelihood function from the above equation is

$$\log p(y_t | z_t; \theta) = \frac{1}{2} \log 2\pi - \frac{1}{2} \log \sigma_{s_t}^2 - \frac{\left(y_t - x_t \beta_{s_t}\right)^2}{2\sigma_{s_t}^2}$$  \hspace{1cm} (11)

\(^7\) Untuk mengetahui optimal lag dari autoregressive akan digunakan nilai AIC dan SBC.
Based on Hamilton, likelihood function from the above equation is

$$
\frac{\partial \log p(y_i \mid z_i; \theta)}{\partial \beta_j} = -2 \frac{y_i - x_i \beta_j}{2\sigma_j^2} x_i = \frac{(y_i - x_i \beta_j)x_i}{\sigma_j^2}, s_i = j
$$

and

$$
\frac{\partial \log p(y_i \mid z_i; \theta)}{\partial \sigma_j^2} = -\frac{1}{2\sigma_j^2} + \frac{(y_i - x_i \beta_j)^2}{2\sigma_j^4}
$$

Based on Hamilton, likelihood function from the above equation is

$$\quad L(\theta) = \sum_{t=1}^{T} \log p(y_i \mid z_i; \theta) \tag{12}$$

According to Hamilton (1990) the marginal distribution function of the joint distribution can be written as follows. Defined as

$$\quad Y = (y_T', y_{T-1}', \ldots, y_1') \tag{13}$$

$$\quad S = (s_T, s_{T-1}, \ldots, s_1) \tag{14}$$

Then the marginal distribution for these two events are

$$\quad p(Y; \theta) = \int_S p(Y, S; \theta) \tag{15}$$

Then new function can be defined as the expectation of log-likelihood

$$\quad Q(\theta_{i+1} \mid \theta_i, Y) = \int_S \log p(Y, S; \theta_{i+1}), p(Y, S; \theta_i) \tag{16}$$

This function is very useful in maximizing log-likelihood. Based on Hamilton it is noted that the FOC condition will be met at the time

$$\quad \frac{\partial Q(\theta_{i+1} \mid \theta_i, Y)}{\partial \theta_{i+1}} = \int_S \frac{\partial \log p(Y, S; \theta_{i+1})}{\partial \theta_{i+1}} p(Y, S; \theta_i) = 0$$

Hamilton (1990) proved that the above equation satisfy the FOC which maximizes the log-likelihood function.
The log-likelihood function is maximized by defining the Lagrange function as follows

\[ J(\theta) = L(\theta) + \lambda \left( 1 - \pi_1 - \pi_2 - \cdots - \pi_k \right) \]  

(17)

With this function will be obtained

1. \[ \frac{\partial J(\theta)}{\partial \beta_j} = \frac{\partial L(\theta)}{\partial \beta_j} = \sum_{t=1}^{T} \frac{p(y_t, s_t = j; \theta) \left( y_t - x_t' \beta_j \right) x_t}{p(y_t; \theta)} \frac{1}{\sigma_j^2} \]

\[ = \sum_{t=1}^{T} \frac{(y_t - x_t' \beta_j) x_t}{\sigma_j^2} p(s_t = j \mid y_t; \theta) = 0 \]

(18)

Multiplied by the divisor 0 then

\[ \sum_{t=1}^{T} (y_t - x_t' \beta_j) x_t \ p(s_t = j \mid y_t; \theta) = 0 \]

(19)

This equation can be solved by

\[ \sum_{t=1}^{T} y_t x_t \ p(s_t = j \mid y_t; \theta) - \beta_j \sum_{t=1}^{T} x_t' x_t \ p(s_t = j \mid y_t; \theta) = 0 \]

(20)

\[ \hat{\beta}_j = \left[ \sum_{t=1}^{T} x_t' x_t \ p(s_t = j \mid y_t; \theta) \right]^{-1} \sum_{t=1}^{T} y_t x_t \ p(s_t = j \mid y_t; \theta) \]

\[ = \left[ \sum_{t=1}^{T} x_t^* x_t^* \right]^{-1} \sum_{t=1}^{T} x_t^* y_t^* \]

(21)

With \( x_t^* = x_t \sqrt{p(s_t = j \mid y_t; \theta)} \) \quad \( y_t^* = y_t \sqrt{p(s_t = j \mid y_t; \theta)} \)

2. \[ \frac{\partial}{\partial \sigma_j^2} J(\theta) = \frac{\partial}{\partial \sigma_j^2} L(\theta) = \sum_{t=1}^{T} \frac{p(y_t, s_t = j; \theta)}{p(y_t; \theta)} \left\{ -\frac{1}{2\sigma_j^2} + \frac{(y_t - x_t' \beta_j)^2}{2\sigma_j^4} \right\} \]

\[ = \sum_{t=1}^{T} \left\{ -\frac{1}{2\sigma_j^2} + \frac{(y_t - x_t' \beta_j)^2}{2\sigma_j^4} \right\} p(s_t = j \mid y_t; \theta) = 0 \]

(22)
If the equation is solved then we will get

\[
\sigma^2_j = \frac{\sum_{t=1}^{T} (y_t - x_t, \hat{\beta}_j)^2 p(s_t = j \mid y_t; \theta)}{\sum_{t=1}^{T} p(s_t = j \mid y_t; \theta)}
\]  

(23)

\[
3. \quad \frac{\partial}{\partial \pi_j} J(\theta) = \frac{\partial}{\partial \pi_j} L(\theta) = \sum_{t=1}^{T} \frac{p(y_t, s_t = j; \theta)}{p(y_t; \theta)} - \lambda
\]

\[
= \sum_{t=1}^{T} \frac{p(y_t \mid s_t = j; \theta)p(s_t = j; \theta)}{p(y_t; \theta)} - \lambda = 0
\]

(24)

\[
s_t = j \Rightarrow p(s_t = j; \theta) = 1
\]

If the equation is solved, it will get

\[
\sum_{t=1}^{T} \frac{p(y_t \mid s_t = j; \theta)}{p(y_t; \theta)} - \lambda = \pi_j^{-1} \sum_{t=1}^{T} \frac{p(y_t, s_t = j; \theta)}{p(y_t; \theta)} - \lambda = \pi_j^{-1} \sum_{t=1}^{T} p(s_t = j \mid \theta) - \lambda = 0
\]

(25)

If simplified, the following is obtained

\[
\sum_{t=1}^{T} p(s_t = j \mid \theta) = \lambda \pi_j
\]

(26)

The sum for \( j = 1, 2, \ldots, k \), is then obtained to get

\[
\sum_{t=1}^{T} \sum_{j=1}^{K} p(s_t = j \mid \theta) = \lambda \sum_{j=1}^{K} \pi_j
\]

\[
\sum_{t=1}^{T} \{1\} = \lambda \cdot 1 \Rightarrow \lambda = T
\]

Because \( \sum_{j=1}^{K} p(s_t = j \mid \theta) = 1 \) dan \( \sum_{j=1}^{K} \pi_j = 1 \) So its estimator can be written

\[
\hat{\pi}_j = \frac{1}{T} \sum_{t=1}^{T} p(s_t = j \mid \theta)
\]

(27)

According to Hamilton (1990) it can be proved that the following transition probabilities satisfy FOC. Then the transition probabilities can be shown by the following equation
From Hamilton (1990) an algorithm is then used to estimate the parameters of the arbitrary initial value.

\[
p(y_t | Y_{t-1}) = \sum_{s_{t-1}} \sum_{s_t} p(s_t | s_{t-1}) p(y_t | s_t) \rho_{s_{t-1}}
\]

\[
p(s_t, s_{t-1} | y_t) = \frac{p(s_t | s_{t-1}) p(y_t | s_t) p(s_{t-1} | y_{t-1})}{p(y_t | Y_{t-1})}
\]

\[
p(s_{t-1} | y_t) = \sum_{s_t} p(s_t, s_{t-1} | y_t)
\]

\[
\rho_{s_{t-1}} = p(s_{t-1} | y_{t-1})
\]

taken from the previous value as the initial value \(\rho_{so} = p(so/yo)\). This value is taken as the initial value of any parameter estimation.

For the case of a two-state markov change regime as used in this paper, the value of the transition probability is calculated as follows.

\[
p^n_{ii+1} = \sum_{t=1}^{T} p(s_t = 1, s_{t-1} = 1 | \theta)
\]

\[
p(s_t = 1, s_{t-1} = 1 | y_t) = \frac{p(s_t = 1 | s_{t-1} = 1)p(y_t | s_t = 1)p(s_{t-1} = 1 | y_{t-1})}{p(y_t | Y_{t-1})}
\]

\[
p(s_t = 2, s_{t-1} = 1 | y_t) = \frac{p(s_t = 2 | s_{t-1} = 1)p(y_t | s_t = 2)p(s_{t-1} = 1 | y_{t-1})}{p(y_t | Y_{t-1})}
\]
\[ p(s_t = 1, s_{t-1} = 1 \mid y_t) = \frac{p_{11}^{n} \eta_{d_{y_t} = 1} \rho_{s_{t-1}}^{n}}{p(y_t \mid Y_{t-1})} \]  

\[
\begin{align*}
\left[ p(s_t = 1, s_{t-1} = 1 \mid y_t) & \quad p(s_t = 2, s_{t-1} = 1 \mid y_t) \\
p(s_t = 1, s_{t-1} = 2 \mid y_t) & \quad p(s_t = 2, s_{t-1} = 2 \mid y_t) 
\end{align*}
\] 

\[
\left[ \begin{array}{c}
p_{s_1 = 1} \\
p_{s_1 = 2}
\end{array} \right] \begin{bmatrix}
p_{11} & p_{12} & \eta_{d_{y_t} = 1} \\
p_{21} & p_{22} & \eta_{d_{y_t} = 2}
\end{bmatrix} \left/ p(y_t \mid Y_{t-1}) \right.
\]  

\[ p(y_t \mid Y_{t-1}) = \sum_{k=1}^{K} \sum_{s_{t-1}=1}^{K} p_{s_{t-1}}^{n} \eta_{d_{y_t}} \rho_{s_{t-1}}^{n} = \left[ \begin{array}{c}
p_{s_1 = 1} \\
p_{s_1 = 2}
\end{array} \right] \begin{bmatrix}
p_{11} & p_{12} & \eta_{d_{y_t} = 1} \\
p_{21} & p_{22} & \eta_{d_{y_t} = 2}
\end{bmatrix}
\]  

\[ p(s_{t-1} = 1 \mid y_t) = \sum_{s_{t-1}=1}^{K} p(s_t = 1, s_{t-1} = 1 \mid y_t) \]  

\[ p(s_{t-1} = 1 \mid y_t) = p(s_t = 1, s_{t-1} = 1 \mid y_t) + p(s_t = 2, s_{t-1} = 1 \mid y_t) \]  

\[ p(s_{t-1} = 1 \mid y_t) = \frac{[p(s_t = 2 \mid s_{t-1} = 1)p(y_t \mid s_t = 2) + p(s_t = 1 \mid s_{t-1} = 1)p(y_t \mid s_t = 1)]p(s_{t-1} = 1 \mid y_{t-1})}{p(y_t \mid Y_{t-1})} \] 

\[ = \frac{[p_{12} \eta_{d_{y_t}} + p_{11} \eta_{d_{y_t}}]p(s_{t-1} = 1 \mid y_{t-1})}{p(y_t \mid Y_{t-1})} \]  

\[ \left[ \begin{array}{c}
p(s_{t-1} = 1 \mid y_t) \\
p(s_{t-1} = 2 \mid y_t)
\end{array} \right] = \left[ \begin{array}{c}
p(s_t = 1, s_{t-1} = 1 \mid y_t) \\
p(s_t = 1, s_{t-1} = 2 \mid y_t)
\end{array} \right] \left[ \begin{array}{c}
p(s_t = 2, s_{t-1} = 1 \mid y_t) \\
p(s_t = 2, s_{t-1} = 2 \mid y_t)
\end{array} \right] \left[ \begin{array}{c}1 \\
1
\end{array} \right] \] 

\[ p_{n+1}^{11} = \frac{\sum_{t=1}^{T} p_{11} \eta_{d_{y_t}} p(s_{t-1} = 1 \mid y_{t-1})}{\sum_{t=1}^{T} (p_{12} \eta_{d_{y_t}} + p_{11} \eta_{d_{y_t}}) p(s_{t-1} = 1 \mid y_{t-1})} \] 

\[ = \left[ \begin{array}{c}
p(s_t = 1, s_{t-1} = 1 \mid y_t) \\
p(s_t = 1, s_{t-1} = 2 \mid y_t)
\end{array} \right] \left[ \begin{array}{c}
p(s_t = 2, s_{t-1} = 1 \mid y_t) \\
p(s_t = 2, s_{t-1} = 2 \mid y_t)
\end{array} \right] \] 

\[ = \left[ \begin{array}{cc}
0 & \left[ p(s_t = 1, s_{t-1} = 1 \mid y_t) + p(s_t = 2, s_{t-1} = 1 \mid y_t) \right] \\
0 & \left[ p(s_t = 1, s_{t-1} = 2 \mid y_t) + p(s_t = 2, s_{t-1} = 2 \mid y_t) \right] 
\end{array} \right] \]
Where $p(s_t = 1 | s_{t-1} = 1)$ is obtained from the transition matrix while $p(y_t | s_t = 1)$ from the equation of conditional distribution. The initial value used is $p(s_0 = 1 | y_0)$. The same way can also be used to for estimating the magnitude $p_{22}$. The initial values used to estimate the magnitude of the parameters are.

$$\{\alpha_1, \alpha_2, \phi_{1,1}, \phi_{2,1}, \phi_{3,1}, \phi_{1,2}, \phi_{2,2}, \phi_{3,2}, p_{11}, p_{22}, \rho_1, \rho_2, \sigma_1^2, \sigma_2^2\}$$
APPENDIX 2
Changes in Fund and Bank to Bank Run Ergodic Probability State

1. State Bank (BP)

<table>
<thead>
<tr>
<th>Waktu (Bulan)</th>
<th>Plot Data Dana Pihak Ketiga</th>
<th>Plot Ergodic Probability ke state-2</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>20</td>
<td></td>
<td>0.2</td>
</tr>
<tr>
<td>40</td>
<td></td>
<td>0.2</td>
</tr>
<tr>
<td>60</td>
<td></td>
<td>0.2</td>
</tr>
<tr>
<td>80</td>
<td></td>
<td>0.2</td>
</tr>
<tr>
<td>100</td>
<td></td>
<td>0.2</td>
</tr>
<tr>
<td>120</td>
<td></td>
<td>0.2</td>
</tr>
<tr>
<td>140</td>
<td></td>
<td>0.2</td>
</tr>
<tr>
<td>160</td>
<td></td>
<td>0.2</td>
</tr>
<tr>
<td>180</td>
<td></td>
<td>0.2</td>
</tr>
<tr>
<td>200</td>
<td></td>
<td>0.2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Waktu (Bulan)</th>
<th>Plot Data Dana Pihak Ketiga</th>
<th>Plot Ergodic Probability ke state-2</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>20</td>
<td></td>
<td>0.2</td>
</tr>
<tr>
<td>40</td>
<td></td>
<td>0.2</td>
</tr>
<tr>
<td>60</td>
<td></td>
<td>0.2</td>
</tr>
<tr>
<td>80</td>
<td></td>
<td>0.2</td>
</tr>
<tr>
<td>100</td>
<td></td>
<td>0.2</td>
</tr>
<tr>
<td>120</td>
<td></td>
<td>0.2</td>
</tr>
<tr>
<td>140</td>
<td></td>
<td>0.2</td>
</tr>
<tr>
<td>160</td>
<td></td>
<td>0.2</td>
</tr>
<tr>
<td>180</td>
<td></td>
<td>0.2</td>
</tr>
<tr>
<td>200</td>
<td></td>
<td>0.2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Waktu (Bulan)</th>
<th>Plot Data Dana Pihak Ketiga</th>
<th>Plot Ergodic Probability ke state-2</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>20</td>
<td></td>
<td>0.2</td>
</tr>
<tr>
<td>40</td>
<td></td>
<td>0.2</td>
</tr>
<tr>
<td>60</td>
<td></td>
<td>0.2</td>
</tr>
<tr>
<td>80</td>
<td></td>
<td>0.2</td>
</tr>
<tr>
<td>100</td>
<td></td>
<td>0.2</td>
</tr>
<tr>
<td>120</td>
<td></td>
<td>0.2</td>
</tr>
<tr>
<td>140</td>
<td></td>
<td>0.2</td>
</tr>
<tr>
<td>160</td>
<td></td>
<td>0.2</td>
</tr>
<tr>
<td>180</td>
<td></td>
<td>0.2</td>
</tr>
<tr>
<td>200</td>
<td></td>
<td>0.2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Waktu (Bulan)</th>
<th>Plot Data Dana Pihak Ketiga</th>
<th>Plot Ergodic Probability ke state-2</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>20</td>
<td></td>
<td>0.2</td>
</tr>
<tr>
<td>40</td>
<td></td>
<td>0.2</td>
</tr>
<tr>
<td>60</td>
<td></td>
<td>0.2</td>
</tr>
<tr>
<td>80</td>
<td></td>
<td>0.2</td>
</tr>
<tr>
<td>100</td>
<td></td>
<td>0.2</td>
</tr>
<tr>
<td>120</td>
<td></td>
<td>0.2</td>
</tr>
<tr>
<td>140</td>
<td></td>
<td>0.2</td>
</tr>
<tr>
<td>160</td>
<td></td>
<td>0.2</td>
</tr>
<tr>
<td>180</td>
<td></td>
<td>0.2</td>
</tr>
<tr>
<td>200</td>
<td></td>
<td>0.2</td>
</tr>
</tbody>
</table>
2. Private Forex Bank (BSD)

![Plot Data Dana Pihak Ketiga](image1)

![Plot Ergodic Probability ke state-2](image2)

![Growth Dana Pihak Ketiga](image3)

![Waktu (Bulan)](image4)
3. Private Non-Forex Bank (BSND)
4. Foreign Bank (BA)
5. Mix Bank (BC)
Early Warning Indicators Study Of Bank Runs In Indonesia: Markov-switching Approach

Plot Data Dana Pihak Ketiga

Waktu (Bulan)

Plot Ergodic Probability ke state-2

Growth Dana Pihak Ketiga

Probability

Waktu (Bulan)

Plot Data Dana Pihak Ketiga

Waktu (Bulan)

Plot Ergodic Probability ke state-2

Growth Dana Pihak Ketiga

Probability

Waktu (Bulan)

Plot Data Dana Pihak Ketiga

Waktu (Bulan)

Plot Ergodic Probability ke state-2

Growth Dana Pihak Ketiga

Probability

Waktu (Bulan)
6. Bank with Frozen Business Activity (BBKU)
7. Bank with Frozen Operation (BBO)

![Graphs showing data and probability plots for different states and time periods.](image-url)
This page is intentionally left blank
META-ANALYSIS
OF MONEY DEMAND IN INDONESIA

Galih Riyandi

Abstract

Studies on the demand for money in Indonesia are widely available. The use of various estimation techniques has given various results, which to some extent is difficult to derive a definitive conclusion about the behavior of the demand for money in this country. This paper aims to find out the tendency of the demand for money in Indonesia by analyzing the long run and the short run income and opportunity cost elasticity. We use fixed effects and unweighted average meta-analysis. The result shows that income and opportunity cost elasticity are consistent with theory of money demand. This result can be used as an empirical foundation to future studies about demand for money in Indonesia.

