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THE PROGRESS OF MONETARY, BANKING AND PAYMENT SYSTEM
Quarter 1, 2010
Quarterly Report Team, Bank Indonesia

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BANK INDONESIA

QUARTERLY ANALYSIS:
The Progress of Monetary, Banking and Payment System
Quarter I, 2010

Author Team of Quarterly Report, Bank Indonesia

The process of strengthening the domestic economy was continually supported by the conducive global economic performance. Indonesia's economic activities showed a significant increase in the fourth quarter of 2009. In that quarter, the Indonesian economy grew by 5.4% (yoy), so that in general, the economy grew by 4.5% (yoy) in 2009. These economic conditions continued to show the optimistic atmosphere that support better economic prospects than previously thought. The Indonesian economy in 2010 was expected to reach 5.5% -6.0% and in 2011 reached 6.0% -6.5%. Price stability was still maintained, as reflected in lower CPI growth during the first quarter of 2010. This was in line with the estimates of significant inflationary pressures, which will not appear until at least the first semester of 2010. For the entire year, CPI inflation in 2010 was targeted at the range of $5\% \pm 1\%$.

Bank Indonesia expected that the global economy continues to recover and gets stronger. The economy of developed countries, especially in the U.S. and Japan continued to improve. Likewise, the economic recovery of non-Japan countries in Asia, especially China and India, was also getting stronger. Meanwhile, the indications of economic recovery in Europe began to be seen though still limited. The settlement of the Greek crisis has so far responded positively by economic actors and only has limited impact on financial markets.

Global economic recovery aligned with the perception of risk sparked optimism in the financial markets and commodity markets. This was reflected by the price index in the global stock markets and commodity prices that recorded an increase in the international market which tends to increase. The flow of foreign capital into the emerging markets financial markets continues along with the improvement in risk perception. These conditions encouraged the strengthening of exchange rates in the region. This optimism that was getting stronger against the global economic recovery and improved global demand, has elevated the prices of various commodities. The price increase was accompanied by a strengthening currency, which so far has not triggered a significant increase in global inflation, especially in developed countries. In the process of world economic recovery which has not fully recovered to normal, the monetary

authorities, especially in developed countries tend to still implement an accommodative monetary policy stance. The signals of monetary tightening policy appeared more in the emerging markets related to increased inflationary pressures in line with high economic expansion.

Domestic economic performance in the first quarter of 2010 had better potential than the previous estimation. In the first quarter of 2010, the domestic economy was expected to grow by 5.7% (yoy). This development was supported by the following matters. First, export performance was expected to increase along with global economic recovery and improvement in international commodity prices. Second, consumption was expected to remain strong supported by consumer purchase power and the maintained consumer expectations. Third, in line with the increased exports and household consumption, investment recovery was expected to be stronger and supported by the efforts of government to promote infrastructure projects. In addition, the investment climate in 2010 was also supported by improved Indonesia's sovereign credit rating by S & P which increased from BB- to BB. With this increase, Indonesia's rating is only one notch away to advance toward *investment grade*. Fourth, in line with improved performance on the external side, a number of sectors were expected to grow higher, particularly the manufacturing and trade sector. The higher growth in manufacturing sector was driven by the improvement in export-oriented and the automotive industries. Meanwhile, the growth in the trade sector was getting higher in line with the increased in export and import activities and the improvement in manufacturing performance. However, there were some challenges in encouraging higher growth, especially related to the efforts to accelerate the implementation of infrastructure programs and to optimally utilize the opportunity of the implementation of the ASEAN-China Free Trade Agreement (AC-FTA).

The continued strengthening of the economy was also reflected in the development of regional economy that continues to show improvement. The performance of the regional economy was sustained by the economy in Sumatra, Kalimantan, Sulawesi, Maluku and Papua (Kali-Sulampua), and Jakarta. Meanwhile, economic activities in other regions (Java, Bali and Nusa Tenggara or Jabalnustra) indicated deceleration. The improved regional economic performance was derived from the increased exports, investment, and consumption. The improved export performance in each area came from the primary commodity exports, such as mining and palm oil products in Sumatra and Kali-Sulampua, and chemical products in Jabalnustra. In terms of the main destination countries, exports of each region experienced a shift which was originally to Japan, America and Europe, turned to the ASEAN countries and China as the economic recovery mainly occurs in these regions. Even the export portion of Sumatra and Kali-Sulampua to India showed a significant increase, especially for palm oil products and coal. In line with increased economic activity, investment was indicated to get stronger.

This was reflected from the growth in cement consumption and the imports of capital goods which growth remain positive. As for the local government investment, the capital expenditure also showed improvement. This was primarily related to infrastructure projects such as reparation and construction of roads, dams, bridges, and airports. As in the field of business and employment, industry sector experienced an increase associated with the improving domestic and external demand. The performance was reflected in the inclining capacity of production and raw material imports in all regions. From the mining sector, the improvement in this sector was mainly due to the increase in non-oil mining and gas production (non-oil), particularly coal and copper, while oil and gas production still tended to slow down.