Keywords: demand for money, meta analysis, fixed effects.

JEL Classification code: E41, E52

1 The author would like to thank Prof. Insukindro, MA, PhD for the guidance, help and advice given to the author during this research. galihriyandi@yahoo.com and galihriyandi@mail.ugm.ac.id
I. INTRODUCTION

Quantitative studies on the analysis of money demand in Indonesia have started long ago. Knell and Stix (2003) even stated that the analysis of the demand for money is one of the most popular areas for economic science researchers as evidenced by the thousands of articles that discuss the demand for money from different countries and time periods. Analysis of the demand for money still plays an important role in the analysis of macroeconomic policy, especially in choosing the appropriate monetary policy. The phenomenon of the globalization of financial markets, domestic financial liberalization and innovation econometric techniques make research on the demand for money more popular in recent decades (Sriram, 2001).


However, based on observations in the research literature, money demand in Indonesia has yielded a variety of analytical results. One of the focuses of this research is the income elasticity and the elasticity of the estimated opportunity cost with a fairly wide range. This has led to difficulties in finding a common symptom of the demand for money in Indonesia. Based on narrative review of studies conducted Phase (1994), he stated that some studies showed conflicting empirical results, with some outliers on the coefficient values of certain variables. This leads to the conclusion that the simplification of the theory of the demand for money is blurred using an empirical approach.

This paper collects and examines various analytical resultson money demand in Indonesia using a technique known as fixed effects meta-analysis by Lipsey and Wilson (2001: 129-133). The purpose of this paper is to examine the behavior of money demand as a common symptom in Indonesia through the observation of the long-term and the short-term elasticity, both for income elasticity and opportunity cost elasticity and/or semi-elasticity of previous studies. Meta-analysis can be used to help solve problems that arise due to the different variations of the study results. Ultimately this technique can be used to estimate the income elasticity and the elasticity of the opportunity cost. This paper developed a meta-analysis of different techniques of analysis-quantitative analysis of money demand has been made. Meta-analysis used in this paper provides comprehensive quantitative summaries of previous quantitative analyzes and examines the elasticity of the short and long runs separately.

The material presented in this paper are expected to provide new insights into understanding the behavior of money demand in Indonesia that can help policy makers in
designing appropriate monetary policy and assist in the development of research money demand in Indonesia in the future.

Next section of this paper discusses the theoretical specification, section 3 discusses the research methodology, section 4 discusses the results of the analysis of the research, and the final section discusses conclusions.

II. THEORY

Sriram (1999) briefly give a conclusion that the theory of demand for money is the theory of the demand for real balances to the equation:

$$\frac{M}{P} = f(S, OC)$$

Demand of real balances $\frac{M}{P}$ is a function of the scale variable ($s$) that represents economic activities and the opportunity cost of holding money ($OC$).

Knell and Stix (2003) provide a more complete model of the equation of money by entering wealth as a factor affecting the demand for money

$$m_t - p_t = \gamma_0 + \gamma_1 Y_t + \gamma_2 i_t^{own} + \gamma_3 i_t^{out} + \gamma_4 \pi_t + \gamma_5 w_t + \gamma_6 X_t + \epsilon_t$$

$m_t - p_t$ is the logarithm of real money demand, $Y_t$ variable is the logarithm of the scale, $i_t^{own}$ is the nominal interest rate of financial assets as defined by the monetary aggregate variables, $i_t^{out}$ is the interest rate for one of the variables out of the definition of monetary aggregates, $\pi$ is the rate of inflation, $w_t$ is the variable approach to wealth and $X_t$ is a vector of other variables that can have a systematic impact on aggregate demand of money.

Price and Insukindro (1994) explain the M1 money demand model for an open country such as Indonesia assuming log linearity as follows:

$$m_t = a + by_t + c r_t - d \tilde{r}_t$$

Domestic money demand is affected by income, $y$ (as the scale variable approach) and as a consequence of the open economy, the holder of money has two alternative options, domestic assets and foreign assets. The domestic interest rate is denoted $r$ and interest rates on holding foreign assets represented by $\tilde{r}$. 
III. METHODOLOGY

3.1 The Concept of Meta-Analysis

This study used meta-analysis as an analytical tool. According to Stanley and Jarell (1989), meta-analysis is an analysis of some of the empirical analysis that aims to combine and clarify the literature on some important parameters. In brief, meta-analysis can be understood as a form of a series of studies conducted as a survey of research results, performs procedure coding, collecting samples or populations of such research, stores information on the characteristics and quantitative results and then performs data analysis by adapting conventional statistical techniques to investigate and to describe the shape of the data (Lipsey and Wilson, 2001:1).

Some experts argue that the primary purpose of meta-analysis is to get statistically significant results (Simon, 2000: 308). This is consistent with the use of statistics in the meta-analysis. However, the statistical significance of the results is not everything. Simon (2000: 308) explains that in the meta-analysis in the field of medical science of statistical significance does not necessarily answer questions of medical experts about how to provide appropriate care to patients. Therapeutic effect size (The size of treatment effect) no less important, especially when dealing with the therapeutic use of hazardous substances and the treatment of patients with a high cost. Simon summed up that the general benefit of statistical analysis in clinical studies or in the meta-analysis was to obtain therapeutic effect size estimates with the goal of helping the process of clinical decision making.

To summarize the evidence (discovery) of various analysis tools, the meta-analysis convert the statistical results into a metric that can be compared (Stanley, 2001). Gene Glass in 1976 and 1977 popularized the term meta-analysis which introduces the concept of effect size to integrate these empirical findings of existing literatures (see Stanley, 2001). According to Lipsey and Wilson (2001:3) the size effect is statistically significant quantitative measure symbolizing each sample of quantitative research results. To obtain the effect size statistical tools are used. The statistics effect size produces a standardized statistic found in the sample and that can be interpreted (Lipsey and Wilson, 2001:4). Other forms of effect size in the field of economics are elasticity, semi-elasticity, partial correlation coefficients, t-statistics, and regression coefficient (Stanley, 2001).

Using meta-analysis is more satisfying than a literature review in a narrative synthesis of research results. Knell and Stix’ s (2003) research stated empirical money demand literature surveys generally stop after it shows the results of descriptive statistics and histograms of the estimated elasticities, but the meta-analysis uses a statistical test to obtain more satisfactory results.
3.2 Research with Meta-Analysis on the Economy

Table 1 provides a summary of the research in the field of economics that have used meta-analysis.

<table>
<thead>
<tr>
<th>Study</th>
<th>Subject</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stanley and Jarell (1989)</td>
<td>The introduction of meta-regression analysis</td>
</tr>
<tr>
<td>Jarell and Stanley (1990)</td>
<td><em>Union wage premium</em></td>
</tr>
<tr>
<td>Smith and Kaoru (1990)</td>
<td><em>Recreation benefits</em></td>
</tr>
<tr>
<td>Phillips (1994)</td>
<td>Education and productivity</td>
</tr>
<tr>
<td>Doucouliagos (1997)</td>
<td>Demand for labor in Australia</td>
</tr>
<tr>
<td>Baaijens, Nijkamp and Montfort (1998)</td>
<td><em>Regional multipliers</em></td>
</tr>
<tr>
<td>Ashenfelter et al. (1999)</td>
<td><em>Returns of education</em></td>
</tr>
</tbody>
</table>

Source: Stanley (2001)

IV. RESULTS AND ANALYSIS

In general, money demand models for a country with a closed economy is influenced by the level of income and the nominal interest rate, while in the case of an open country like Indonesia there is the option of holders of money to choose alternative assets such as domestic assets and foreign assets that earn interest (Price and Insukindro, 1994). Therefore, some recent studies include a variable interest rate abroad (e.g. LIBOR) in the analysis of the demand for money. However, the variable interest rates abroad are not used in the analysis of this study. Another approach used to measure the opportunity cost elasticity is the inflation rate as in Aghevoli (1976), Aghevoli et al. (1979), Insukindro and Sugiyanto (1987), Iljas (1998), Bahmani-oskoee and Rehman (2005), and Yu and Gan (2009).

This study gathered 23 researches. The results of these researches are used as in meta-analysis. Descriptions about the characteristics of the data are listed in Table A1 in the Appendix. The table provides information on the sample observation period, monetary variables (real and nominal), variable scale, the opportunity cost variables and other variables, the unit root test, cointegration test, stability test and the key findings of research on the demand for money that has been done in the case of Indonesia. This information can be used by readers as a guide for future researchers in conducting an assessment of similar research.
Table A2 (in Appendix) presents the income elasticity, opportunity cost elasticity or semi-elasticity both for the short and the long term. In general, these studies have used standard procedures of the study. Research conducted using a structured ECM from the unit root test to test cointegration. Some studies have even put a money demand stability test. In general, research on money demand in Indonesia use monetary variable components of M1, M1, and M2. Variable scale that is widely used is the Gross Domestic Product, and the opportunity cost variable used is the rate of 3-month deposit interest rate and or the rate of inflation. A stability test conducted also showed that generally money demand in Indonesia is stable.

According to Stanley (2001), one form of the effect size in the analysis and the social sciences is the elasticity or semi-elasticity. The effect size calculations can be done using an unweighted average, fixed effects, random effects, and the effects of the combination (mixed effects). This study only uses fixed effects methods to calculate the average size of the elasticity effects of independent variables. Calculating the average effect size (mean effect size) in this study is limited to the analysis of the income elasticity and the opportunity cost elasticity or semi-elasticity in the short term; while the long-term elasticity analysis only using an unweighted average, since data on standard deviations or t-statistics of the estimation results are generally not considered in the sample study research.

This paper divides 23 samples into 6 groups according to the definition of the money used for the primary study investigators. Distribution groups can be seen in table 4 as follows.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Components of the money in the narrow sense</td>
<td>5</td>
<td>8</td>
<td>1</td>
<td>1</td>
<td>4</td>
<td>7</td>
</tr>
<tr>
<td>Money in the narrow sense (M1)</td>
<td>14</td>
<td>16</td>
<td>8</td>
<td>6</td>
<td>7</td>
<td>11</td>
</tr>
<tr>
<td>Money in a broad sense (M2)</td>
<td>14</td>
<td>17</td>
<td>6</td>
<td>5</td>
<td>7</td>
<td>13</td>
</tr>
</tbody>
</table>

Calculation of average effect sizes can be seen in detail in the appendix, while the counting result average effect sizes can be seen in table 5 as follows.
Based on Table 3, the z-statistic for the effect size of the income elasticity of M1 component, the income elasticity of the M1, the income elasticity for M2, the M2 opportunity cost elasticity, opportunity cost semi-elasticity of M1 and M2, exceed the critical value, hence the average effect size are statistically significant and the 95 percent confidence interval around the average effect size are not zero. The statistical significance also increase the accuracy of the average effect size in the data (Lipsey and Wilson, 2001: 132).

Based on Table 3, the average value of the effect size of the components of the short term income elasticity of narrow money (M1) is 0.1289. These results are consistent with the theory of money demand that changes in component of money demand (M1) is associated with changes in income. The average value of the short-term income elasticity effectsize for M1 is less than 1 (one) which is inelastic. This means that a 1 percent increase in income leads to an increase in money demand component of M1 by less than 1 percent. The average value of the effect size of the opportunity cost semi-elasticity of M1 in the short term is -0.0025. This result are consistent with the theory that changes in the demand for money M1 is negatively associated with changes of opportunity costs (interest rates or inflation). The increase in interest rates would decrease the demand for money in the short-term. The average value of the effect size...
size of the opportunity cost semi-elasticity of the M1 in the short term is less than 1 (one) which is inelastic. The increase of interest rates by 1 (one) percent will increase the demand for M1 by less than 1 (one) per cent in the short term.

For comparison, Table 4 presents the calculation results of the average and median effect size analysis both for the income elasticity and also the elasticity or semi-elasticity of the opportunity cost in the short term using an unweighted average.

<table>
<thead>
<tr>
<th>Definition of Money</th>
<th>Average Size Effect of Short Run Income Elasticity</th>
<th>Average Size Effect of Short Run Opportunity Cost Elasticity</th>
<th>Average Size Effect of Short Run Opportunity Costs Semi-Elastic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Components of the money in the narrow sense</td>
<td>0.1178*</td>
<td>-</td>
<td>-0.4113*</td>
</tr>
<tr>
<td>Money in a narrow sense (M1)</td>
<td>0.26905*</td>
<td>-0.1865*</td>
<td>-0.2952*</td>
</tr>
<tr>
<td>Money in a broad sense (M2)</td>
<td>0.33431*</td>
<td>-0.05343*</td>
<td>-0.15189*</td>
</tr>
</tbody>
</table>

Note: *) mean, **) median.
The analysis of the opportunity cost elasticity of the M1 in the short term were not analyzed because of limited study sample.

Based on Table 4, the mean and the median of effect size of the short run income elasticity of money in the narrow sense (M1) is 0.1178 and 0.17 respectively. These results are consistent with the theory that changes in the demand for money M1 is in line with the changes of the income. The mean and the median effect size of the income elasticity of M1 component in the short term is less inelastic. A 1 percent increase in income leads to an increase in money demand by less than 1 percent. The mean and the median effect size of the opportunity cost semi-elasticity of M1 component in the short term is -0.4113 and -0.3667 respectively. These results are consistent with the theory that changes in the demand for money M1 is reversely associated with the changes of opportunity costs (interest rates or inflation). The increase in interest rates would decrease the demand for component of M1 money in the short run. The mean and the median effect size of the opportunity cost semi-elasticity of M1 are inelastic in the short term. The increase in interest rates by 1 (one) percent will increase the demand for M1 by less than 1 (one) percent.

The calculation for the size effect on the analysis of the long run income elasticity and the long run opportunity costs elasticity or semi-elasticity can be seen in Table 5 as follows.
Based on Table 5, the mean and the median effect size of the long run income elasticity of money in the narrow sense (M1) is 0.95078 and 0.9192 respectively. These results are consistent with the theory that changes in the demand for money are associated with the changes in income. The mean and the median effect size of the long run income elasticity of M1 is close to 1 (one) which means close to unitary elasticity. This means that changes in money demand is proportional to changes in income. The mean and the median effect size of the long run opportunity cost semi-elasticity of M1 is elastic in the long run. The increase in interest rates by 1 (one) percent will increase the demand for money M1 by more than 1 (one) percent.

Based on the mean and the median of Tables 5 and 6 it can be seen that in general, by any definition of money, the income elasticity and the opportunity cost elasticity or semi-elasticity, are in accordance with the theory in the short run and is inelastic. In the long-term analysis (Table 5), the mean value and the median of income elasticities and opportunity cost elasticity or semi-elasticity, by any definition of the money, in the long run is consistent with the theory. The income elasticity of the components of M1 and its component are close to 1 (close to unitary) in the long run, while the income elasticity of the M2 is elastic in the long run (mean = 1.6588 and median = 1.526). The elasticity of the opportunity cost of the M1 and its component are inelastic, while the long run opportunity cost semi-elasticity of M1’s component is elastic. Conversely, the long run opportunity cost semi-elasticity of M2 is inelastic. In long run opportunity cost semi-elasticity of M1, there is contrary results between the mean value and the median. The mean of the long run opportunity cost semi-elasticity of M1 is elastic, but the median shows the opposite result of inelastic.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Components of the money in the narrow sense</td>
<td>0.95078*&lt;br&gt;0.9192**</td>
<td>-</td>
<td>-2.31622*&lt;br&gt;-1.5**</td>
</tr>
<tr>
<td>Money in a narrow sense (M1)</td>
<td>1.19713*&lt;br&gt;1.13**</td>
<td>-0.14105*&lt;br&gt;-0.11**</td>
<td>-2.06529*&lt;br&gt;-0.06**</td>
</tr>
<tr>
<td>Money in a broad sense (M2)</td>
<td>1.65882*&lt;br&gt;1.526**</td>
<td>-0.25858*&lt;br&gt;-0.28**</td>
<td>-0.50643*&lt;br&gt;-0.01**</td>
</tr>
</tbody>
</table>

Note: *) mean, **) median.
The analysis for the long run opportunity cost elasticity of M1 component in the long run were not analyzed because of limited study sample.
V. CONCLUSION

This paper concludes that the results of the meta analysis on short run income elasticity and the short run opportunity cost elasticity or semi-elasticity according to any definition of money is consistent with the theory. This is evident from the mean and the median effect size of the income elasticity of demand for money (all definitions of money), which are positive. The mean and the median effect size of opportunity cost elasticity of demand for money (all definitions of money) are negative and consistent with the theory of demand for money. In general, the income elasticity and the opportunity cost elasticity or semi-elasticity by any definition of money in Indonesia is inelastic in the short run, either using the fixed effects or using an unweighted average.