In terms of prices, inflation remained under control in the first quarter of 2010. Inflationary pressure in the first quarter 2010 tended to be low, marked by deflation in March 2010 by 0.14% (mtm), so that annual CPI inflation reached 3.43% (yoy). This controlled inflation at a relatively low level was in line with the strengthening of the rupiah and the adequacy of supply in response to the increased demands. In addition, the low inflation in March 2010 was also supported by the waning of inflationary pressure that comes from volatile food (mainly rice) due to the start of harvesting season in some areas and minimal inflationary pressures originating from the administered price

The performance of Indonesia's balance of payments (BOP) in the first quarter of 2010 was expected to remain solid, supported by the world economic recovery. The current account was expected to record surpluses. This is in line with export performance that continues to improve primarily that come from natural resource-based commodities, such as coal and copper. On the other hand, imports also increased, in line with the rising of domestic demand and exports. In terms of balance sheet of capital and financial (neraca transaksi modal dan finansial/TMF), the first quarter in 2010 was also expected to record a surplus associated with capital inflows and the issuance of government's foreign denominated bond. The Indonesia risk indicators also improved, as reflected in indicators of credit default swaps (CDS) which was at that time placed at the lowest level, the decline in yield spreads of Indonesia Government Bond U.S. Treasury Note, as well as the improved rating of Indonesia. With these developments, the national reserves at the end of March 2010 was estimated to reach 71.8 billion dollars, equivalent to 5.8 months of imports and foreign debt repayments by the Government.

In line with the performance of BOP, rupiah exchange rate tended to strengthen. Overall, during the first quarter 2010, rupiah rose by an average of 2.2% to the level of Rp9.254/USD. At the end of first quarter 2010, the rupiah reached the level of Rp9.090/USD or gained 3.7% (point to point). The strengthening of the rupiah was supported by a conducive macroeconomic fundamental, reflected on the BOP performance that was quite good and the improved

perceptions of risk. In addition, the strengthening of the rupiah was also supported by the attractive yield of rupiah, reflected in the uncovered interest parity (UIP), covered interest parity (CIP) and the yield spread Indonesian Government Bond which was relatively high, the highest compared with other regional countries. The strengthening of rupiah was also followed by the volatility of relatively stable rupiah exchange rate that reached 0.57% compared to the fourth quarter 2009 that reached 0.56%.

Improved financial sector performance was aligned with global and domestic economic recovery. The Jakarta Stock Exchange Index (IHSG) during the first quarter 2010 experienced a significant strengthening, reaching 10.2%. The performance index was the highest in the region. Some of the factors driving this increase of IHSG included the improving Indonesia's economic prospects, followed by a decline in risk perception, improved credit rating, and high yields on rupiah. It was also reflected in other financial indicators such as the declining yield on government securities (SUN). On the interbank money market, excess liquidity is still large enough to push the PUAB O/N interest rate close to the lower limit of the BI Rate. The step taken by Bank Indonesia to extend the term of the SBI can be viewed among others, in the context of financial deepening runs very well reflected in the declining of the highest and the lowest interest rate spread PUAB O/N market. In addition, the current portion of SBI with a tenor of 3 months has increased to 67.04% from 24.64% at the end of the previous quarter. Along with lowered risk perception of banking, the deposit and credit rates were still decreasing although not as big as expected. In the future, monetary policy transmission was expected to further improve with the increased optimism of banking on the economic conditions

As for the micro-banking, national banking conditions remained stable. This could be indicated from the maintained capital adequacy ratio (CAR) in February amounted to 19.3%. Meanwhile, the ratio of gross non-performing loans (NPLs) ratio remained at 4% with net NPL ratio of 1%. In addition, bank liquidity, including liquidity in the interbank money market was getting better. Similarly, third-party funds (TPF) have shown improvement.

Global and domestic economic developments that improved during the first quarter of 2010 are expected to continue ahead. This supports Bank Indonesia's belief that Indonesia's economic will have better prospect than expected. Economic growth in 2010 was estimated at 5.5% -6.0%, higher than original estimates of 5.0% -5.5%. The economic recovery was sustained not only by consumption which remained strong, but also by the increased exports in line with the global economic recovery. Increasing demand coupled by the improved investment climate was expected to encourage the increase of investment significantly. The economic recovery was expected to continue in 2011 with economic growth to reach 6.0% -6.5%. Increased demand which could be adequately responded by the supply side, was expected to

keep inflation pressures at a low level. The medium and long term economic prospects of year 2010-2014 were presented in the Indonesian Economy Report 2009 which can be accessed through the website of Bank Indonesia.

It was considered that the BI Rate at 6.5% rate is still consistent with the inflation target for 2010 at $5\% \pm 1\%$ and the current direction of monetary policy were also considered conducive for the ongoing process of economic recovery and banking intermediation. The meeting of the Board of Governors of Bank Indonesia on 6 April 2010 decided to maintain the BI Rate at 6.5% with interest rate corridor of $\pm 50\text{bps}$ in the vicinity of the BI Rate.