Based on the long-term analysis, this paper concludes that in general the income elasticity and the opportunity cost elasticity or semi-elasticity of the money by any definition is consistent with the theory. The income elasticity of the components of M1 and M1 in the long run is close to 1 (close to unitary) and the income elasticity of the M2 in the long run is elastic. The elasticity of the opportunity cost of the M1 and its component are inelastic. The long run opportunity cost semi-elasticity of M1’s component is elastic. Conversely, the long run opportunity cost semi-elasticity of the M2 is inelastic. In the long run opportunity cost semi-elasticity of M1 there are different results between the mean and the median values. The mean value of the long run opportunity cost semi-elasticity of M1 is elastic, but the median showed the opposite result, which is inelastic.

Until now, it is still rare for researchers in Indonesia to use meta-analysis as an analytical tool in integrating existing researches, especially in the field of monetary economics. Meta-analysis can help economic and non-economic researchers integrate research results easily. Using meta-analysis to analyze money demand in Indonesia provides a new view in determining the value of the average effect size of the income elasticity of money demand, a measure of the effect of the opportunity cost elasticity or semi-elasticity of money demand. The average value of the effect size of the meta-analysis study can be used as a basis or hypothesis in the analysis of money demand in Indonesia in the future either using econometric analysis tools, literature review and statistics. Meta-analysis with fixed effects methods, the confidence interval and statistical significance estimation makes results more convincing.

The calculation of the average income elasticity and opportunity cost elasticity and / or semi-elasticity of all definitions of money do not significantly affect the demand for money in the short term, therefore, the Central Bank could consider the opportunity cost elasticity in formulating the inflation target to direct the market participants and the public expectation on inflation and interest rate, so the inflation will not miss the targeted one.

Research on the demand for money using meta-analysis in the future is expected to collect a larger sample and to obtain a more complete information about the characteristics of the sample (for example: standard error and t-statistics) to enable deeper exploration about the characteristics of the demand for money in Indonesia.
REFERENCES


### APPENDIX

#### Table A1.
Summary of data used in the meta-analysis.

<table>
<thead>
<tr>
<th>No</th>
<th>Research</th>
<th>Sample Period/Frequency</th>
<th>Monetary Variables</th>
<th>Explanatory variables</th>
<th>Model</th>
<th>Unit Root Test</th>
<th>Degrees of Integration and Cointegration Test</th>
<th>Stability Test</th>
<th>Important findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Aghevli (1976)</td>
<td>1968.1 - 1973.4 Quarterly</td>
<td>Log (Real M2)</td>
<td>-Inflation Rate</td>
<td>PAM</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>The estimates in accordance with the theory</td>
</tr>
<tr>
<td>2</td>
<td>Aghevli et al. (1979)</td>
<td>1968.2 - 1976.4 Quarterly</td>
<td>M1 Log (Real M2)</td>
<td>-Level of inflation expectations</td>
<td>PAM</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>The estimates in accordance with the theory</td>
</tr>
<tr>
<td>3</td>
<td>Insukindro dan Sugiyanto (1987)</td>
<td>1970.1 - 1986.1 Quarterly</td>
<td>Log (Real M2)</td>
<td>-Log interest rate on deposits of government banks pemerintah</td>
<td>PAM</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>Banking deregulation negatively affect demand for M1 and positively affected demand for M2</td>
</tr>
<tr>
<td>4</td>
<td>Jaya (1990)</td>
<td>1973.1 - 1987.4 Quarterly</td>
<td>Real M1 Real M2</td>
<td>Average rate of interest on savings and time deposits</td>
<td>PAM</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>Model SAM (Shock Absorber Model) was superior to the model PAM (Partial Adjustment Model)</td>
</tr>
<tr>
<td>5</td>
<td>Price dan Insukindro -1994</td>
<td>1969.1 - 1987.4 Quarterly</td>
<td>Ln (real CHP) Ln (real DD)</td>
<td>-Level of interest rates on deposits, Interest rate LIBOR</td>
<td>ECM, Forward Looking Model</td>
<td>I (1) EG (1987) J (1988) JJ (1990)</td>
<td>Chow test; Salkever (1976), dummy variable approach to the analysis of ECM</td>
<td>EG (1987); Cointegration relationships are weak on variables CHP J(1988) ; There are two cointegration vectors in both equations LIBOR that are not important variables in the analysis of ECM</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>No</th>
<th>Research</th>
<th>Sample Period/Frequency</th>
<th>Monetary Variables</th>
<th>Explanatory variables</th>
<th>Model</th>
<th>Unit Root Test</th>
<th>Degrees of Integration and Cointegration Test</th>
<th>Stability Test</th>
<th>Important findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Aghevli (1976)</td>
<td>1968.1 - 1973.4 Quarterly</td>
<td>Log (Real M2)</td>
<td>-Inflation Rate</td>
<td>PAM</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>The estimates in accordance with the theory</td>
</tr>
<tr>
<td>2</td>
<td>Aghevli et al. (1979)</td>
<td>1968.2 - 1976.4 Quarterly</td>
<td>M1 Log (Real M2)</td>
<td>-Level of inflation expectations</td>
<td>PAM</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>The estimates in accordance with the theory</td>
</tr>
<tr>
<td>3</td>
<td>Insukindro dan Sugiyanto (1987)</td>
<td>1970.1 - 1986.1 Quarterly</td>
<td>Log (Real M2)</td>
<td>-Log interest rate on deposits of government banks pemerintah</td>
<td>PAM</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>Banking deregulation negatively affect demand for M1 and positively affected demand for M2</td>
</tr>
<tr>
<td>4</td>
<td>Jaya (1990)</td>
<td>1973.1 - 1987.4 Quarterly</td>
<td>Real M1 Real M2</td>
<td>Average rate of interest on savings and time deposits</td>
<td>PAM</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>Model SAM (Shock Absorber Model) was superior to the model PAM (Partial Adjustment Model)</td>
</tr>
<tr>
<td>5</td>
<td>Price dan Insukindro -1994</td>
<td>1969.1 - 1987.4 Quarterly</td>
<td>Ln (real CHP) Ln (real DD)</td>
<td>-Level of interest rates on deposits, Interest rate LIBOR</td>
<td>ECM, Forward Looking Model</td>
<td>I (1) EG (1987) J (1988) JJ (1990)</td>
<td>Chow test; Salkever (1976), dummy variable approach to the analysis of ECM</td>
<td>EG (1987); Cointegration relationships are weak on variables CHP J(1988) ; There are two cointegration vectors in both equations LIBOR that are not important variables in the analysis of ECM</td>
<td></td>
</tr>
</tbody>
</table>

The table above summarizes the data used in the meta-analysis, including the sample period, frequency, monetary variables, explanatory variables, model used, and important findings. Each row represents a different study, with details on the specific variables and methods used. The table highlights the methodologies and results compared across different research periods and datasets.
<table>
<thead>
<tr>
<th>No</th>
<th>Research</th>
<th>Sample Period</th>
<th>Frequency</th>
<th>Monetary variables</th>
<th>Explanatory variables</th>
<th>Opportunity Cost</th>
<th>Important findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>Insukindro (1998)</td>
<td>1987.1 - 1997.4</td>
<td>Quarterly</td>
<td>Log Reserve</td>
<td>Log (Real C) Ln (Real M1) Log M1 Ln (Real M2) Log M2 Ln Reserve</td>
<td>Log Effective Exchange Rate</td>
<td>ECM (I-ECM) DF, ADF Test - I (1) - EG (1987) - EG - C and M have a long-term relationship with the explanatory variables. J-C: There is 1 cointegration vector. RM: At least there is 1 cointegration vector. BM: there are less than/equal to 2 cointegration vectors. Model ECM Log is superior to the linear ECM models.</td>
</tr>
<tr>
<td>7</td>
<td>Iljas (1998)</td>
<td>1983 - 1996</td>
<td>Quarterly</td>
<td>Ln Real G</td>
<td>Ln Real C Ln Real M1 Ln Reserve</td>
<td>Log Nominal interest savings</td>
<td>ECM (I-ECM) DF, ADF Test - I (1) - EG (1987) - EG - C and M have a long-term relationship with the explanatory variables. J-C: There is 1 cointegration vector. RM: At least there is 1 cointegration vector. BM: there are less than/equal to 2 cointegration vectors. Model ECM Log is superior to the linear ECM models.</td>
</tr>
<tr>
<td>8</td>
<td>Darsono (1999)</td>
<td>1970.1 - 1996.4</td>
<td>Quarterly</td>
<td>Log Reserve M</td>
<td>Log C Ln Real G Ln Real M1 Ln Real M2 Ln Reserve</td>
<td>Log Effective Exchange Rate</td>
<td>ECM (I-ECM) DF, ADF Test - I (1) - EG (1987) - EG - C and M have a long-term relationship with the explanatory variables. J-C: There is 1 cointegration vector. RM: At least there is 1 cointegration vector. BM: there are less than/equal to 2 cointegration vectors. Model ECM Log is superior to the linear ECM models.</td>
</tr>
<tr>
<td>9</td>
<td>Insukindro dan Aliman (1999)</td>
<td>1994.2 - 1997.4</td>
<td>Quarterly</td>
<td>Ln Reserve M</td>
<td>Ln C Ln (Real G) Ln (Real M1) Ln (Real M2) Ln Reserve</td>
<td>Log Effective Exchange Rate</td>
<td>ECM (I-ECM) DF, ADF Test - I (1) - EG (1987) - EG - C and M have a long-term relationship with the explanatory variables. J-C: There is 1 cointegration vector. RM: At least there is 1 cointegration vector. BM: there are less than/equal to 2 cointegration vectors. Model ECM Log is superior to the linear ECM models.</td>
</tr>
<tr>
<td>10</td>
<td>Pasanibu (2002)</td>
<td>1970 - 2001</td>
<td>Quarterly</td>
<td>Log Reserve M</td>
<td>Log C Ln Real G Ln Real M1 Ln Real M2 Ln Reserve</td>
<td>Log Effective Exchange Rate</td>
<td>ECM (I-ECM) DF, ADF Test - I (1) - EG (1987) - EG - C and M have a long-term relationship with the explanatory variables. J-C: There is 1 cointegration vector. RM: At least there is 1 cointegration vector. BM: there are less than/equal to 2 cointegration vectors. Model ECM Log is superior to the linear ECM models.</td>
</tr>
<tr>
<td>Sampling Period</td>
<td>Frequency</td>
<td>Monetary variables</td>
<td>Explanatory variables</td>
<td>Model</td>
<td>Unit Root Test</td>
<td>Stability Test</td>
<td>Important findings</td>
</tr>
<tr>
<td>-----------------</td>
<td>-----------</td>
<td>-------------------</td>
<td>-----------------------</td>
<td>-------</td>
<td>----------------</td>
<td>----------------</td>
<td>-------------------</td>
</tr>
<tr>
<td>Duhaldo (2002)</td>
<td>Quarterly</td>
<td>Ln (Real M2)</td>
<td>Ln deposit interest rate of 3 months</td>
<td>ADF</td>
<td>- (1)</td>
<td>- (1)</td>
<td>Phillips-Perron (1988)</td>
</tr>
<tr>
<td>Suherman (2003)</td>
<td>Quarterly</td>
<td>Ln (Real M1)</td>
<td>3-month deposit rate for M1</td>
<td>ECM</td>
<td>-</td>
<td>-</td>
<td>Phillips-Loretan (1990)</td>
</tr>
<tr>
<td>Sriwijanto (2004)</td>
<td>Quarterly</td>
<td>Ln (Real M2)</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>Phillips-Loretan (1990)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sample Period</th>
<th>Frequency</th>
<th>Monetary variables</th>
<th>Explanatory variables</th>
<th>Model</th>
<th>Unit Root Test</th>
<th>Stability Test</th>
<th>Important findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>1983.1 - 1999.3</td>
<td>Quarterly</td>
<td>Ln (Real M1)</td>
<td>Ln deposit interest rate of 3 months</td>
<td>ECM</td>
<td>-</td>
<td>-</td>
<td>Phillips-Loretan (1990)</td>
</tr>
<tr>
<td>1990.1 - 2002.4</td>
<td>Quarterly</td>
<td>Ln (Real M2)</td>
<td>1-month deposit rate for M1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>Phillips-Loretan (1990)</td>
</tr>
<tr>
<td>1978.4 - 2003.4</td>
<td>Quarterly</td>
<td>Ln (Real GDP)</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>Phillips-Loretan (1990)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sample Period</th>
<th>Frequency</th>
<th>Monetary variables</th>
<th>Explanatory variables</th>
<th>Model</th>
<th>Unit Root Test</th>
<th>Stability Test</th>
<th>Important findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>1983.1 - 1999.3</td>
<td>Quarterly</td>
<td>Ln (Real M1)</td>
<td>Ln deposit interest rate of 3 months</td>
<td>ECM</td>
<td>-</td>
<td>-</td>
<td>Phillips-Loretan (1990)</td>
</tr>
<tr>
<td>1990.1 - 2002.4</td>
<td>Quarterly</td>
<td>Ln (Real M2)</td>
<td>1-month deposit rate for M1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>Phillips-Loretan (1990)</td>
</tr>
<tr>
<td>1978.4 - 2003.4</td>
<td>Quarterly</td>
<td>Ln (Real GDP)</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>Phillips-Loretan (1990)</td>
</tr>
<tr>
<td>No</td>
<td>Research</td>
<td>Sample Period/Frequency</td>
<td>Monetary variables</td>
<td>Explanatory variables</td>
<td>Model</td>
<td>Unit Root Test</td>
<td>Degrees of Integration and Cointegration Test</td>
</tr>
<tr>
<td>----</td>
<td>----------</td>
<td>-------------------------</td>
<td>--------------------</td>
<td>-----------------------</td>
<td>-------</td>
<td>----------------</td>
<td>-----------------------------------------------</td>
</tr>
<tr>
<td>15</td>
<td>Bahmani-Oskooee dan Rehman (2005)</td>
<td>1973.1 - 2000.4 Quarterly</td>
<td>Ln (Real M1) Ln (Real GDP)</td>
<td>Inflation Rate Ln Real exchange rate</td>
<td>-ECM ARDL</td>
<td>-</td>
<td>ARDL (Pesaran et al., 2001) CUSUM dan CUSUM SQ of residual</td>
</tr>
<tr>
<td>16</td>
<td>Achsani et al (2005)</td>
<td>1990.1 - 2002.3 Quarterly</td>
<td>Log (Real M2) Log (Real GDP)</td>
<td>-Log long-term interest rates -Log CPI Dummy variable for 1998 quarter 1, 2 and 3</td>
<td>PAM</td>
<td>PP</td>
<td>CUSUM SQ</td>
</tr>
<tr>
<td>17</td>
<td>Sidiq (2005)</td>
<td>1990.1 - 2004.2 Quarterly</td>
<td>Log GDP Log (Real M1) Log (Real M2)</td>
<td>-3-month deposit interest rate - 3 month interest rate LIBOR -Inflation Rate Exchange rates</td>
<td>ECM</td>
<td>DF</td>
<td>I (1)</td>
</tr>
<tr>
<td>No</td>
<td>Research</td>
<td>Sample Period/ Frequency</td>
<td>Monetary variables</td>
<td>Explanatory variables</td>
<td>Model</td>
<td>Unit Root Test</td>
<td>Degrees of Integration and Cointegration Test</td>
</tr>
<tr>
<td>----</td>
<td>----------</td>
<td>--------------------------</td>
<td>-------------------</td>
<td>-----------------------</td>
<td>-------</td>
<td>----------------</td>
<td>------------------------------------------</td>
</tr>
<tr>
<td>19</td>
<td>Ronaldo (2008)</td>
<td>1990.1 - 2005.4 Quarterly</td>
<td>Ln (Real M2) Ln (Real GDP)</td>
<td>-Interest rates on 3-month SBI-JIBOR -Tingkat suku bunga kredit/modal kerja - Variabel boneka untuk krisis ekonomi</td>
<td>ECM</td>
<td>- I (1)</td>
<td>-</td>
</tr>
<tr>
<td>20</td>
<td>Sulaiman (2008)</td>
<td>1999.4 - 2006.4 Quarterly</td>
<td>Log M1 Log GDP</td>
<td>-Log interest rates on 3-month deposits -Log Inflation Rate</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>21</td>
<td>Lestano et al. (2009)</td>
<td>1980.1 - 2004.4 Quarterly</td>
<td>Ln (Real M1) Ln (Real GDP)</td>
<td>-Intercall Bank Rate - Short Term US Treasury Bill Ln Real exchange rate</td>
<td>ECM-ARDL</td>
<td>-</td>
<td>-ARDL (Pesaran, Shin, Smith, 1996, 2001) CUSUM dan CUSUM SQ of Residual</td>
</tr>
<tr>
<td>22</td>
<td>Yu dan Gan (2009)</td>
<td>1987.1 - 2007.4 Quarterly</td>
<td>Log (Real M1) Log (Real GDP)</td>
<td>- Money-market interest rates - Inflation-rate expectations Interest rates on loans</td>
<td>ECM PP</td>
<td>-</td>
<td>- I (1) - EG (1987)</td>
</tr>
<tr>
<td>No</td>
<td>Research</td>
<td>Sample Period/Frequency</td>
<td>Monetary variables</td>
<td>Explanatory variables</td>
<td>Model</td>
<td>Unit Root Test</td>
<td>Degrees of Integration and Cointegration Test</td>
</tr>
<tr>
<td>----</td>
<td>----------</td>
<td>------------------------</td>
<td>-------------------</td>
<td>----------------------</td>
<td>-------</td>
<td>----------------</td>
<td>-----------------------------------------------</td>
</tr>
<tr>
<td>23</td>
<td>Achsani (2010)</td>
<td>1990.1 - 2008.3 Quarterly</td>
<td>Ln (Real M2)</td>
<td>Ln (Real GDP)</td>
<td>-CMR</td>
<td>-</td>
<td>VECM dan ARDL</td>
</tr>
</tbody>
</table>