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THE IMPACT OF FISCAL POLICY TOWARD ECONOMIC PERFORMANCE AND POVERTY RATE IN INDONESIA

***Indra Maipita
Mohd. Dan Jantan
Nor Azam Abdul Razak¹***

Abstract

The government is continuously formulating some policies in order to boost economic growth and downsize poverty rate. However, the government is facing some obstacles such as an increasingly in budget deficit which is potentially impacting to the determining of priority scale as well as the pro and contra within it. Based on that consideration, economic policy is needed to be revised and redesigned in order to meet the need of pro growth, pro job, and pro poor. Generally, this research aims to examine the impact of an expansion and contraction of fiscal policy measures on Indonesia economic performance. For the purpose of this study, the change of macro economic indicators, economic sector performance, and the change of poverty and income distribution are examined using the Computable General Equilibrium (CGE) model. In order to evaluate the disparity of income distribution, beta distribution function is used which is adopted from Decaluwe, et al. (1999). This study employs Foster, Greer, and Thorbecke (F-G-T) and Cockburn (2001) methods to evaluate poverty (poverty incidence) on each household group. The results of this study show that the impact of an increase in subsidy is more favourable than two others fiscal policy measures. Even though the policy of transfer income gives a positive impact for the upsizing of rural household income and the downsizing in poverty, but on the other hand it has negative impact on others household income which aggregately has a negative impact on the decreasing of GDP.

JEL Classification: I32, E62.

Keywords: fiscal policy, poverty, income distribution

¹ Indra Maipita is a lecturer at State University of Medan (imaipita@gmail.com); Mohd. Dan Jantan is a lecture at Universiti Utara Malaysia (djantan@uum.edu.my); Azam Abdul Razak is a lecturere at Universiti Utara malaysia (azam@uum.edu.my).

I. INTRODUCTION

Poverty alleviation has been the objective of fundamental development that becomes an indicator to assess the effectiveness of various development programs. Based on that view, the government has been establishing some poverty alleviation programs since 1960's by using the strategy of fulfilling people's basic need as stated in the Eight-year National Development Plan (Pembangunan Nasional Berencana Delapan Tahun, Penasbede). Unfortunately, this program halted due to a political crisis in 1965. However in 1970's, the government had been re-established poverty alleviation program through the Five-year National Development Plan (Repelita). During the Repelita V-VI, the government implemented poverty alleviation program using a distinctive strategy which was eradicating socio-economic disparity problems. For the last 40 years the government observed that there were some obstacles in implementation of various poverty alleviation programs. Consequently, the government's efforts in tackling poverty have not been achieved.

Poverty remains the biggest problem within the scope of economic development in Indonesia. The Central Bureau of Statistic (BPS) reported that there were 35 million (15.47 percent) poor people in 2008. Eventhough, this number was 6% less than those in 2007, but the 2008 figure was almost equal to those in 1990 and 2005. Poverty rate in 2009 has decreased by 1.32 percent compared to those in 2008. The disparity in income distribution, welfare, and poverty once again attracts the attention of many parties, such as development planner, social researcher, politician, and citizen at large. These problems show that economic growth is not automatically parallel with the expansion of employment and the reduction of poverty rate. Thus, economic policy should be re-designed towards more *pro growth*, *pro job*, dan *pro poor*.

The government has designed some policies to promote economic growth and at the same time to eradicate poverty. However, budget deficit is the main obstacle faced by the government. And, this budget deficit keeps increasing over the years. If this condition persist, then there will be a big pressure on national budget (APBN), especially on expenditure side. The changing position of Indonesia from net oil exporter to net oil importer resulted in deficit in Indonesia's trade balance. A huge subsidy on refined fuel oil in national budget and the same time an increasing in the price of crude palm oil (CPO) have in part contributing to the burden of government in national budget. In order to reduce the budget deficit, the government has opted to undertake a fiscal policy contraction by reducing subsidy on fuel (BBM). This policy absolutely has a negative impact on poor households. Since this impact is anticipated, then at the same time the government implemented income transfer in the form of cash grant to poor households (*unconditional transfer*).

The general objective of this study is to assess the impact of various government fiscal policy measures on income distribution and poverty rate in Indonesia. Specifically, this research is aimed to analyze the impact of: (1) an expansion and contraction of fiscal on Indonesia macro-economic performance, (2) an increase in tax on sectoral economic performance, (3) an increase in tax on income and poverty in Indonesia, (4) an increase in subsidy on sectoral economic performance, (5) an increase in subsidy on income and poverty in Indonesia, (6) a transfer of income on sectoral economic performance, (7) a transfer of income on income and poverty in Indonesia, and (8) an expansion and contraction of fiscal on income distribution and poverty in Indonesia.

II. THEORY

II.1. Fiscal Policy

Fiscal policy consists of two main instruments, (1) tax policy and (2) government expenditure (Mankiw, 2003; Turnovsky, 1981), however, any policy directly affect the aggregate demand components fall in this fiscal policy. According to Sudiyono (1985) the variable instruments of fiscal policy could be in the form of tax, government transfer, subsidies, and government expenditure. Fiscal policy or budgetary has three functions: (1) allocation function, (2) distribution function, and (3) stabilization function. Allocation function is related to the provision of social good and the total utilization process of resources for the production of private goods, social goods, and the combination of selected social goods. Distribution function is related to the equity of wealth and income distribution within a society. While stabilization function is aimed to stabilize or maintain low unemployment rate, price or inflation rate, and targeted economic growth.

II.2. The Effect of Keynesian's Fiscal Policy

Keynes postulates that during an economic turmoil, monetary policy such as a decreasing interest rate is ineffective. The aggregate demand could be increased rapidly by only fiscal policy measure (Romer, 2001). In the Keynes Macroeconomic model, government budget is the pivotal part in order to control the aggregate demand. If the economic is below full employment level, aggregate demand could be increased by increasing government expenditure and / or by decreasing the tax rate. According to Keynes, the government has a very important role to promote aggregate demand towards achieving full employment level.

The core problems in most developing economies are high unemployment and inflation rates, and deficit current account or external imbalance. To overcome these problems, a high

economic growth is required, but the expansionary policy to increase the growth rate has a drawback in terms of unbalance between high growth in demand and the existing supply capacity in the economy. This would impact the external balance which is an increase in imports and a decrease in exports, as well as an excess demand that would cause a high inflation. As a result of these situations, an economy might lose its competitiveness which eventually worsens the external imbalance. Even though it is achievable to increase employment level but it creates the problems of worsening current account and balance of payment (BOP).

The conflict between external and internal balance obliged an effective fiscal policy with minor negative impact. Historically, developing countries relied on fiscal expansionary policy in order to attain economic growth. The Fleming-Mundell Model of the standard IS-LM model employing Keynesians approach could explain that historical phenomenon. The assumptions used in the Mundell-Fleming (MF) Model of Balance of Payment (BOP) are: (1) nominal wage and fixed price, (2) aggregate demand is positively related to government expenditure (G) and foreign output (Y_f), and exchange rate (e) is negatively related to domestic interest rate (r_d), (3) money demand is a negative function of world interest rate (r*) and a positive function of domestic income rate, (4) money supply is negatively influenced by deviation between exchange rate (e) and targeted exchange rate (e*), (5) trade value is determined by domestic output rate (Y_d) and foreign output rate (Y_f), and (6) capital account is determined by the difference between foreign and domestic interest rates (Husain and Chowdhury, 2001).

The degree of capital mobility is determined by the sensitivity of interest rate differences between r and r^* , which has a pivotal role in MF model.

$$Y = C(Y-T) + I(r^*) + G(D) + NX(e) \quad (II.1)$$

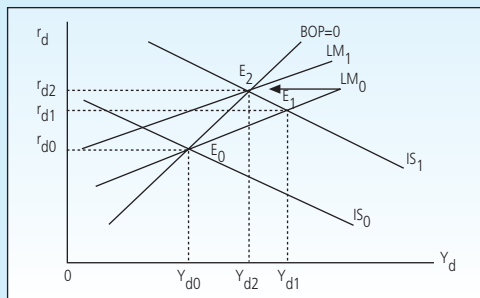
$$M/P = f(r^*, Y) \quad (II.2)$$

$$BOP = f(Y_f, Y, ER, r, r^*) \quad (II.3)$$

Equation (II.3) shows that $BOP = 0$ for various combinations of domestic income (Y) and their corresponding domestic interest rates (r). Government expenditure (G), exchange rate (e) and foreign income (Y_f) are positive variable shifters. The slope of the BOP curve shows the degree of capital mobility. If BOP curve is vertical, then there is no capital mobility. Perfect capital mobility is shown by a horizontal BOP curve. A horizontal BOP curve implies that there is no difference between foreign and domestic interest rates and as such there is no incentive for capital flows. The effectiveness of fiscal policy on MF model in an open economy depends on the degree of capital mobility and the exchange rate. Most East Asia countries including Indonesia, are open economies, however, there is only little foreign investment inflow. This implies that the slope of BOP curve is relatively steep or probably almost vertical, which apparently

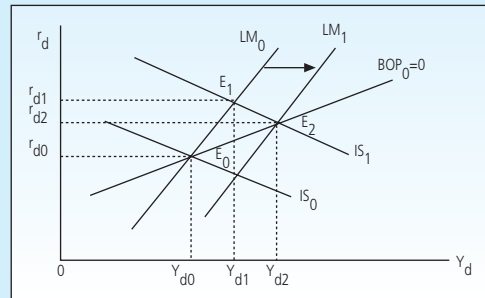
shows that there is a limited capital mobility. On these countries, the interest rate merely has no significant role on money demand, and depicted by a very steep LM curve.