Notes:
- ADF: Augmented Dickey-Fuller Unit Root Test
- ARDL: Auto Regressive Distributed Lag
- C: Currency
- CHP: Currency Held by Public deposits
- CMR: Call Money Rate
- CPI: Consumer Price Index
- DD: Demand Deposit
- DF: Dickey-Fuller (1979) Unit Root Test
- ECM: Error Correction Mechanism
- EG: Engle-Granger (1987 or 1991) Cointegration Test
- GDP: Gross Domestic Product
- JJ: Johansen-Juselius (1990) Cointegration Test
- M1: Money in the narrow sense, consists of currency outside banks and demand deposits
- M2: Money in a broad sense, consisting of M1 and quasi money
- OLS: Ordinary Least Square
- PAM: Partial Adjustment Model
- VECM: Vector Error Correction Mechanism
- DF: Dickey-Fuller (1979) Unit Root Test
<table>
<thead>
<tr>
<th>No</th>
<th>Research</th>
<th>Sample Period / Frequency</th>
<th>Model</th>
<th>Monetary Variables Approach</th>
<th>Short Run</th>
<th>Opportunity Cost Elasticity of the Monetary Variables</th>
<th>Long Run</th>
<th>Opportunity Cost Elasticity of the Monetary Variables</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Income Elasticity for Monetary Variables</td>
<td>Elastisitas</td>
<td>Semi Elastisitas</td>
<td>Model</td>
</tr>
<tr>
<td>1</td>
<td>Aghevli (1976)</td>
<td>1968.1 - 1973.4 Quarterly</td>
<td>PAM</td>
<td>M2</td>
<td>0.49</td>
<td>-</td>
<td>-</td>
<td>PAM</td>
</tr>
<tr>
<td>2</td>
<td>Aghevli et al (1979)</td>
<td>1968.2 - 1976.4 Quarterly</td>
<td>PAM</td>
<td>M1 M2</td>
<td>0.334</td>
<td>0.292</td>
<td>-0.726*</td>
<td>PAM</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>-0.823*</td>
<td>M2</td>
</tr>
<tr>
<td>3</td>
<td>Insukindro dan Sugiyanto (1987)</td>
<td>1970.1 - 1986.1 Quarterly</td>
<td>PAM</td>
<td>M1 M2</td>
<td>0.1816</td>
<td>0.0432</td>
<td>-0.0963</td>
<td>PAM</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>-0.0237*</td>
<td>M2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>-0.081</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>-0.0345*</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Jaya (1990)</td>
<td>1973.1 - 1987.4 Quarterly</td>
<td>PAM</td>
<td>M1 M2</td>
<td>0.258</td>
<td>0.0125</td>
<td>-0.077</td>
<td>PAM</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.015</td>
<td>M2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Price dan Insukindro (1994)</td>
<td>1969.1 - 1987.4 Quarterly</td>
<td>ECM</td>
<td>CHP DD</td>
<td>0.17</td>
<td>-0.01</td>
<td>-0.73</td>
<td>EG</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>-0.91</td>
<td>J</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>J</td>
<td>JJ</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1.1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Insukindro (1998)</td>
<td>1987.1 - 1997.4 Quarterly</td>
<td>C</td>
<td>C</td>
<td>0.5171</td>
<td>-</td>
<td>-0.0019</td>
<td>EG</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>M1 M2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>M2</td>
</tr>
<tr>
<td>7</td>
<td>Ilias (1998)</td>
<td>1983 - 1996 Quarterly</td>
<td>ECM</td>
<td>CHP DD</td>
<td>0.4998</td>
<td>0.7215</td>
<td>-0.9229*</td>
<td>EG</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>-</td>
<td>M2</td>
</tr>
<tr>
<td>No</td>
<td>Research</td>
<td>Sample Period / Frequency</td>
<td>Model</td>
<td>Monetary Variables Approach</td>
<td>Short Run</td>
<td>Opportunity Cost Elasticity of the Monetary Variables</td>
<td>Long Run</td>
<td>Opportunity Cost Elasticity of the Monetary Variables</td>
</tr>
<tr>
<td>----</td>
<td>----------</td>
<td>---------------------------</td>
<td>-------</td>
<td>-----------------------------</td>
<td>-----------</td>
<td>-----------------------------------------------</td>
<td>----------</td>
<td>---------------------------------------------------</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Income</td>
<td>Semi</td>
<td></td>
<td>Income</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Elasticity for Monetary Variables</td>
<td>Elastisitas</td>
<td>Elastisitas</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Darsono (1999)</td>
<td>1970.1 - 1996.4 Quarterly</td>
<td>ECM</td>
<td>C M1 M2</td>
<td>0.289</td>
<td>0.621 *</td>
<td>J</td>
<td>C M1 M2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.277</td>
<td>-0.090</td>
<td></td>
<td>1.4342</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.277</td>
<td>-0.046</td>
<td></td>
<td>1.0049</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>-</td>
<td>-</td>
<td></td>
<td>-</td>
</tr>
<tr>
<td>9</td>
<td>Insukindo dan Aliman (1999)</td>
<td>1984.2 - 1997.4 Quarterly</td>
<td>ECM</td>
<td>C</td>
<td>-0.3771</td>
<td>-0.0034</td>
<td>EG</td>
<td>C</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>-</td>
<td>-</td>
<td></td>
<td>-</td>
</tr>
<tr>
<td>10</td>
<td>Pasaribu (2002)</td>
<td>1970-2001 Quarterly</td>
<td>ECM</td>
<td>M1 M1</td>
<td>0.766</td>
<td>-0.003</td>
<td>EG</td>
<td>M1 M1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.758</td>
<td>-0.279</td>
<td></td>
<td>3.5754</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>-</td>
<td>-</td>
<td></td>
<td>-</td>
</tr>
<tr>
<td>11</td>
<td>Simorangkir (2002)</td>
<td>1968.1 - 1997.4 Quarterly</td>
<td>PAM</td>
<td>M1 M2</td>
<td>0.229</td>
<td>-0.015</td>
<td>PAM</td>
<td>M1 M2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.345</td>
<td>-0.042</td>
<td></td>
<td>2.1562</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>-</td>
<td>-</td>
<td></td>
<td>-</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>-</td>
<td>-</td>
<td></td>
<td>-</td>
</tr>
<tr>
<td>12</td>
<td>Ouk-Heon (2002)</td>
<td>1983.1 - 1996.4 Quarterly</td>
<td>ECM</td>
<td>M2</td>
<td>0.25</td>
<td>-0.04</td>
<td>EG</td>
<td>M1 M2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>-</td>
<td>-</td>
<td></td>
<td>2.05</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>-</td>
<td>-</td>
<td></td>
<td>-</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>-</td>
<td>-</td>
<td></td>
<td>-</td>
</tr>
<tr>
<td>14</td>
<td>Sriwijanto (2004)</td>
<td>1978.4 - 2003.4 Quarterly</td>
<td>ECM</td>
<td>M1</td>
<td>0.4878</td>
<td>-0.0024</td>
<td>J</td>
<td>M1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>-</td>
<td>-1.05*</td>
<td></td>
<td>-</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>-</td>
<td>-0.0075</td>
<td></td>
<td>-</td>
</tr>
<tr>
<td>15</td>
<td>Bahmani-oskooee dan Rehman (2005)</td>
<td>1973-2000 Quarterly</td>
<td>ECM</td>
<td>M1</td>
<td>0.1</td>
<td>-1.05*</td>
<td>ARDL</td>
<td>M1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>-</td>
<td>-</td>
<td></td>
<td>-</td>
</tr>
<tr>
<td>16</td>
<td>Achhsani et al., (2005)</td>
<td>1990.1 - 2002.3 Quarterly</td>
<td>PAM</td>
<td>M2</td>
<td>0.47</td>
<td>-0.127</td>
<td>PAM</td>
<td>M2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>-</td>
<td>-</td>
<td></td>
<td>-</td>
</tr>
<tr>
<td>No</td>
<td>Research</td>
<td>Sample Period / Frequency</td>
<td>Model</td>
<td>Monetary Variables Approach</td>
<td>Income Elasticity for Monetary Variables</td>
<td>Short Run</td>
<td>Opportunity Cost Elasticity of the Monetary Variables</td>
<td>Model</td>
</tr>
<tr>
<td>----</td>
<td>-----------</td>
<td>--------------------------</td>
<td>-------</td>
<td>---------------------------</td>
<td>----------------------------------------</td>
<td>-----------</td>
<td>------------------------------------------------</td>
<td>-------</td>
</tr>
<tr>
<td>17</td>
<td>Sidiq (2005)</td>
<td>1990.1 - 2004.2 Quarterly</td>
<td>ECM</td>
<td>M1, M2</td>
<td>0.6256, 0.6641</td>
<td>-</td>
<td>0.0085*</td>
<td>EG</td>
</tr>
<tr>
<td>18</td>
<td>James (2005)</td>
<td>1983.1 - 2000.4 Quarterly</td>
<td>UECM</td>
<td>M2</td>
<td>0.6835</td>
<td>-</td>
<td>-0.1973</td>
<td>ARDL</td>
</tr>
<tr>
<td>19</td>
<td>Ronaldo (2008)</td>
<td>1990.1 - 2005.4 Quarterly</td>
<td>ECM</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>EG J</td>
<td>M2</td>
</tr>
<tr>
<td>20</td>
<td>Sulaiman (2008)</td>
<td>1999.4 - 2006.4 Quarterly</td>
<td>ECM</td>
<td>M1</td>
<td>0.1759</td>
<td>-</td>
<td>-0.3049, 0.0371*</td>
<td>EG</td>
</tr>
<tr>
<td>21</td>
<td>Lestano et al., (2009)</td>
<td>1980.1 - 2004.4 Quarterly</td>
<td>ECM</td>
<td>M1 (AIC) (SBC), M2 (AIC) (SBC)</td>
<td>-0.389, -0.537, 0.141, 0.155</td>
<td>-</td>
<td>-0.003, -0.003</td>
<td>ARDL</td>
</tr>
<tr>
<td>22</td>
<td>Yu dan Gan (2009)</td>
<td>1987.1 - 2007.4 Quarterly</td>
<td>ECM</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>EG</td>
<td>M2</td>
</tr>
<tr>
<td>23</td>
<td>Achsani (2010)</td>
<td>1990.1 - 2008.3 Quarterly</td>
<td>ARDL</td>
<td>M2</td>
<td>0.1356</td>
<td>-</td>
<td>0.0022</td>
<td>VECM (5)</td>
</tr>
</tbody>
</table>

Notes
*) : Inflation or expected inflation rate as the opportunity cost variable approach
ARDL : Auto Regressive Distributed Lag
AIC : Akaike Information Criterion
C : Currency
CHP : Currency Held by Public
DD : Demand Deposit
ECM : Error Correction Mechanism
EG : Engle-Granger (1987 or 1991) Cointegration Test
J : Johansen (1988) Cointegration Test
M : Money in the narrow sense, consists of currency outside banks and demand deposits
M2 : Money in a broad sense, consists of M1 and quasi money
OLS : Ordinary Least Square
PAM : Partial Adjustment Model
SBC : Schwarz Bayesian Criterion
VECM : Vector Error Correction Mechanism
This page is intentionally left blank
This paper analyzes the influence of ownership and specific characteristic of banks on the capital structure and the intermediation function of commercial banks in Indonesia. Using multivariate regression on bank level data of 2006-2009, the result shows the ownership structure, profitability, size, and management expense affect the bank capital structure, with a total effect of 50.14%. Towards the bank intermediation, with a total effect of 27.01%, the ownership structure, profitability, bank size, credit risk, expense management and capital structure influence the banks intermediation function.

Keyword: Ownership structure, specific characteristic of bank, capital structure and bank intermediation function

JEL Classification: G21, G32
I. INTRODUCTION

The function of bank as intermediary institution particularly on allocating credit plays important role for the economic growth. On macro level, bank can be a vehicle to implement monetary policy, while in micro level the bank is the main source of financing both for firm and individuals (Konch, 2000).

In allocating a large value of loan, bank also need a large financing; otherwise will disturb its liquidity. Any expansionary plan on credit requires additional capital since it will reduce the capital adequacy ratio (CAR). Concerning this, the management of the bank needs to decide the capital structure on supporting their operational activity, particularly on credit allocation. The decision on capital structure concerns the optimal combination among available source of fund to finance the investment and to support the firm operation to increase the profit, hence the higher value of the firm (Gitman, 2009).

The capital structure of the financial institution including the bank, is fundamentally different from the non-financial one, because its business characteristic and operational activities is different. In addition, the bank must have a buffer following the regulation by monetary authority or the central bank on minimum reserve requirement, in order to protect depositors (Saunders, 2008). The optimal capital structure is the ultimate target to achieve by the bank. The trade-off theory or balancing theory explains that in order to achieve this optimal capital structure, the firm has to optimize the combination of the trade-off between the benefit and the risk (or the cost) to maximize the firm value (Brigham, 2005). On the other hand, the bank also has to choose which source of fund to use first, as explained by the pecking order theory.

Several empirical research on the choice of source of fund to optimize the capital structure, shows varies result. The empirical study by Darwanto (2008) on foreign exchange bank about the relationship between the leverage with the choice between debt and equity shows a negative correlation, which suggest the bank to increase their own capital instead of relying on the debt to optimize the firm value. This result is in line with Kishan and Opiela (2000), who found that the increase of credit growth is determined by the bank size (asset), and the bank capital (leverage ratio) via the increase of equity. This result is different from Inderst and Mueller (2008), who found the leverage ratio with debt increase, is positively correlated to the increase of risky credit, under the assumption of no regulation.

Beside the choice of fund sources, the decision on optimal capital structure may also be influenced by the ownership structure. The structure of ownership commonly relates to the proportion of the share hold by the shareholders who give them a right to control (source of power) and to make decisions for the firm. From the control perspective, the ownership structure of the bank in Indonesia can be classified into four categories, namely concentrated ownership, government, private and foreign ownership (Taswan, 2010). The large magnitude of individual ownership indicates the ownership structure is concentrated on minority
shareholders. The consequence is the manager is only the lengthen hand of the controlling shareholders, and his decision will depends on them.

With the increasing competition on banking industry and the process of globalization, the national banking policy is directed to provide a healthy, strong and efficient bank. One of the policy is the implementation of Indonesian Banking Architecture, includes the consolidation policy on capital structure and ownership structure. This policy shifted the bank ownership map, where many of the domestic banks are owned by foreign. The increase of foreign investment on domestic bank has automatically changed the control of the domestic bank, especially on the market share.

The change of the policy and the control system due to the ownership shift possibly alters the specific characteristic of the bank. Athanasoglou et.al, (2005) argue that the specific characteristic of the bank is the internal micro condition of the bank, and is identifiable from their balance sheet and income statement. This characteristic may also be identified from the bank capital, size, profitability, credit risk, productivity, management expenses, etc.

The current phenomena on Indonesian banking performance shows a very good progress, as reflected on the growth of asset, a high capital adequacy ratio and high profitability (ROA), stable and well managed liquidity, and also reflected on low non-performing loan (NPL). However, the intermediation function is not yet optimal both on the collection of the third party fund, and the allocation of the credit. The distributed loans is still dominated by consumption sector, while the loan for productive sector, working capital and long term investment, grew less than the consumption credit.

Concerning the above phenomena and the variety result of the existing studies, then it is necessary to carry out a more in depth analysis on the specific characteristic of the bank. This study focuses on the ownership structure of the bank in Indonesia by government, private domestic, venture, and foreign bank. As explained above, the ownership structure and the specific characteristic of the bank do affect the capital structure (Darwanto, 2008, Gropp and Heider, 2009), however, on choosing the source of fund to increase the allocation of loan, there is still different conclusion of whether using equity (Kishan dan Opiela, 2000, Darwanto, 2008) or using additional debt (Inderst and Mueller, 2008).

The explicit aim of this study are, first, to analyze the simultaneous impact of ownership, profitability, bank size, credit risk and the management responsibility on the capital structure; second, to analyze the partial impact of these variables; and third, to analyze the impact of these variables on the intermediary function of the bank.

The second session of this paper discusses the theory and literature studies. The third session discusses the methodology and the data used, while the fourth session discusses the analysis of estimation result. Conclusion and policy implication will be presented on the last session and close the presentation.
II. THEORY

Bank is a business activity that provides services to save and to withdraw it using check or electronic transfer, and also to distribute commercial credit (Rose dan Hudgins, 2010). Apostolik et.al, (2009) divide the core activity of the bank into three; (1) deposit collection, which is collection of the third party fund in the form of giral, saving and time deposit, (2) payment services, which is money transfers, and (3) loan underwriting, which is distributing the fund in the form of credit.