Using MF model for a fixed exchange rate regime results in a more limited capital mobility and the slope of the LM curve either relatively more steeper or less flatter than those of BOP curve. Expansionary fiscal policy would shift IS curve to the IS_1 (Romer, 2001; Sukirno, 2005). When BOP is steeper than LM curves, as shown in Figure II.1.(a), the new internal equilibrium (E_1) causes deficit in BOP, since it lies below the BOP curve. If the Central Bank contractionally intervenes the money market in order to neutralize the domestic currency depreciation, the LM curve shifts to the left and this will decrease the effectiveness of fiscal expansionary policy. On another case where the BOP curve is flatter than the LM curve, as depicted in Figure II.1.(b), the new internal balance (point E_1) shows a surplus in BOP since it lies above the BOP curve. In general, to reduce this surplus pressure and to maintain the fixed exchange rate due to the domestic currency appreciation pressure, the central bank wants to reduce the domestic-foreign interest rate differential by monetary expansion hence the money supply increases. When the LM curve shifts to the right and if the inflow of capital is not sterilized, then the effectiveness of fiscal policy would be enlarged. Therefore, under fixed exchange rate regime, the effectiveness of fiscal policy would be enlarged by the increasing of capital mobility.



Source: Romer (2001), Sukirno (2005)

(a)



Source: Romer (2001), Sukirno (2005)

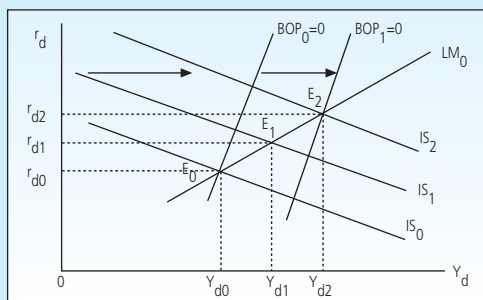
(b)

Figure II.1: The effectiveness of fiscal policy under fixed exchange regime and limited capital mobility

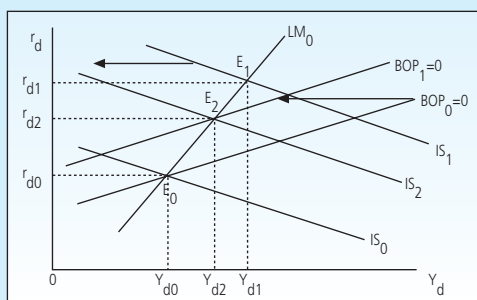
Figure II.2 shows the BOP curve under flexible exchange rate regime (Romer, 2001; Sukirno, 2005). If the BOP curve is steeper than the LM curve, as shown in Figure II.2.(a), fiscal expansionary policy would cause deficit in the BOP and real exchange rate is depressed. As such the competitiveness and export would increase, the IS curve will further shift to the right

and so will the BOP curve. The new equilibrium is E_2 where the effectiveness of fiscal policy would be relatively larger than the case of fixed exchange rate regime.

If the BOP curve is flatter than the LM curve, as depicted by Figure II.2.(b), expansionary fiscal policy would create a surplus in the BOP. This surplus causes appreciation in real exchange rate, reduce competitiveness and thus decrease in exports. The last equilibrium, either IS curve or BOP curve shifts to the left until the new external and internal balances are achieved at point E_2 . This concludes that under flexible exchange rate regime, the more sensitive of capital mobility on interest rate, the less effective the fiscal policy will be .



Source: Romer (2001), Sukirno (2005)



Source: Romer (2001), Sukirno (2005)

Figure II.2: The effectiveness of fiscal policy under flexibel exchange and limited capital mobility

II.3. Government Revenue

Sources of government revenue are tax, non-tax, and endowment. Tax covers central tax, which is collected by central government, and local tax which is collected by local government. Types of central tax are: (1) income tax (PPh), (2) value added tax on goods and services (PPn), (3) tax on the sales of luxurious goods (PPnBM), (4) quit rent and assesment (PBB), (5) real estate tax (BPHTB), (6) stamp duty, (7) excise tax, (8) export tax, and (9) entry tax (Hutahaean, et al, 2002).

Income tax (PPh) and value added tax (PPn) have a relatively a fast transmission effect on the change in saving behavior, investment, and firm expansion (James and Nobes, 1992). According to James and Nobes (1992), the behavior of households and firms in Indonesia is sensitive to a change in PPh and PPn. Consequently, government intervention to influence

sectoral performance would be effective using the instruments of PPh dan PPn (Darsono, 2008). The combination analysis of income tax (PPh) and value added tax (PPn) are found in Atkinson and Stiglitz (1976), Mirrlees (1976), and Myles (1997). In this model, it is assumed that there are n goods provided by the producer as good 1 and wage rate, w . Rule of normalization says that tax is linear toward n goods. By this rule, a limited budget (qx) faced by a consumer that has an ability to pay tax, s , and tax level T is:

$$\sum_{i=2}^n q_i x_i = swx_1 - T(sw x_1) \tag{II.4}$$

In order to simplify derivation, production technology is assume to be linear so that production possibility is bounded by the following relationship:

$$\sum_{i=2}^n \int_0^\infty x_i(s) \gamma(s) ds \leq \int_0^\infty swx_1(s) \gamma(s) ds - z^G \tag{II.5}$$

where, z^G is the imposition of government on tax. The linearity of technology enable us to derive producer's price for each good 2, . . . , n becomes 1. The optimal tax could be attained by positioning $U(s)$ as a real variable and $x_i(s)$, $i = 1, \dots, n-1$ as control variables. The $x_n(s)$ is determined by the identity of $U(s) = U(x_1(s), \dots, x_n(s))$. The requirement of first order for self

selection is derived by using the fact $u_s = -\frac{U_1^2}{s^2} = \frac{U_1 l}{s}$ or in the notational form as .

$$u_s = -\frac{U_{x_i} x_1}{s}$$

The Hamiltonian first order condition for maximization can be written as equation

$$H = \left[U + \lambda \left[swx_1 - \sum_{i=2}^n x_i \right] \right] \gamma(s) - \mu \frac{x_i U_{x_i}}{s} \tag{II.6}$$

In order to choose $x_k(s)$, $k = 2, \dots, n-1$, the fact that being used is:

$$\frac{\partial x_n}{\partial x_k} = -\frac{U_{x_k}}{U_{x_n}} \tag{II.7}$$

The necessary condition for optimality is:

$$-\lambda \left[1 - \frac{U_{x_k}}{U_{x_n}} \right] \gamma - \frac{\mu x_1}{s} \left[U_{x_1 x_k} - U_{x_1 x_n} \frac{U_{x_k}}{U_{x_n}} \right] = 0, k = 2, \dots, n \tag{II.8}$$

From the above necessary condition, households maximize their utility as follows:

$$\frac{U_{x_k}}{U_{x_n}} = \frac{1+t_k}{1} \quad (II.9)$$

Substitute equation (II.9) into equation (II.8) and rearrange terms to get an optimal tax (t_k) that can be written as follow:

$$t_k = \frac{\mu x_1 U_{x_k}}{\lambda \gamma s} \left[\frac{d \log \left[\frac{U_{x_k}}{U_{x_n}} \right]}{dx_1} \right], k = 2, \dots, n-1 \quad (II.10)$$

II.4. Government expenditure

The connection between government consumption and its budget can be seen by looking at the public sector's financial balance as follows

$$(T - Cg - Ig) = Bgp + \Delta H + Bgf \quad (II.11)$$

where T is tax revenue, Cg is government consumption, Ig is government investment, Bgp is government borrowing from private sector, ΔH is change in the stock of high-powered money, and Bgf is government borrowing from foreigners. The left-hand side of equation (II.12) shows the fiscal deficit while on the right-hand side shows the sources of fund. If the government desires to increase its expenditure, then the financing could be done by raising tax revenue without effecting fiscal deficit. The level of government consumption is determined by its revenue and outside financing for the budget deficit. In order to overcome a budget deficit, the government could initiate the followings: (a) borrow from private sector, (b) money creation (c), borrow from abroad, (d) the reduction of devisa's saving, (e) privatisation, and (f) arrears accumulation.

Alternatively, to view fiscal position of the government is by looking at the economy's saving-investment balance. Mathematically, it is presented in equation (II.12).

$$(T - Cg - Ig) = (Sp - Ip) + (M - X) \quad (II.12)$$

where T is tax revenue, Cg is government consumption, Ig is government investment, Sp is private saving, Ip is private investment, M is import, X is export, and $(M - X)$ is the external current account deficit. Equation (II.12) shows that the fiscal deficit is equal to the total saving-investment gap from private sector and external current account deficit. Combining (II.11) and (II.12) to get the following equations:

$$Sp - Ip = Bgp + \Delta H - Bpf \quad (II.13)$$

$$M - X = Bgf + Bpf \quad (II.14)$$

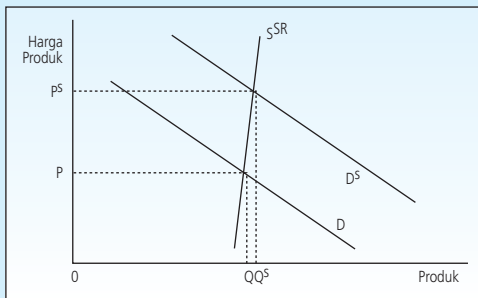
where Bpf is borrowing from foreign and private sector.

Equation (II.13) states that the surplus of private sector saving is equal to government borrowing plus its own money minus its foreign debt. Equation (II.14) states that external current account deficit is financed by government's foreign debt and private's foreign debt. The source of foreign debt is foreign saving. Substituting (II.13) and (II.14) into equation (II.12) to get equation (II.11).