The main function of the bank is intermediating, which is a process to redistribute from the fund surplus unit (firm, government, or household) to the deficit ones. The intermediary function arise because of the expensive monitoring cost, liquidity cost and the price risk, due to the asymmetric information between the net saver and net borrowers (Saunders, 2008). In addition, Saunders (2008) outlined the financial intermediary function into: (1) function as broker, (2) function as asset transformers, and (3) role as delegated monitor, and (4) role as information producer.

The intermediary function of the bank has evolved following the changing of economic environment and the development of the financial market, particularly in industrialized countries such as Europe (Bikker and Wesseling, 2003). The progress of information technology, deregulation, liberalization, internalization is the main reasons why the theory of financial intermediary is not relevant anymore to the current business practice (Scholtens and Wensveen, 2003). These factors tend to reduce the transaction cost and the asymmetric information between the savers and the investors, which is contrary to the assumption of the classic financial intermediary theory.

Bikker and Wesseling (2003) also argue that he liberalization and the development of information technology on capital market has shifted the intermediary function from bank to capital market and non-intermediary financial institution such as insurance. The liberalization of the non-bank financial institution is reflected from the process of facilitating people to save assets and to commit investment. Moreover, along with this liberalization, people are freer to choose the means to save their assets. Beside that, development of technology has assisted people in monitoring their assets development and provided an opportunity to diversify their assets, hence reduces the monitoring-cost. These lead to disintermediation process in banking industries.

Globalization and competition between banking institution and capital market also influence banking intermediation activities. It leads to the increase of banking consolidation through merger and acquisition in order to increase their capacity through increasing asset (Bikker and Wesseling, 2003). The banking consolidation increase the banking ownership of foreigners, which occurs not only occur in industrialized countries (Bikker and Wesseling, 2003), but also in emerging countries (Mian, 2003).
Intermediation function can be implemented optimally if supported by sufficient capital/resources (Buchory, 2006). Even the collected third party's fund is huge, but without being compensated by additional capital then the bank would still be limited to distribute loans.

2.1. Concept of Capital Structure

Capital structure is one of important financial decision making process because it has a reciprocal relationship to other financial variables. Brigham (2005:547) stated definition of capital structure as follow:

"The firm’s mixture of debt and equity is called its capital structure. The capital structure decisions include a firm’s choice of target capital structure, the average maturity of its debt, and the specific sources of financing it chooses at any particular time. Managers should make capital structure decisions designed to maximize the firm’s value.”

The capital structure reflects the proportion between the capital from long-term debt and equity, hence will be measured by Debt to Equity Ratio (DER). The higher DER shows higher proportion of the total debt compared to total equity; vice versa.

The underlying theory about the optimal capital structure are: (a) Modigliani-Miller (MM) theory, which state that without considering the tax, the company’s value is not affected by the capital structure, (b) Trade-Off theory, explains that the company will have optimal capital structure based on the trade off between the benefit and the cost of the debt (c) Pecking Order Theory, explains that the company will determine the hierarchy of its source of funds, where the internal financing should come first than the external financing. This theory does applies not only for non-financial company but also for banking industry (Marques and Santos, 2003). Marques and Santos (2003) argued that in the process of deciding capital structure, the most important concern is the trade-off between incentive and governance, and the ownership structure as the control on equity and debt allocation.

Related to the intermediary function, then banks should have increased the source of funds from equity because of its low volatility and cost relative to debt. This is in line with Buchory’s (2006) and Kishan and Opiela (2000). Under strict regulation condition in Indonesia, banks are suggested not to take high risk by increasing high risk loan, since high credit and bankruptcy risk would decrease of public trust. This view contradicts to the idea of Inderst and Mueller (2008), who predicts that capital structure of bank will positively influence the intermediation function of the banks, especially in distributing loan.
2.2. Ownership Structure

Decision on capital structure is made by management of a company influenced by the shareholders. Ownership structure represents source of power to control company’s management especially in making policies for the company. The relevance of ownership structure to explain the capital structure is provided by the Agency Cost theory, which expressed that manager and shareholders have an Agency Relationship. Agency relationship is a contract between individual or more precisely as principal, who gives authority to someone (agent) to make decisions on behalf of principal in order to maximize their benefit. The conflict of interest and the consequence of the contract will in turn create agency cost.

Agency relationship in banking institution is very complex since it involves the relationship between shareholders and management (agent), the relationship between bank and debtor, and also the relationship between bank and regulator (Taswan, 2010). From the perspective of banking management, debt collected from the third party’s funds (DPK), is the main source for debt, hence plays highly important role for the bank. The use of debt from public becomes incentive for managers to work carefully to avoid the risk of bankruptcy and to keep public trust on the bank.

Taswan (2010), based on study by Atif Mian (2003), divided ownership structure of bank in Indonesia into four; concentrated ownership, government, domestic, and foreign ownership. In this paper, ownership structure dominated by government and private sector is hypothesized to positively and significantly influence the capital structure (DER). It implies for banks dominated by government or domestic private, the capital structure tends to increase debt relative to equity. Instead, foreign ownership structure negatively influences the DER.

2.3. Specific Characteristics of Bank

Specific characteristics of Bank that influences capital structure policy, are the firm internal condition, which can be observed from their balance sheet and income statement (Athanasoglou et.al, 2005). This study will use the following 4 main factors from specific characteristics of bank to determine the capital structure policy: (1) profitability, (2) size of bank, (3) credit risk, (4) management expenses.

Profitability is the ability of the bank to create profit in a certain period expressed in percentage. The rate of banking profitability is usually computed by using ROA (return on asset), which is a ratio between net income and total asset. ROA reflects the ability of bank’s management to make profit from their asset (Athanasoglou, et.al, 2005). Thus, the hypothesis is profitability negatively and significantly influences the capital structure of bank.
Size shows business scale made by a firm. Size is observed from the number of firm’s assets, and an increase on firm’s assets shows higher investment made. The size of bank is hypothesized to have a significant and a positive influence on capital structure of the bank.

Credit risk or frequently called as default risk is a risk due to customer’s failure to repay the amount of loan granted by bank along with the interest in a certain specified period (Dahlan Siamat, 1999). Thus, the hypothesis is credit risk is negatively and significantly influences the capital structure of bank.

Management expense reflects the total expenses on the cost spent by the management in running the business, including operating cost and other expenses. The increase in management expense, proxied by relative proportion of the total cost on total assets, will have a direct relationship with bank’s leverage. In this paper, the increase in management expense of bank positively and significantly influences the capital structure, which is in the form of increasing total debt relative to equity.

A lot of studies on the influence of bank specific characteristics on capital structure provide varies results. Gropp and Heider (2009) and Titman and Wessels (1988) found that the profitability has a negative impact on debt policy, while the size influences positively. Meanwhile the credit risk negatively influences debt policy (Darwanto, 2008 and Gropp and Heider, 2009) and management expenses has a positive influence on debt policy (Titman and Wessel, 1998 and Darwanto, 2008)

III. METHODOLOGY

We use descriptive analysis to show and to explain the condition of research object. After verifying the hypothesis, the analysis is continued with quantitative approach to test the proposed hypothesis.

In this paper, we use the ownership structure as independent variable which is divided based on the proportion of the large block shareholding, and falls into three categories; government, domestic, and foreign ownership. The next independent variable is the specific characteristic of the bank includes profitability, size of bank, credit risk, and management expenses. The dependent variables is the capital structure as intervening variable and the bank’s intermediation function.

3.1. Empirical Model

Based on the model framework with two dependent variables, where one of them is intervening one, in the form of capital structure variable (DER), then we apply the path analysis. The structure of model is presented in Figure 1 as follow:
As shown above, the model is divided into two structural equations as follows:

**Structural equation 1:**

\[ Y = \rho y_1 X_1 + \rho y_2 X_2 + \rho y_3 X_3 + \ldots + \rho y_7 X_7 + \rho y e_1 \]

**Structural equation 2:**

\[ Z = \rho z X_1 + \rho z X_2 + \rho z X_3 + \ldots + \rho z X_7 + \rho z y + \rho z e_2 \]

These equations are used to explain the direct effect of the exogenous variables on endogenous one. \(Y\) refers to the Capital Structure, influenced by Ownership Structure \((X_1, X_2, X_3)\) and Specific Characteristics of Bank \((X_4, X_5, X_6, X_7)\). Meanwhile \(Z\) refers to Intermediation Function of the bank, which is influenced by Ownership Structure, Specific Characteristics of Bank, and Capital Structure \((Y)\).

### 3.2. Data

The unit of analysis is conventional banks in Indonesia covering the observation period of 2006-2009, and using purposive sampling, we obtained the total samples of 54 banks over initially 121 banks.

Banks included are the conventional banks with major ownership structure and is dominated by one shareholder (\(\geq 51\%\) of the total shares) consecutively during the observation period.
period of 2006-2009. From the overall population, there are only 54 banks that meet the
criteria, consisting of 12 government banks (BUMN and BPD), 24 Domestic Private Banks or
BUSN (foreign exchange and non-foreign exchange BUSN) and 18 Foreign Banks (joint venture
and foreign banks). Some samples are failed to include because fail to meet the set criteria and
or insufficient observation.

In terms of the data, we need to run the normality test to ensure whether the residuals of
the regressed model has a normal distribution. We do the the normality test using plotted
graph and Kolmogorov-Smirnov test, since the the samples are large enough. Since the structure
of the model contains two path, the result of normality test is also divided into two, both for
structural equation 1 and 2.

Graphic test shows a dispersion around the diagonal line, both for equation 1 and 2 ,
which shows that residual is not normally distributed. Similar result  is obtained fromKolmogorov-
Smirnov with the probability of-test0,013 for equation 1 and 0,000 for equation 2; both shows
the residual of the model are not normally distributed.

To overcome this non-normality issue, we can reduce the outlier data for variable with
extreme values or large deviation. From descriptive identification, some bank have large deviation
compared to others. 6 (six) banks are taken out from data including PT Bank Akita/Bank Barclay
Indonesia, PT Bank BNP Paribas, PT Bank Maybank, PT Rabobank, Bank Of China Limited, and
The Bangkok Bank Comp.Ltd, and leave 48 banks on the sample set. The normality test result
for equation structure 1 and 2 using graph plot test shows data spread around the diagonal
line and follow the direction of the line. It shows that residual data are normally distributed.
Similarly, using the Kolmogorov-Smirnov test, with probability of 0,194 and 0,116, for equation
1 and 2 respectively, the test conform the normal distribution of the residual, hence we can
proceed the analysis..

Beside the above normality test, another important thing to do is to make sure the
estimated models are free from multicollinearity which can be identified from relationship among
independent variables. Relationship or correlation shows initial indication of the existing
relationship among exogenous variables. The correlation can be positive or negative. The
negative correlation value shows reversed directional relationship while the positive one shows
common directional relationship.

We find a very strong but negative correlation between domestic ownership and size of
-0.608 and is significant. It confirms that the higher proportion of domestic ownership on
bank, the smaller the size (total asset), and vice versa. Meanwhile a very low correlation exists
between ROA and NPL by 0,003 and is not significant (this correlation can be ignored because
the value is very small).

Strong and significant correlation exists between government ownership and domestic
ownership, -0,454. A strong correlation is also found between government ownership and
foreign ownership by (-0.460), and domestic relationship and foreign relationship by (-0.522). These strong correlations occur because those three variables are part of the ownership concept with opposite correlation as expected. The rest variables show low correlation.

IV. RESULT AND ANALYSIS

4.1. Descriptive Analysis

The highest DER ratio of 1753.83% belongs to Bank of China Limited, and the lowest one belongs to PT. Maybank Indocorp by 11.51%, with the average DER ratio of 500.79%. The high DER ratio is due to the high level of debt taken from third party’s funds. This is natural since the function of the bank is as funds collector from the public. Meanwhile the high average equity exists for the publicly listed banks, since they can obtain additional capital from the owner as well as from the public capital market.

The highest average of Loan to Deposit Ratio (LDR) which is 320.89% belongs to The Bangkok Bank Comp.Ltd, and the lowest one belongs to Bank of China Limited by 21.59%, while the average of LDR for all bank is 88.67%. This average ratio of LDR is fair enough, since 88.67% of the collected third party’s funds is distributed in the form of loan, showing the intermediation function of bank is very good. The high average ratio of LDR belongs to foreign banks, because in general, foreign banks get some liquidity facility from its headquarter in abroad.

During the period of 2006-2009, ownership structure of some domestic banks has shifted to foreigners, while the government ownership remains unchanged. After clustering the data, the highest total average of ROA exists on foreign banks by 3.11%, then government banks by 2.89%, and the lowest one belongs to domestic banks by 1.76%. The average ROA of domestic-owned banks is below standard ROA regulated by Bank Indonesia, which should be above 2%. The largest average assets ratio belongs to the government-owned banks by 16.69% (in natural logarithm), then foreign-owned banks by 16.00 (in natural logarithm), and the lowest one belongs to domestic-owned banks. The total assets of bank owned by government are dominated by BUMN banks such as PT Bank Mandiri, PT Bank Rakyat Indonesia and PT Bank Negara Indonesia. While largest asset value for foreign-owned banks are dominated by PT Bank Danamon, PT Bank CIMB Niaga, PT Bank Internasional Indonesia and Citi Bank N.A.

For the average ratio of credit risk (NPL), the highest ratio belongs to government-owned banks by 3.86%, then foreign-owned banks by 3.32%, while the lowest one is domestic-owned banks by 2.66%. The average of management expenses has different pattern, where the highest average belongs to domestic-owned banks by 10.23%, then government-owned banks by 9.20% and the lowest one belongs to foreign-owned banks by 7.49%. These descriptions indicate that the domestic and the government banks in Indonesia are less efficient relative to foreign-owned banks.
On the DER value, the highest average DER belongs to domestic banks by 589.64%, then government banks by 560.38%, and the lowest one belongs to foreign banks by 400.80%. It shows that the domestic and the government banks in Indonesia rely more on debt rather than equity in their capital structure. On the other hand, for the value of Loan to Deposit Ratio (LDR), the high average ratio of LDR (>100%) is dominated by foreign banks and joint venture banks, while for LDR (<100% belongs to domestic and government banks. The highest LDR belongs to foreign banks by 107.24%, then domestic banks by 79.07%, and the lowest one belongs to government banks by 65.35%.

4.2. Result of Path Analysis for Equation Structure I

The model on structural equation is used to know and to test the simultaneous impact of the ownership structure (government, domestic, and foreign ownership) and the specific characteristics of the bank (profitability, size of bank, credit risk, and management expenses) on capital structure.

The determination coefficient (R²) is 0.496 or 49.6%. This coefficient reflect that 49.6% of the variability of capital structure (DER) can be explained by variables of government, domestic, foreign ownership structure profitability, size of bank, credit risk and management expenses, while the rest 50.4% is affected by other factors beyond this model. Even though the determination coefficient value is small, the F-test shows that the simultaneous influence of government, domestic, foreign ownership structure, profitability, size of bank, credit risk and management expenses on the capital structure do exist.

Meanwhile the influence of the seven exogenous variables on the capital structure is partially explained by observing the sign, value, and significance of each path coefficient of the exogenous variables.

Effect of Government, Private Domestic, and Foreign Ownership Structure on Capital Structure

Statistically, the ownership of government negatively and significantly influences the capital structure. This result is inconsistent to the initial hypothesis that government ownership structure positively influences the capital structure.

Initially, the direct effect of the government ownership on the capital structure by 15.37%, and it has the correct sign. However, when it is related to other exogenous variables, the effect decrease then turn to be negative. The value of the total government ownership structure on the capital structure become -4.11%. This indicate that the banks with major government ownership tend to use equity as their source of funds. This contrary to Atif Mian (2003) who argued that the government banks have weak control because the
implementing principle is agent to agent instead of agent to principal, hence tend to use
debt as the control to reduce the agency conflict. Our result is also contrary to Smith (2005)
who argue that the equity ownership that is concentrated has strong relationship with
concentrated debt holder.

The partial test shows the domestic ownership negatively and significantly influences the
capital structure. Nevertheless its sign is not consistent to our initial hypothesis formulation.

Similar to the government banks, the domestic banks tend to reduce debt as their source
of funds, and tend to use equity. The direct effect of domestic ownership on the capital structure
is initially positive by 10,69%, however, due to the existing correlation with other variables, the
total effect of domestic ownership structure on the capital structure is negative by -3,85%.
This is also contrary to the study by Atif Mian (2003) who found domestic banks tend to use
debt in their capital structure, and also contrary to Smith’s argument (2005).

The partial test shows the foreign ownership negatively and significantly influence the
capital structure of the bank by 15,83%. This means the foreign-owned banks tend to reduce
the debt and use equity instead in their capital structure. This result conforms the Atif Mian’s
study (2003) and Douma and Kabir’s study (2002), who argued that the foreign-owned banks
tend to be moderate in constructing their portfolios, because they have strict supervision or
control from the parent company. In addition, foreign banks usually have relatively high liquidity,
facilitated by parent company and high capital ratio. Moreover, Atif Mian (2003) also argued
that the foreign private banks tend to use equity to cover the risk.

Looking at the ownership structure from 54 banks during the observation period of
2006-2009, the maximum ownership by government and foreigner is 100%, while the domestic
ownership is 99,998%. The 100% shareholding of the government is in PT. Bank Tabungan
Negara (Persero), while 100% shareholding of foreign banks as branch office in Indonesia is
Bank of China Limited, Citi Bank N.A, Deutsche Bank AG, The Bangkok Bank Comp.Ltd, and
The Bank of Tokyo Mitsubishi.

The average shareholding of government is 71,27%, domestic is 41,95%, and foreigner
is 82,12%. As explained previously, during 2006-2009, there was a shifting of ownership,
where the domestic-owned banks became foreign-owned banks, while the government
ownership remains unchanged. Some banks categorized as foreign exchange Conventional
Domestic Private Banks (BUSD) that has shifted to major foreign-owned banks in 2007 are PT
Bank Niaga to PT Bank CIMB Niaga, PT Bank Bumi Putera Indonesia to PT Bank ICB Bumi Putera
Indonesia, and PT Bank Nusantara Parahyangan. Moreover, the ownership of Bank Akita, in
2009, also shifted to foreign and change its name to PT Bank Barclay Indonesia. The domestic
banks with major foreign ownership during 2006-2009 are PT Bank Danamon, PT Bank
Internasional Indonesia, PT Bank OCBC NISP, and PT Bank UOB Buana.
**Profitability Effect on the Capital Structure**

Based on Bank Indonesia’s regulation, a good ratio of ROA is higher than 2%. From the 216 ratios of ROA, the highest one is 11.21% and the lowest one is -22.76%, while the average is 2.63%. In general, it indicates that banks can make profit from the asset by 2.63% and is categorized as good. From the total 54 of bank samples, there are 4 banks with negative ROA; namely Bank Ganesha, Bank Harda Internasional, Bank Agroniaga and Bank Akita, and all of them are classified as domestic private banks. The high average ROA belongs to the foreign-owned banks with the status as joint venture banks such as PT Bank BNP Paribas Indonesia (7.02%), PT Bank China Trust Indonesia (6.07%), PT Bank Woori Indonesia (5.92%), PT Bank Maybank (5.74%), and PT Bank KEB Indonesia (5.71%).

The partial test result shows that the profitability (X4) negatively and significantly influences the capital structure of the bank by 24.72%. This means the more capable of bank to make profit from its assets (ROA), the tendency of the bank to reduce debts as their source of funds. This result confirms Myers (1984) who argued that high level of profitability will encourage the firm to use retained earnings as source of funds rather than external funding or debt.

The result of this research also confirms Gropp and Heider (2009) that used large banks as the sample in United States. Moreover Titman and Wessels (1988) also found the same result on manufacturing firms. Compared to other specific characteristics variables of the bank, the level of profitability gives a higher effect to the capital structure. As for its indirect effect, the level of profitability to the capital structure is higher when it is related to foreign ownership structure by 6.87%. This indicates that high profitability tends to belong to foreign-owned banks that use lower proportion of debt, since the need of funds can be obtained from retained earnings (equity).

**Size Effect on the Capital Structure**

Size positively and significantly influences the capital structure of banks by 7.61%. This means the bigger the size of bank, the higher the use of debt as a source of funds. It conforms Gropp and Heider (2009), Darwanto (2008) and Titman and Wessels (1988) who used manufacturing companies as their sample.

From the 216 observations, the highest LnAsset by 19.73% or amounted Rp 370.310.994 (in million rupiahs) belongs to PT Bank Mandiri (Persero). The lowest LnAsset by 11.22% or amounted Rp 74.251 (in million rupiahs) belongs to PT. Bank Sahabat Purba Danarta. For all samples, the average of LnAsset is 15.55% or amounted Rp 25.676.935 (in million rupiahs). Among the total 54 bank samples during 2006-2009, the largest three assets are government-owned banks or BUMN (Persero); namely PT Bank Mandiri with the average of total asset of
Rp 317,090,587, PT Bank Rakyat Indonesia, Rp 229,775,347, and PT Bank Negara Indonesia Rp 194,185,760. Those figures are far above the average of all bank samples.

The size shows the business scale of the bank indicated from their total assets, and the increase in bank’ asset indicates the increase of investment. Bigger size of bank requires more funding in the long-term, and one of the fund source choice is debt, where the cost is lower than issuing new stocks. When size is related to domestic ownership structure, its indirect effect on the capital structure is higher and will be 7.75%. This shows that the bank with broader scale of business and with major domestic-owned shares, tends to use debt as its source of funds.

**Credit risk Effect on the Capital Structure**

The highest average bad debts is recorded by PT. Bank Mandiri (Persero) of Rp 10,930,498 (in million rupiahs), and the lowest belong to Bank of China Limited by zero and PT Bank Sahabat Purba Danarta by Rp 1,673 (in million rupiahs). In line with this, the lowest *Non Performing Loan* ratio by 0,00% is recorded by Bank of China Limited and the highest NPL belongs to PT Bank Mandiri (Persero) by 16,89%. From all 216 observations, the average NPL is 3,26%, showing that the average of bad debts rate is still below the limit regulated by Bank Indonesia; NPL < 5%. During observation period, the lowest average NPL is recorded by PT. BPD Kalimantan Barat by 0,25% and the highest one is by PT BPD Sulawesi Tengah by 10,19%.

The estimation result shows the credit risk negatively and significantly influences the capital structure of bank by 1,52%. This means the higher the risk, the lower DER will be, indicating that the bank will reduce source of funds from debts. This result of conforms Darwanto (2008), and also Gropp and Heider (2009) who found that the asset risk and the market risk negatively influence the capital structure.

Credit risk has a significant influence on bank’s capability in providing funds. High credit risk due to the bad loans could decrease the public trust which in turn leads difficulties for the bank in collecting funds from the third party; hence reduces the debt source. Indirect influence of the credit risk on the capital structure is higher by 1,14%, when it is related to the government ownership structure.

**Influence of Management Expenses on the Capital Structure**

The highest average of total cost is recorded by PT Bank Mandiri (Persero) by Rp 22,784,811 (in million rupiahs), and the lowest one is by PT Bank Sahabat Purba Danarta by Rp 15,524 (in million rupiahs). Using management expense ratio to total asset, the lowest is PT Bank Maybank Indocorp by 0,871%, and the highest ratio belongs to Bank Akita/PT Bank Barclay Indonesia by 40,05%. The average of management expense ratio from the 54 bank samples is 8,79%. The
highest average of total expenses arise from interest expenses by 49.04\% of the total cost, then followed by operating expense by 38.94\%, and the rest 12.02\% comes from the write-off productive activa expense and the Commitment and Contingency Expense.

The partial test shows that the management expense of the bank positively and significantly influences the capital structure by 8.43\%. This indicates as the management expense ratio increase, then the leverage ratio of the bank tends to increase simultaneously. This result conform the study by Titman and Wessel (1988) and Darwanto (2008).

If a company uses more debt than equity, it will increase the total cost in the form of interest expense. When related to domestic ownership, the indirect effect of management expense on the capital structure is 4.82\%. It means that the bank with high management expense and with major domestic shareholding, tends to use debt as their source of funds.

4.3. Result of Path Analysis on Equation Structure II

The structural equation 2 is used to analyze the impact of the ownership structure of bank (government, domestic, and foreign ownership), the specific characteristic of bank (profitability, size of bank, risk of credit and management expense) and the capital structure on the intermediary function of bank.

Determination coefficient of the model (R²) is 0.270 or 27.0\%. This value is relatively low that shows only 27.0\% of the variability of intermediation function of bank (LDR) can be explained by the government, domestic, and foreign ownership, the structure specific characteristic of bank (profitability, size of bank, credit risk, management expense), and the capital structure, while the rest 73.0\% is explained by other variables beyond the model². However, the F-test indicates all exogenous variables simultaneously influence the intermediation function of the bank.

Similar to structural equation 1, we also analyze the partial test for all dependent variables in structural equation 2. The partial test shows the government, domestic, and foreign ownership structure, the profitability, the size of bank, the credit risk, and the management expense variables do not have significant influence on the intermediary function of the bank. It means small changes in ownership structure or in specific characteristic of the bank does not directly influence the intermediation function of bank. However those above variables have indirect effect through its relationship with capital structure.

From the computation of path coefficient, the capital structure is the only one that has direct negative and significant influence on the bank intermediation by 12.18\%, with the total effect of 13.846\%. It indicates the higher debt ratio to equity (DER), the lower the ratio of

---

² The writer realizes that this model still needs more improvement and become further research agenda.
intermediation function of bank. In other words, the intermediation function of the bank through loan distribution will increase if the source of funds from equity is increased. This is in line with the research done by Kishan and Opiela (2000) who stated that loan distribution is influenced by increasing equity and also research by Buchory who stated that intermediation function of bank is influenced by capital structure from equity. This finding also confirms the theory by Rose (2010) that capital structure is a critical factor that should be noticed by management of the bank on implementing its intermediation function, in order to build the public trust and to anticipate the current risk.

These findings, however, contrary with Inderst and Mueller (2008) idea who stated that under the assumption of no regulation, the high risk loan can be distributed by increasing the leverage ratio of the debt. This is not the case for Indonesia, since the banking industry is regulated and tightly controlled by monetary authority.

Compared to all explanatory variables, , the foreign ownership \( (X_3) \) and profitability \( (X_4) \) have relatively high indirect influence on intermediation function of the bank through its relationship with capital structure by 1.33% and 1.20% respectively. It indicates that foreign-owned banks with capital structure coming from equity, will have higher intermediation function, indicated with higher rate of LDR ratio. And bank with high profitability, and with higher equity in their capital structure, also will have higher intermediation function.

This finding is different from what Atif Mian said that the domestic banks tends to be aggressive in allocating the funds in the form of loan, because of its competitive advantage related to “soft information” that enable them to distribute higher loan with higher interest rate. This contradictive findings is acceptable, since if we look at the foreign ownership structure in our sample, most of them are classified into domestic private banks (foreign exchange BUSN) with large total asset and are already go public such as PT Bank CIMB Niaga, Tbk, PT Bank ICB Bumi Putera Indonesia, Tbk, PT Bank Nusantara Parahyangan, Tbk, PT Bank Danamon, Tbk, PT Bank Internasional Indonesia, Tbk, PT Bank NISP, Tbk, PT Bank UOB Buana, Tbk.

V. CONCLUSION

This paper is an empirical research on 54 conventional banks in Indonesia with observation period of 2006-2009. The first conclusion of this paper is the ownership of government, domestic, and foreign ownership, the profitability, the size of bank, the credit risk, and the management expenses simultaneously and significantly influence the capital structure of the bank. The ownership structure negatively and significantly influence the capital structure. In the other hand, the size of bank and management expense of the bank positively and significantly affect the capital structure. The second conclusion related to intermediary function of banking, the government, domestic, and foreign ownership structure, the profitability, the size, the credit
risk, the management expense and the capital structure simultaneously influences the intermediary function of the bank.

Based on these conclusions, we derive recommendation for banking practice and suggestion for further academic research development. In terms of the first point, the following recommendations are:

1. Considering the high impact of the ownership structure and the specific characteristics of bank on the capital structure, then it is important for banks in Indonesia to concern more on this issue in order to optimize their intermediary function to increase the growth of loan distribution for the real sector.
2. Our findings suggest the banks with higher potencies to go public to increase their capital, the loan expansion, and their liquidity. This will also help the bank to be more transparent *(market to corporate control)* while keeping prudential practice.
3. Domestic banks are suggested to increase the performance by increasing profitability and reduce management expense by increasing their operating cost efficiency, in order to compete with foreign-owned or joint venture banks.
4. The government must keep concerning about their policies on foreign-owned banks establishment, especially for those with branch office status, since only few foreign banks contribute to the performance of banking in Indonesia. It is different from the joint venture bank and the foreign ownership in domestic private banks, that give better performance and better control.

In terms of academic aspect and further research, this paper provide the following recommendations:

1. It is important to differentiate the ownership structure of bank before and after *go public*, to give a more accurate result.
2. It is important to clarify the alternative source of funds from debt; whether it is bond, *long-term debt*, subordinates loan, or *offshore loans*. The increasing of equity is also important to be clarified whether it is in the form of an increase of additional paid-in capital, *initial public offering (IPO), right issue* or retained earnings.
3. It is important to distinguish the types of distributed loan (investment loan, working capital loan, or consumption loan), in order to clearly address the optimization of bank’s intermediary function, particularly in supporting the real sector growth.
4. Further model development is required since the determination coefficient of the model in this paper is considerably low.
REFERENCES

Apostolik, Richard., Donohue C., Went, Peter (2009), Foundation of Banking Risk: An overview of Banking, Banking Risks, and Risk-based Banking Regulation, John Wiley and Sons, Inc.


Mandala, Manurung., Rahardja Prathama. (2004), Money, Banking, and Monetary Economy, Faculty of Business and Economics University of Indonesia Press.
Siamat, Dahlan. (1999), Bank and Other Financial Institutions, Faculty Business and Economics, University of Indonesia Press.
Does the Local Economic Governance in Indonesia Perform an Improvement?

Haryo Kuncoro

Abstract

Governance has gone through radical changes over the last twenty-five years. Seemingly, it became one of the important strategies, processes, methods and mechanisms in governing countries to achieve economic development goals. The objective of this paper is to observe the local economic governance dynamics in the case of districts/municipalities in Indonesia. First, the dynamics behavior of local governance over time is analyzed by visual inspection of their non-parametric density distribution. More deeply, we use Markov chains to predict a pattern of change in local economic governance toward its steady state. Based on comparison between 2007 and 2011 data delivered by Commission of Regional Autonomy Implementation Watch, we conclude that there is a high level of persistence in the relative position of local governance index, consistent with a low degree of mobility in the index distribution implying the implementation of governance in the districts/municipalities in Indonesia is weak enough. This finding implies that the local economic governance is a key to achieve sustainable regional economic growth in line with fiscal decentralization and regional autonomy.

Keywords: Local Economic Governance, Decentralization, Regional Economic Growth, Kernel Densities, Markov Chains

JEL Classification: H70, O43, O56

1 Lecturer at Faculty of Economics, State University of Jakarta; har_kun@feunj.ac.id. Author would like to thank a unanimous BEMP reviewer for his/her constructive comments. Earlier version of this paper has been presented in the 11th Indonesian Regional Science Association (IRSA) Conference held by Faculty of Economics, Lambung Mangkurat University on July, 9-10, 2012 in Banjarmasin, South Kalimantan, Indonesia. My acknowledgement also goes to all participants for invaluable suggestions. However, any error, shortcoming, and confusion which may remain are my responsibility.
I. INTRODUCTION

Regional development is essentially an integral part of the national development. The regional development is directed to achieve the national targets that are adjusted to the potential, aspirations, and problems of development in the region. Therefore, the achievement of the national development is a shared responsibility among the central, provincial, and district/municipalities governments so that the national development is an aggregation of the regional development performance (Hariyoga, 2009).

Within that framework, since 2001 the government of Republic of Indonesia has been implementing the fiscal decentralization and regional autonomy policies. Those policies are based on the fact that a broad area such Indonesia which each region has variety conditions and specific economic potencies. Within the fiscal decentralization and regional autonomy policies, the regions are expected to develop local economic potencies more effectively and efficiently (Kuncoro, 2005).

In macroeconomic perspective, the potency of those local economies is a necessity for national strategy in order to improve the quality of national economic growth. In principle, the local economic potencies engage the regional and bottom-up approaches, which in turn could be a correction for industrial approach which had been used by the previous regime. In addition, the majority of economic actors are small and medium enterprises reaching 44.7 million people or 99.9 percent of the total employment in Indonesian manufacturing industry and they are local resources basis. Thus, the local economies potencies can overcome the problem of unemployment, poverty, and improve the national economic resilience (Sebayang and Kuncoro, 2011).

The success of the local economic potencies will depend on the regions in structuring and managing their own localities, including improving the investment climate and attracting investors within the fiscal, political, and administration decentralizations frameworks (Mahi, 2009). The average of regional economic growth in the decentralization period performed an improvement. However, relative to the decentralization (e.g. the period 1993-1996) the economic growth after the decentralization was still lower. The decentralization also spawned the growth of regions is relatively high, compared to the national average; however, some areas require the acceleration of growth (Lewis, 2003). In the second half of 2000s, the regional economic growth and income distribution across locality relatively remain unchanged (Figure 1 and 2).

Those facts confirm the necessity of local government behavior changes to facilitate local economic potencies in order to achieve the sustainable living standard improvement (Kaufmann et al., 2005; Knack, 2003). This paper would like to examine the dynamics of local economic governance in the case of districts / municipalities in Indonesia. This paper will begin with a view of the relevant literature regarding the governance. This is followed by exploring the empirical evidence concerning the influence of governance on the local economic
performance. The assessment data for Indonesia is placed in the next section. Finally, some concluding remarks are drawn.

II. THEORY

Political economics literature offers a huge interpretation regarding governance which nowadays is still in process to reach a general consensus. Broadly speaking, governance is defined as the traditions and institutions that determine how authority is exercised in a country (Kaufmann et al., 2000). Weiss (2005) noted that governance is related to strategies, processes, methods, and mechanisms in governing countries and achieving public demand and interest.

Weiss (2005) further explained that good governance has been associated with democracy and good civil rights, with transparency, with the rule of law, and with efficient public services. Governance also involves the interaction between formal institutions publicly and privately and those of civil society. Similarly, Chibba (2009) pointed out that governance matters have been an integral part of societies since the dawn of civilization, and especially so with respect to what values, ethics and rules of conduct, and justice should be upheld, how societies should be organized, and who should hold power and authority.

Some definitions above are complementary with each other and clearly propose the same basic idea of governance. However, they are still in the area of political science, i.e. have less economic meaning. In the context of economics, Dixit (2001) pointed out that economic governance consists of the processes that support economic activity and economic transactions by protecting property rights, enforcing contracts, and taking collective action to provide appropriate physical and organizational infrastructure. Tong (2011) simply defined governance quality as the capacity of a government to internalize externality. Even though the Dixits' and
Tongs’ definitions are still general, they provide a useful starting point to explore the more detailed concepts.

Other scholars have narrowed the lens somewhat, disentangling governance into separate concepts, such as corruption (Wei, 2000), transparency (Kaufmann et al., 2000), regulation (Djankov et al., 2002), and public goods provision (Kaufmann et al., 2005), that each themselves still contain a number of different policy levers and types of interactions. Other scholars have taken a micro perspective where individual policies such as business registration procedures have been isolated and explored separately from other modes of governance in society (see, for instance, Helpman, 2008) for several recent studies.