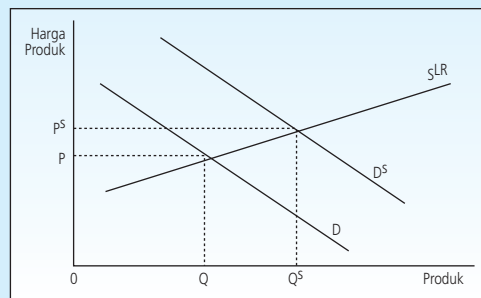
II.5. Subsidy and Direct Cash Aid

Subsidy is a payment by the government to firm or household in order to attain certain goals which eventually enables them to produce or consume a product in a bigger quantity or at a cheaper price. The goal of a subsidy is to decrease the price of a good or to increase the quantity of output (Spencer & Amos, 1993). According to Suparmoko (2003), subsidy or transfer of payment is a sort of government expenditure which is also known as a negative tax and eventually would increase the income of the subsidy recipient or the consumer realizes an increase in real income if they consume a subsidised good. There are two types of government subsidies - transfer of cash and in kind subsidy. Cash transfer is given to the consumer as an additional income or if it is given to producers it is expected that a lower product price. In kind subsidy is a subsidy in which a recipient received a quantity of a good without paying it (Handoko dan Patriadi, 2005). Subsidy is a form of government expenditure to help the people for their basic needs at an affordable price. Also, a subsidy is given to help the producer to produce enough quantity of a basic need type of good at an affordable price to the society. The subsidy is aimed to stabilize the economy, especially price stability. Subsidy is expected to keep the existing raw materials in a ready stock and to ensure its price is affordable (Nota Keuangan & APBN, 2010). In many developing countries, subsidy is very important to enhance productivity and welfare (Norton, 2004). Subsidy is an efficient way of transfer of payment from the government to the people as a way of welfare redistribution. Welfare redistribution is the bottomline of a subsidy.

The effect of a government subsidy, especially for agricultural products, is shown in Figure II.3. An agricultural product supply curve in a short run (SR) is assumed to be inelastic as shown in Figure II.3(a). If the government pays subsidy for agricultural production, then the impact would be an increase in the product demand, i.e. the demand curve shifts to the right and



Source : Stiglitz (2000)



Source : Stiglitz (2000)

**Figure II.3:
The Effect of Subsidy on Agricultural Production**

above. An increase in demand leads to an increase in price but the farmers are unable to increase their production. However, in the long run (LR), subsidy on agricultural production leads to an increase in quantity supplied because in the LR, supply curve is more elastic as shown in panel (b), Figure II.3.

The effect of subsidy on consumption and production can be analyzed by looking at the demand curve as well as the supply curve. Subsidy shifts demand curve to the right and above as well as a shift to the right and below for a supply curve of a subsidised good. The result of both of these subsidies is a bigger new equilibrium quantity of goods. The influence of these two subsidies in demand and supply are shown Figure II.4. In Figure II.4(a) subsidy on consumption shifts demand curve D to D' . While in Figure II.4 (b), subsidy on production shifts supply curve S to S' .

The elasticity effect on supply and demand curves are displayed in Figure II.5. If the demand curve is perfectly inelastic, as shown in Figure II.5 (a), subsidy shifts supply curve from S to the S' . The equilibrium quantity remains the same but price will decrease. If the demand is perfectly elastic, as shown in panel (b), Figure II.5, the effect of subsidy is an increase in equilibrium quantity at the same price. If the supply curve is perfectly elastic, subsidy increases the equilibrium quantity, as shown in panel (c).

The government policy on subsidy is usually related to the goods and services that have a positive externality. While negative effect from subsidy is creating ineffective allocation because the consumer lavishly consumed a subsidized good. Also, since price is lower than opportunity