Based on some extended interpretations above, one important thing that could be inferred is that the government’s capability in managing its administration will bring a critical impact on all economic agents’ activities. Even though the concept of governance is not new, it is as old as human civilization, unfortunately, this factor is considered to be given in traditional neoclassical economic growth models, as in the proposition of Solow (1956), Cass (1965), and Koopmans (1965) (see: Romer, 1996). The endogenous growth theory proposed by Romer (1986; 1990) and Lucas (1988) tried to incorporate the factors of innovation without explaining how and where the innovation can be created. The technological innovation can only be created because of institutional environment.

A link connecting among institution, governance, and economic performance has been a subject of intense discussion for the last 25 years. The seminal work of North (1981) could be considered as pioneer the emerging idea of government capability inducement. According to North (1981) institutions are the rules of the game in a society or, more formally, are the humanly devised constraints that shape human interaction. The constraints would affect through incentives (North, 1990). In this circumstance, the incentive is understood as conditioning the willingness of economic actors to accept the rule of the game.

Since that, a numerous economists develop the North’s idea in creating incentive in order to promote economic growth using different perspectives. In principle, they have the same objectives, i.e. reducing uncertainty and promoting efficiency. The New Political Economy, for example, argued the need of structural adjustment programs by remove the incentives for rent seeking and corruption (Krueger, 1974; Posner, 1975; Bhagwati, 1982; Bardhan, 1984; Colander, 1984; Alt and Shepsle, 1990; Lal and Myint, 1996; Bates, 2001).

In line with the New Political Economy, the New Institutional Economy (initiated by Williamson, 1975; 1985) had brought to the fore economic theories that identified governance capabilities that states needed to have to create the conditions for low transaction cost (efficient) markets. In principle, the New Institutional Economics emphasized the importance of market-enhancing government through contracts enforcement and property rights protection. In short, Acemoglu, Johnson, and Robinson (2005) concluded that good government governance is a fundamental cause of long run economic growth.
Although there is no governance without government, governance cannot be judged solely on outcomes but must also consider the processes and relationships that produce them, however. More operationally, some expert teams develop indices to accommodate various concepts of the economic governance above (for example Knack and Keefer, 1995, 1997; Kaufmann et al., 1999, and Kaufmann et al., 2005). World Bank (2005) recently summarized them into six broad governance indicators. These are:

1. Voice and Accountability — measuring political, civil, and human rights
2. Political Instability and Violence — measuring the likelihood of violent threats to, or changes in, government, including terrorism
3. Government Effectiveness — measuring the competence of the bureaucracy and the quality of public service delivery
4. Regulatory Burden — measuring the incidence of market-unfriendly policies
5. Rule of Law — measuring the quality of contract enforcement, the police, and the courts, as well as the likelihood of crime and violence
6. Control of Corruption — measuring the exercise of public power for private gain, including both petty and grand corruption and state capture.

The six indicators above suggest that governance quality is a complex notion. It can take many forms and there may be trade-off between different dimensions of governance. As noted by Tong (2011), however, good governance is often loosely described as effective government, which is a broad and multi-dimensional concept itself. Various widely used governance indicators do not provide an all-encompassing definition. Thomas (2007) describes the various indicators as a result of the mixed “personal ideas of governance” put forward by people developing them. Quibria (2006) points out that governance is often “used as an umbrella concept to federate a whole assortment of different, albeit related, ideas”.

Regardless the different dimensions of governance, the convergence of those different perspectives led to the emergence of a set of policy priorities for governance that has come to be known as the good governance agenda. Empirical studies regarding the good governance have been conducted widely. In general, they support to close correlation or even causal relationship between institutional governance and economic performance.

In the cross-country level, some determining factors which have been identified in particular researches are property rights and entrepreneurial activity (Galiani and Scargrodsky, 2006; Di Tella, 2007; Fields, 2007; Banerjee and Iyer, 2005; and Malesky and Taussig, 2009). Mengistu and Adhikary (2011) considered good governance as a key determinant for foreign investors to invest their fund in the case of Asian countries.

Other scholars have devised clever sub-national analyses of the impact of corruption on economic behavior (Fisman, 2001; Golden and Picci, 2005; Di Tella and Scharagrodsky, 2003; and
Olken, 2007), the importance of state-business relations (Cali, 2009) as well as the predictability of corruption (Malesky and Samphantharak, 2008). Ardagna and Lusardi (2008) show that better contract enforcement institutions increase the share of entrepreneurs that identify themselves as growth-oriented. Using variance in institutions across provinces in Mexico, Laeven and Woodruff (2007) find a significant relationship between better contracting institutions and higher levels of growth in firm size.

Most studies above have focused on cross-country data which differ from Indonesia that has a unique economic characteristics and culture. According to Lewis (2003), the economic performance of Indonesia’s districts since decentralization in 2001 has varied dramatically. Some districts have seen steady economic progress, strong investment, and job creation. But many others have lagged behind, failing to share in overall economic growth. Moreover, there is evidence that the policies pursued by sub-national authorities have had an important bearing on the quality of the local investment climate (Lewis 2003).

Kuncoro and Suryanto (2003) found that there was a high level of persistence in the relative position of regional income, consistent with a low degree of mobility in the income distribution. The richest regions tend to polarize gradually, which may be attributed to externalities linked to localization or to the proximity the rest of Java. Pepinsky and Wihardja (2009) also suggest that divergent economic performance across districts/municipalities is driven by heterogeneity in endowments, factor immobility, and institutional quality. Those findings confirm to study of Mahi (2009). He found that even though the geographical concentration of industries gradually decreased (especially in Java and Bali) after decentralization, it has a bad impact on the regional economic development equality. He also found that investment climate played an important role in the geographical concentration.

Istiandari (2009) assessed the local economic governance and related it to regional income as well as poverty rate. According to her study, most regions in Java had a higher governance rate to provide a positive impact on welfare. She also found that there was a large disparity of governance implementation among districts/municipalities. Most recently, McCulloch and Malesky (2010) exploit a new dataset of firm perceptions of the quality of economic governance in 243 districts across Indonesia to estimate the impact of nine different dimensions of governance on districts/municipalities growth. Surprisingly, they found relatively little evidence of a robust relationship between the quality of governance and local economic performance.

Numerous studies above suggest that the local economic governance matters for the regional economic performance. So, it is urgent for us to investigate the local economic governance. For point of view of researchers, it is an important test for the validity of the New Political and New Institutional Economics when confronted with the Neoclassical and Endogenous Growth models. Policy makers, in turn, consider governance also as crucial issue and a new dimension to the administration and policy studies and planning for countries globally. Moreover, sub-national analysis of this kind is becoming increasingly relevant for policy as many countries
move towards greater political, fiscal, and administrative decentralization. Indeed central
governments and donor agencies often have an explicit objective of improving governance at
the sub-national level on the grounds that this will improve local economic growth.

This paper contributes to the local government governance literature and empirics
particularly to Indonesia. Our approach is in the same spirit with Istiandari (2009) and McCulloch
and Malesky (2010), although it has three significant differences. First, we observe the governance
indices instead of estimating directly governance indicators to regional economic growth. Second,
we focus on the transition dynamics of relative governance indices using non parametric method
(i.e. Kernel density function) to identify the pattern of governance distribution across countries.
Third, we focus on the transition dynamics of relative governance distribution using Markov
chains. This paper also detects some particular changes in the movement of local economies
governance according to their index ranks. The use of Markov chains which intensively has
been employed in business research is intended to offer a deeper analysis of local economic
governance dynamics process in Indonesia.

III. METHODOLOGY

To have a better understanding about the shape of the relative local governance distribution or
how it evolved over the years in Indonesia, the Kernels of the actual relative local governance in
different time periods are estimated so that their shapes and inter-temporal dynamics can be
studied. A Kernel estimator of a set of observations – in this case the relative rankings of the
local economic governance index – is an estimated distribution function from which the
observations are likely to have been drawn (for details, see Silverman (1986)). Mathematically,
the Kernel estimator $f(x)$ is defined as

$$f(x) = \frac{1}{Nh} \sum_{j=1}^{N} K \left[ \frac{x - X_j}{h} \right]$$

(1)

where,

$X_j = \text{data}$

$N = \text{number of data points}$

$h = \text{window width/smoothing parameter}$

$K = \text{Kernel/weighting function (assumed to be the normal distribution in this paper)}$

The Kernel density estimation requires several steps (see Silverman, 1986). In the first
step, in each year, the sub-index of each district/municipality was re-scaled as a fraction of the
national average the associated sub-index, such that the distribution is restricted to lie in the
positive values. Since by construction, the national average sub-index is always 1 (100 percent).
In the next step, for a suitably large number of points spanning the interval, the relative frequency, i.e. the unconditional probability, with which each of these values could have occurred, was estimated. The probability of each point was computed as the weighted average of the distance of that points from the given relative incomes of all the regions, with the weights drawn from a normal or Gaussian distribution centered at that point. Weights drawn from an Epanechnikov distribution, which is the other frequently used weighting method, did not seem to make any material difference to the shape of the estimated Kernels.

In the third step, the relative frequencies of these points were filtered for noise using the procedure in Silverman (1986). The collection of the filtered relative frequencies formed the Kernel of the relative local governance in that year. The area of the distribution was normalized to 100 (percent). The Kernel estimators tell us how likely it is that governance score, on average, was a certain fraction of national average governance score in a particular year.

As stated above, the Kernel density distribution is helpful to identify the shape of the relative governance distribution or how it evolved over the years. But it can not predict each transition probability of the distribution will converge toward each steady state. Markov chains offer the transition probability of each distribution to achieve each steady state. Markov processes can be considered as a special case of stochastic processes. They can be defined in continues of discrete time and relate to a continuous or discrete set of states.

Following Amemiya (1985), a Markov model can be characterized by the following two properties:

- A sequence of binary random variables taking the values $y_j(t) = 1$ if the $i$th unit is the state $j$ at time $t$ and $y_j(t) = 0$ otherwise, for $i = 1,...,n$

  If, in a discrete-time context, for each unit $i$, the distribution of the vector $y_j(t)$ depends fully and only on $y_j(t-1)$, then the process is a first-order discrete-time Markov process.

- A set of transition probabilities, in which $p_{ik}(t)$ denotes the probability of unit $i$ being in the state $j$ at time $(t-1)$ and jumping to state $k$ at time $t$. If the set of states is finite and denumerable then all the transition probabilities may be ordered in the form of the so-called Markov matrix. $P(t) = \{p_{ik}(t)\}$, in which the sum of all the element of a row will add up to one.

Let $p(t)$ be the vector describing the distribution of the units over the different states at moment $t$. It holds of course that

$$p_j(t) = \frac{1}{n} \sum_{i=1}^{n} y_{ij}(t)$$

(2)

where $n$ is the number of units. Such model is called a Markov chains.
Furthermore, if the transition probabilities do not depend on time or on the unit, the model is called homogenous and stationary. It can be shown that, under fairly general conditions, there exists a uniquely defined long run, or ‘ergodic’, matrix of transition probabilities $P$ and a corresponding vector of equilibrium probabilities associated to a stationary Markov chain. More formally, if we denote the transition matrix by $P = \{p_{jk}\}$, then the ‘ergodic’ equilibrium vector is $\pi$, verifying

$$\pi = p'\pi$$

Such that

$$\pi_j \geq 0 \text{ and } \sum_{j \in \mathcal{E}} \pi_j = 1$$

It follows that

$$\lim_{t \to \infty} p_j(t) = \pi_j$$

In other words, in the long run the elements of the transition matrix will reach the state of nature $j$ with probability $\pi_j$, irrespective of the starting position. If we consider a finite number of states (as determined, for example, by different levels of index rank), the shift of the units among states can be easily traced and, therefore, the transition probability matrix can be obtained.

This matrix will show the dynamic behavior of the units, since the transition matrix expresses, roughly speaking, and the probability of a unit starting off in a particular state and ending up in the same or in a different state. Notice that, by means of using first-order Markov chains, it is implicitly assumed that all the relevant information about the past behavior of a particular region is embedded in its fundamentals underlying the steady state towards which a region converges are fairly stable over time.

We can apply, again following Amemiya (1985), the rule that the maximum likelihood estimator of the transition probabilities can be computed as follows:

$$P_{jk} = \frac{\sum_{t} s_{jk}(t)}{\sum_{k} \sum_{t} s_{jk}(t)} = \frac{\sum_{t} \sum_{i} y_{ij}(t-1) y_{ik}(t)}{\sum_{k} \sum_{t} y_{ij}(t-1) y_{ik}(t)}$$

in which $s_{jk}(t)$ denotes the number of units that have changed from state $j$ to state $k$ in period $t$. The ergodic vector, that describes the index distribution of the units in the long run, is obtained...
by means of iterating the transition matrix. If the ergodic density vector has only one maximum, it suggests some degree of convergence. Instead, if it tends to a bi-modal (or even tri-modal) structure it may be pointing to some degree of polarization.

The nature of this analysis, however, suggests that results regarding the steady state governance index distribution should be looked at with some caution. The computation of long-run probabilities implicitly implies that historic probabilities will somehow carry over in the future. In other words, there is no place for shocks to alter the course of this economy and change the current trend. This surely is unrealistic; there is no reason to believe that institutions, the rate of technological progress, the nature of human capital, and other crucial factors determining local economic governance index will remain constant over time.

IV. RESULTS AND ANALYSIS

This paper used local economic governance data published by Commission of Regional Autonomy Implementation Watch (Komisi Pengawas Pelaksanaan Otonomi Daerah, KPPOD). Since 2007, the Asia Foundation, in conjunction with a national Indonesian NGO, KPPOD, has been launching data set of firm perceptions which measures the quality of local economic governance in 243 districts across the country. The data is based on a statistically representative random sample of over 12,000 firms and 729 business associations throughout these districts/municipalities. The selected firms cover small (those have 10-19 workers), medium (those have 20-99 workers), and large (those have more than 100 workers) industries. The proportion is 50, 45, and 5 percent respectively.

We use 2007 data and compared with the latest 2011 data. The Local economic governance indicators used by KPPOD comprise 9 elements following World Bank (2005) criteria:

1. Land Accessibility
2. Business Licensing
3. Interaction between Local Government and Private Sector
4. Business Development Programmes
5. Capability and Integrity of Local Government Officials
6. Local Taxes and Local Retributions and other Transaction Costs
7. Infrastructure Management
8. Security and Conflict Resolution
9. Quality of Local Regulations

Each criterion then is calculated into sub-indices respectively as well as total index. In constructing those indices KPPOD used judgment, analytical hierarchy process, and finalized
by focus discussion group. Each index ranges from 0 to 100 points. The higher the index, the better the governance is. Based on the total index, KPPOD then ranks all regions consecutively as presented in Table 1. During 2007-2011, Blitar was the number one both in the two periods. Magetan and Probolinggo also lied in ten top ranks.

Table 1. Ten Top of Local Economic Governance Total Index Rank in 2007-2011

<table>
<thead>
<tr>
<th>Rank</th>
<th>Region</th>
<th>2007</th>
<th>Region</th>
<th>2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Blitar District</td>
<td>76.00</td>
<td>Blitar District</td>
<td>80.50</td>
</tr>
<tr>
<td>2</td>
<td>Magetan Municipality</td>
<td>75.40</td>
<td>Lampung Utara Municipality</td>
<td>79.00</td>
</tr>
<tr>
<td>3</td>
<td>Probakulur District</td>
<td>74.70</td>
<td>Probolinggo District</td>
<td>78.40</td>
</tr>
<tr>
<td>4</td>
<td>Musi Banyu Asin Municipality</td>
<td>74.30</td>
<td>Batu District</td>
<td>76.30</td>
</tr>
<tr>
<td>5</td>
<td>Jembrana Municipality</td>
<td>73.70</td>
<td>Sorong Municipality</td>
<td>74.60</td>
</tr>
<tr>
<td>6</td>
<td>Tuban Municipality</td>
<td>74.30</td>
<td>Bangka Tengah Municipality</td>
<td>74.30</td>
</tr>
<tr>
<td>7</td>
<td>Lumajang Municipality</td>
<td>72.00</td>
<td>Magetan Municipality</td>
<td>73.90</td>
</tr>
<tr>
<td>8</td>
<td>Madiun Municipality</td>
<td>72.00</td>
<td>Probolinggo Municipality</td>
<td>73.80</td>
</tr>
<tr>
<td>9</td>
<td>Probolinggo District</td>
<td>71.50</td>
<td>Solok District</td>
<td>73.20</td>
</tr>
<tr>
<td>10</td>
<td>Gianyar Municipality</td>
<td>71.30</td>
<td>Padang Panjang District</td>
<td>73.10</td>
</tr>
</tbody>
</table>

Source: KPPOD

Table 2 broke down further into two main characteristics of regions. Referring to the main island, the average of total index of local economic governance in Java (64.32) is much higher than that in outer Java (59.82). In 2011, it did not change. The local economic governance index in Java increased faster than in outer Java. It seems that Java, where the industry concentrate geographically, has relatively better local economic governance. Consequently, it has a bad impact on the regional economic development equality as stated by Mahi (2009).

Table 2. Descriptive Statistics of Local Economic Governance Total Index 2007-2011

<table>
<thead>
<tr>
<th></th>
<th>Java</th>
<th>Outer Java</th>
<th>District</th>
<th>Municipality</th>
</tr>
</thead>
<tbody>
<tr>
<td>2007</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>64.32</td>
<td>59.82</td>
<td>61.75</td>
<td>61.70</td>
</tr>
<tr>
<td>Std. Dev</td>
<td>4.85</td>
<td>6.76</td>
<td>6.62</td>
<td>6.38</td>
</tr>
<tr>
<td>Obs</td>
<td>102</td>
<td>141</td>
<td>55</td>
<td>188</td>
</tr>
<tr>
<td>2011</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>67.11</td>
<td>61.79</td>
<td>65.94</td>
<td>62.12</td>
</tr>
<tr>
<td>Std. Dev</td>
<td>6.12</td>
<td>7.23</td>
<td>5.95</td>
<td>7.43</td>
</tr>
<tr>
<td>Obs</td>
<td>46</td>
<td>199</td>
<td>43</td>
<td>202</td>
</tr>
</tbody>
</table>

Source: KPPOD (processed)
Based on the administrative region, the average of local economic governance in districts (61.75) relatively equals to that in municipalities (61.70). However, in 2011, the average of local economic governance in districts grew higher than that in municipalities, consistent with study of Istiandari (2009). Moreover, the variability of the average of local economic governance in municipalities was larger than that in districts indicated by higher standard deviation to mean ratio. These imply that the unequal economic governance exist either in Java-outer Java or in district-municipality, consistent with unequal regional income as found by Kuncoro and Suryanto (2003).

Table 3 provides the descriptive statistics the 9 sub-indices for 2007. The highest is score on the Quality of Local Regulations (X9, 84.22). The two lowest score are on Business Development Programs (X4, 43.04) and the Interaction between Local Government and Private Sector (X5, 56.92). On the average the local economic governance total index is relatively moderate about 61.72 and standard deviation is 6.42 points. Looking at the coefficient of variation (CV, standard deviation to mean ratio), all of the indices do not vary around the mean value.

Table 3 also shows the shape of the distribution. All sub-indices lightly skewed to the left, as indicated by the negative value of skewness (except X4, Business Development Program). In terms of sharpness, the polygon frequency is likely to mesokurtic shape as shown by the value of kurtosis around 3. The Quality of Local Regulations (X9) sub-index is an
exception. The value of kurtosis is the highest, 8.87, displaying leptokurtic shape of its polygon frequency.

Table 4 shows the descriptive statistics for 2011. The interesting thing is the average of governance index of Local Taxes and Local Retributions and other Transaction Costs (X6) currently it becomes the highest (81.28) in 2011 slightly higher than that of Quality of Local Regulations (X9). It appears that there is a significant improvement for local governments to revise their regulations. According to KPPOD (2011), during 2001-2010 the central government (i.e. Ministry of Finance) assessed 13.252 local regulation drafts, 4.885 drafts were recommended to Ministry of Home Affairs to be canceled. Ministry of Home Affair has already officially canceled only 1.843 local regulations especially regarding taxes and levies regulations. The remaining regional regulation drafts have not been decided yet whether canceled, held, or suspended.

Table 4.
Descriptive Statistics of Sub-Indices of Local Economic Governance 2011

<table>
<thead>
<tr>
<th>Sub-Indices</th>
<th>X1</th>
<th>X2</th>
<th>X3</th>
<th>X4</th>
<th>X5</th>
<th>X6</th>
<th>X7</th>
<th>X8</th>
<th>X9</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>73.77</td>
<td>62.22</td>
<td>50.94</td>
<td>38.57</td>
<td>50.90</td>
<td>81.28</td>
<td>69.18</td>
<td>67.06</td>
<td>81.13</td>
<td>62.76</td>
</tr>
<tr>
<td>Median</td>
<td>74.90</td>
<td>61.80</td>
<td>50.70</td>
<td>37.50</td>
<td>51.60</td>
<td>82.50</td>
<td>71.00</td>
<td>68.70</td>
<td>83.80</td>
<td>63.40</td>
</tr>
<tr>
<td>Max.</td>
<td>94.30</td>
<td>84.60</td>
<td>80.10</td>
<td>78.40</td>
<td>89.80</td>
<td>100.00</td>
<td>94.00</td>
<td>94.20</td>
<td>100.00</td>
<td>80.50</td>
</tr>
<tr>
<td>Min</td>
<td>41.80</td>
<td>31.10</td>
<td>25.00</td>
<td>0.00</td>
<td>14.90</td>
<td>44.20</td>
<td>29.50</td>
<td>2.40</td>
<td>31.60</td>
<td>39.40</td>
</tr>
<tr>
<td>Std. Dev.</td>
<td>11.23</td>
<td>8.57</td>
<td>9.91</td>
<td>15.84</td>
<td>12.52</td>
<td>10.77</td>
<td>12.94</td>
<td>12.28</td>
<td>11.19</td>
<td>7.31</td>
</tr>
<tr>
<td>CV</td>
<td>0.15</td>
<td>0.14</td>
<td>0.19</td>
<td>0.41</td>
<td>0.25</td>
<td>0.13</td>
<td>0.19</td>
<td>0.18</td>
<td>0.14</td>
<td>0.12</td>
</tr>
<tr>
<td>Skewness</td>
<td>-0.45</td>
<td>-0.15</td>
<td>0.12</td>
<td>0.25</td>
<td>0.06</td>
<td>-0.77</td>
<td>-0.69</td>
<td>-1.04</td>
<td>-1.12</td>
<td>-0.57</td>
</tr>
<tr>
<td>Kurtosis</td>
<td>2.70</td>
<td>3.63</td>
<td>3.24</td>
<td>2.88</td>
<td>3.34</td>
<td>3.58</td>
<td>3.18</td>
<td>6.36</td>
<td>4.66</td>
<td>3.33</td>
</tr>
<tr>
<td>J-B test</td>
<td>9.24</td>
<td>4.97</td>
<td>1.13</td>
<td>2.63</td>
<td>1.28</td>
<td>27.45</td>
<td>19.89</td>
<td>159.44</td>
<td>77.67</td>
<td>14.62</td>
</tr>
<tr>
<td>Prob.</td>
<td>0.0099</td>
<td>0.0831</td>
<td>0.5670</td>
<td>0.2686</td>
<td>0.5280</td>
<td>0.0000</td>
<td>0.0000</td>
<td>0.0000</td>
<td>0.0000</td>
<td>0.0007</td>
</tr>
<tr>
<td>Obs.</td>
<td>245</td>
<td>245</td>
<td>245</td>
<td>245</td>
<td>245</td>
<td>245</td>
<td>245</td>
<td>245</td>
<td>239</td>
<td>245</td>
</tr>
</tbody>
</table>

Note: The total sample is 245, 6 regions are incomplete for X9
Source: KPPOD (processed)

The next three lowest average of sub-indices are X4 (Business Development Programmes, 38.57), X3 (Interaction between Local Government and Private Sector, 50.90), and X5 (Capability and Integrity of Local Government Officials, 50.94). The latter is slightly similar to that in 2007. They imply that capability and integrity of local government officials to interact with private sectors in order to promote business are quite low even thought they have successfully maintained security and conflict resolutions in their regions.
The overall local economic governance index on the average is 62.76 in 2011, almost close to 61.72 in 2007. In general, all sub-indices and total index of local economic governance during 2007-2011 tend to stagnate. Visual inspection of Kernel density as displayed in Figure 3 supports that preliminary conclusion. The non-parametric densities have been computed using Gaussian Kernel, with optimal bandwidth selected for each case. In the starting year, the shape is closely to be a normal distribution and the probability density is slightly right-skewed. It is also notable that a local peak at the right of the mode, suggesting some degree of polarization for this specific year.

In 2011, the progress experienced in the highest part of the distribution is noticeable, since the probability mass has partly shifted slightly to the right. Even though the probability mass has remained unchanged, two local peaks at the center now appear, suggesting that some degree of polarization of the higher governance regions for this specific year was also occurred. Basically, there is no significant difference between the shapes of local economic governance total index distribution in 2007 and 2011. In general, almost all sub-indices and the total index are normally distributed as indicated by the Jarque-Berra test as delivered previously in Table 3 and 4.

Table 5 presents the simple pair wise correlations matrix between the governance sub-indices. The bottom-left part presents for 2007 and the upper-right part presents for 2011. Almost all sub-indices being positively correlated with most of the other sub-indices, but, usually negatively with the Business Development Programs sub-index. In 2007, for example, sub-index X1 (Land Accessibility) is negatively correlated with X4 (Business Development Program). This conditional so occurs in relation to sub-indices X4, X6, X7, X8, and X9. This implies that the land remains areal obstacle for the economic development in the area as found by Mahi (2009).
In 2011 the phenomena did not shift. Land Accessibility (X1) is still a serious constraint, especially related to X4 as well as the Quality of Local Regulations (X9). The X4 was also significantly negatively correlated with the X6 (Local Taxes and Local Retributions and other Transaction Costs). The Quality of Local Regulations and Local Taxes and Levies are fully under the control of local governments so that appropriate adjustments can be done immediately. This probably means that the local government is less responsive in capturing the economic problems that emerged in their own area.

The two highest positive correlations are X3 with X5 and X2 with X3 in 2007. In 2011 the two highest positive correlations are X3 with X5 and X1 with X6. They inform us that Capability and Integrity of Local Government Officials (X5) matters in relation to Interaction between Local Government and Private Sector (X3) as well as Business Licensing (X2). The broader land accessibility tends to increase the local tax and levies revenues.

Those large correlations suggest that it may be possible to summarize these governance concepts with fewer variables. Moreover, the fact that one sub-index – Business Development Services – is negatively correlated four other sub-indices is peculiar. Meanwhile, the small positive correlations between these sub-indices since the concepts of governance inevitably overlap to some extent (McCulloch and Malesky, 2010).

So far, we have talked about the local economic governance in Indonesia within the comparative statics frameworks. Is the phenomenon of local economic governance in each region as occurred in Tables 2 through 5 above temporary (that can still be changing in the long term) or permanent in nature? Will there be a dramatic fundamental change in the local economic...
governance in addressing the economic issues that emerge in each region? The last section will answer that question more forcefully.

To answer these questions, some adjustments are done. This is because the districts/municipalities sampled by KPPOD in a particular year could not be covered again in the next annual survey. For this reason, the selected regions are districts/municipalities that were sampled in 2007 and also surveyed in 2011. In this circumstance, there are 62 selected districts/municipalities. I then classify arbitrary them into four categories, (a) very good (ranked 1-10), (b) good (ranked 11-50), (c) fair (ranked 51-100), and (d) bad (ratings greater than 100). The classification is carried out respectively for 2007 and 2011. The results are presented in Table 6 below.

Table 6 shows there are only three regions (as highlighted in Table 1, namely Blitar, Magetan, and Probolinggo) that occupy the top ranking from 1 to 10 (state A) either in 2007 or in 2011. The classification B populated 6 regions with a rating of 11 to 50. The main diagonal from upper-left to lower-right is by itself, shows the degree of persistence in the relative position of the district/municipalities is high, suggesting the permanent change of local economic governance. This means that there were no significant increases in ratings more than 50 percent (32 regions) of the observed districts/municipalities.

<table>
<thead>
<tr>
<th>Year</th>
<th>State</th>
<th>2011</th>
<th></th>
<th></th>
<th></th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2007</td>
<td>A</td>
<td>3 (0.5000)</td>
<td>0 (0.0000)</td>
<td>3 (0.5000)</td>
<td>0 (0.0000)</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>B</td>
<td>1 (0.0714)</td>
<td>6 (0.4286)</td>
<td>2 (0.1429)</td>
<td>5 (0.3571)</td>
<td>14</td>
</tr>
<tr>
<td></td>
<td>C</td>
<td>0 (0.0000)</td>
<td>3 (0.2000)</td>
<td>7 (0.4667)</td>
<td>5 (0.3333)</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>D</td>
<td>0 (0.0000)</td>
<td>6 (0.2222)</td>
<td>4 (0.1482)</td>
<td>17 (0.6296)</td>
<td>27</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>4</td>
<td>15</td>
<td>16</td>
<td>27</td>
<td>62</td>
</tr>
<tr>
<td></td>
<td>Ergodic</td>
<td>0.0233</td>
<td>0.1629</td>
<td>0.1454</td>
<td>0.2879</td>
<td></td>
</tr>
</tbody>
</table>

Notes: Figures in parentheses are probability
Source: KPPOD (processed)

Only one region (Probolinggo municipality) that in 2007 still was in state B jumped to category A. The other positive changes occurred for three regions. They in 2007 were able to move to occupy from state C to state B in 2011. Four regions that originally were in category D was able to ascend to the rank position of C in 2011. In fact, there are six regions that still in classification D in 2007 can jump into the category B in 2011.

This contrasts with 15 other regions that experienced a decrease in their position. For example, there are three regions in 2007 is located at position state A then decreased even into
the predicate C. Overall, there are evidently no jumps from state D to A or C to A (or vice versa) are visible — there are no governance shift miracles in this sample — and thus the degree of mobility is limited to the better category, consistent with the study of McCulloch and Malesky (2010).

The transition is assumed to continue to evolve through the mechanism of the Markov chains until it reaches a steady state position. The last line of Table 6 presents the probability of ergodic occurrence. The calculation result shows that there is little opportunity (2.33 percent) in the long-term for the regions to keep staying in the ten top rankings. The probability to reach the category Band Care also relatively low, approximately 16.29 and 14.54 percent respectively. This implies that the local government has not reached yet at the optimum level in improving the regional economic governance, even though they already have been in the good rankings.

The greatest probability is on the classification D(ranked in over 100). The probability of not getting out from D position is nearly 28.79 percent. The highest persistence in the lowest state of regions should, no doubt, be a matter of concern for both academic and policy makers: it may be hiding some kind of poor governance trap. It presents that because of structural constrains those regions cannot grow as fast as others. As a result, their position remains unchanged. Thus, to move out from the predicate of bad governance into a better category, it requires the local government’s entrepreneurial touches to solve the excessive problems typically occur in each region.

The current results agree with the intuitions obtained from the visual inspection of the graphs above, since they do not predict polarization among districts/municipalities in the years 2007-2011 but, rather, some kind of concentration around the average values. Nevertheless, these results may also suggest some sort of geographical externality, along the lines of Krugman (1991a, 1991b). Spillovers among neighboring regions may foster the governance development of the contiguous areas. In particular, when examining the region in the highest states in 2007 and 2011, a shift of the highest governance index were located to the west of the country can be observed, such as Java, Sumatera, and Bali, while in the same period some well-off regions were located in other areas. To sum up, all of the analytical tools applied in this paper provide a strong indication that there is no significant improvement of the local economic governance in the case of district/municipalities in Indonesia.

V. CONCLUSION

This paper tries to observe the local economic governance in the case of districts/municipalities in Indonesia through various measures of economic governance index. Observations for 2007 and 2011 showed that there were no significant changes in the performance of local economic governance. The unchanged ingovernance of local economic performance due to land issues,
business development programs, taxes and levies and other transaction costs, security, and local regulations.

These results suggest improving the local economic governance to create conducive investment climate to support the growth of economic activities. An industry in a particular area will improve if the region has a favor investment climate. In terms of improving the investment climate, the local governments should focus their economic development primarily on providing the quality of infrastructure in the area, especially land accessibility and business development program. The central government can encourage some policies for national infrastructure improvements and provide stimulation for the local government to give priority to infrastructure provision.

Finally, it should be noted that the local economic governance is a necessary condition for the creation of regional economic growth, but not a sufficient condition for the improvement of regional economic performance. It seems that the local governance can be a source of explanatory (symptoms) for regional economic growth, rather than the causes of regional economic performance. This also confirms that the various efforts to improve local governance require greater attention to understanding how the structural characteristics that makes up the regional political economy which in turn affects the performance of the economy in line with decentralization and regional autonomy.

The local economic governance particularly in Indonesia is still open and relevant to analyze. This paper used two sample point data only. The further investigation can be done using more sophisticated devises. Employing most recent time series data and applying, for example, Markov chains method for continuous variable, are advisable so that the transition dynamics of local economic governance will be more accurate for policy makers to address the related problems.
REFERENCES


WRITING GUIDANCE

1. The paper should be original and should not violate any copyrights. The submitted paper should have never been published or not being submitted to other publisher. The copyright of the published paper is retained to the author.

2. The Bulletin of Monetary Economics and Banking provide a financial incentive between IDR 1,000,000 to IDR 3,000,000.

3. The paper should be submitted in two formats (i) Microsoft Word (*.doc) and (ii) portable digital file (*.PDF). These files should be sent to the following mail address:

   paper.bemp@gmail.com and Cc to: bemp@bi.go.id

   You may save your files in CD and send it to the following Editorial Address:

   BULLETIN OF MONETARY ECONOMICS AND BANKING
   Department of Economic Research and Monetary Policy-Bank Indonesia
   Building Syafruddin Prawiranegara, 20th Floor
   Jl. M. H. Thamrin No.2 Central Jakarta, Indonesia
   Ph. +62-21-3818202, Fax. +62-21- 3800394

4. To avoid missing fonts or other compatibility issues, any special characters or mathematical expression (equations, symbols, matrix, etc.) must be written using Microsoft Equation.

5. The submitted paper should contain (i) an abstract of maximum one page A4, (ii) keywords and (iii) JEL classification code. See the JEL code at http://www.aeaweb.org/journal/jel_class_system.html.

6. The paper must contain the followings:
   - The background, the aim of the paper and its distinction to previous study
   - Theory and review of literatures
   - Methodology (quantitative methodology is preferred)
   - Result and analysis
   - Policy and further study implication

7. The citation should be in footnote and not in endnote.

8. The references must obey the following rule:
a. **Book:**


b. **Article in journal:**


c. **Article in book edited by other people:**


d. **Working papers:**


e. **Mimeo or unpublished work:**


f. **Article from web or other electronic form:**


g. **Article in newspaper, magazine or equal periodicals:**


9. The paper should be submitted along with curriculum vitae complete with mail address and phone number.