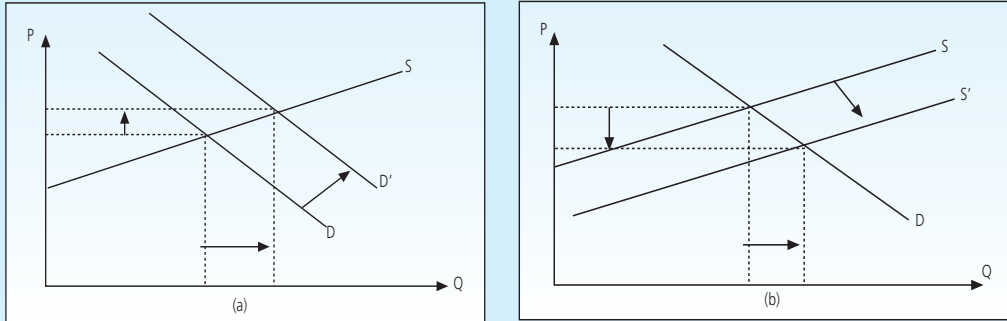


Figure II.4:
The Effect of Subsidy on Demand and Supply

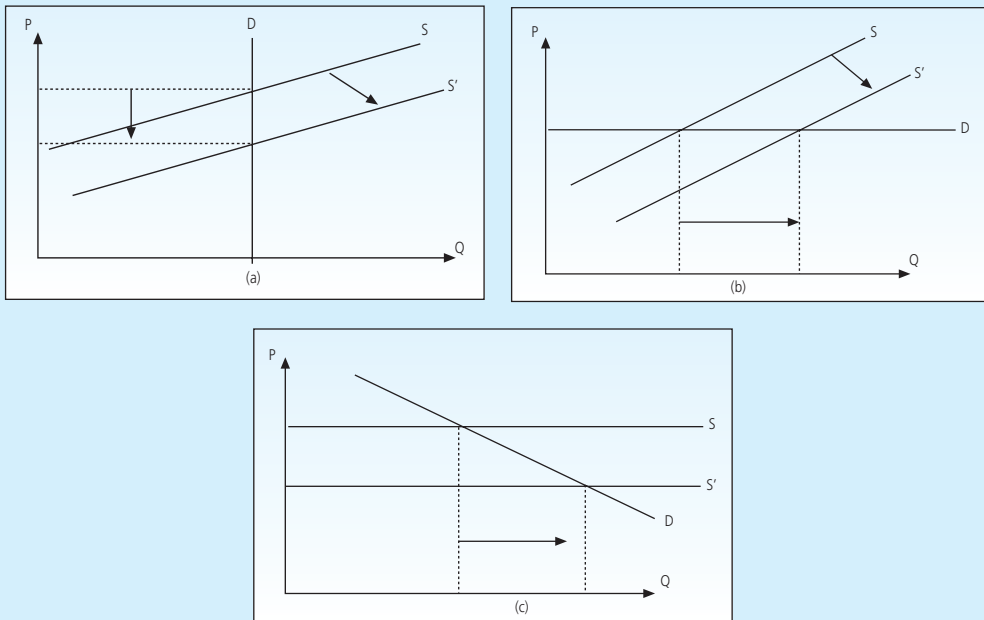


Figure II.5:
The Effect of Subsidy in a Perfectly and Imperfectly Elastic

cost, there is a possibility for producer to be inefficient in using resources to produce subsidized goods (Spencer & Amos, 1993). Subsidy which is not transparent and not well targeted possibly cause price distortion, inefficiency, and enjoyed by non-deserve people (Basri, 2002).

II.6. The effect of government expenditure

The impact of an increase in government expenditure on output advancement relied on multiplier effect of that policy that could be explained using the IS-LM approach. The IS curve shows the balance in goods market, while the LM curve shows the balance in the money market. Systematically, these two balances could be written in equations (II.15) and (II.16), respectively.

$$y = c(y - t_{(y)}) + i_{(r)} + g \quad (\text{II.15})$$

$$\frac{M}{P_0} = l_{(r)} + k_{(y)} \quad (\text{II.16})$$

Consumption function and tax have a positive slope but smaller than one ($0 < c', t' < 1$). Investment slope, money demand and money demand transaction are $i' < 0$, $l' < 0$, and ($k' > 0$ symbol ' shows a certain value). Equations (II.15) and (II.16) are derived by assuming $\frac{M}{P}$ is constant, then we get equations (II.17) and (II.18).

$$\begin{aligned} dy &= c(dy - t' dy) + i' dr + dg \\ dy &= c(1 - t')dy + i' dr + dg \end{aligned} \quad (\text{II.17})$$

$$0 = l' dr + k' dy$$

$$dr = -\frac{k'}{l'} dy \quad (\text{II.18})$$

Substituting (II.18) into (II.17) to get equation (II.19).

$$dy = \frac{1}{1 - c'(1 - t') + \frac{i'k'}{l'}} dg \quad (\text{II.19})$$

Since $c'(1 - t') < 1$ and $\frac{i'k'}{l'}$ has a positive value, then this multiplier would be positive.

The slope of LM curve is $-\frac{i'k'}{l'}$ shows a decrease in investment triggered by an increasing in r when y and r increase along LM curve. If LM curve is horizontal, i.e zero sloped, then the multiplier would be:

$$dy = \frac{1}{1 - c'(1 - t')} dg = \frac{1}{1 - MPC} dg \quad (\text{II.20})$$

The implication of equation (II.20) is that eventhough the government spending is at a low level, it has an impact on output. In other words, the change in output is relatively bigger

if LM curve is relatively flat, i.e. when the slope of the LM curve approaches zero.

BPS uses the concept of basic needs approach in measuring poverty in Indonesia. This approach views poverty as the incapability of the economy to fulfill the food and non-food basic need, that is measured using household expenditure. Using this approach, three measures of poverty, i.e. Headcount Index that is those people who are living under poverty line, poverty depth index (P1) and poverty severity index (P2) are able to be computed.

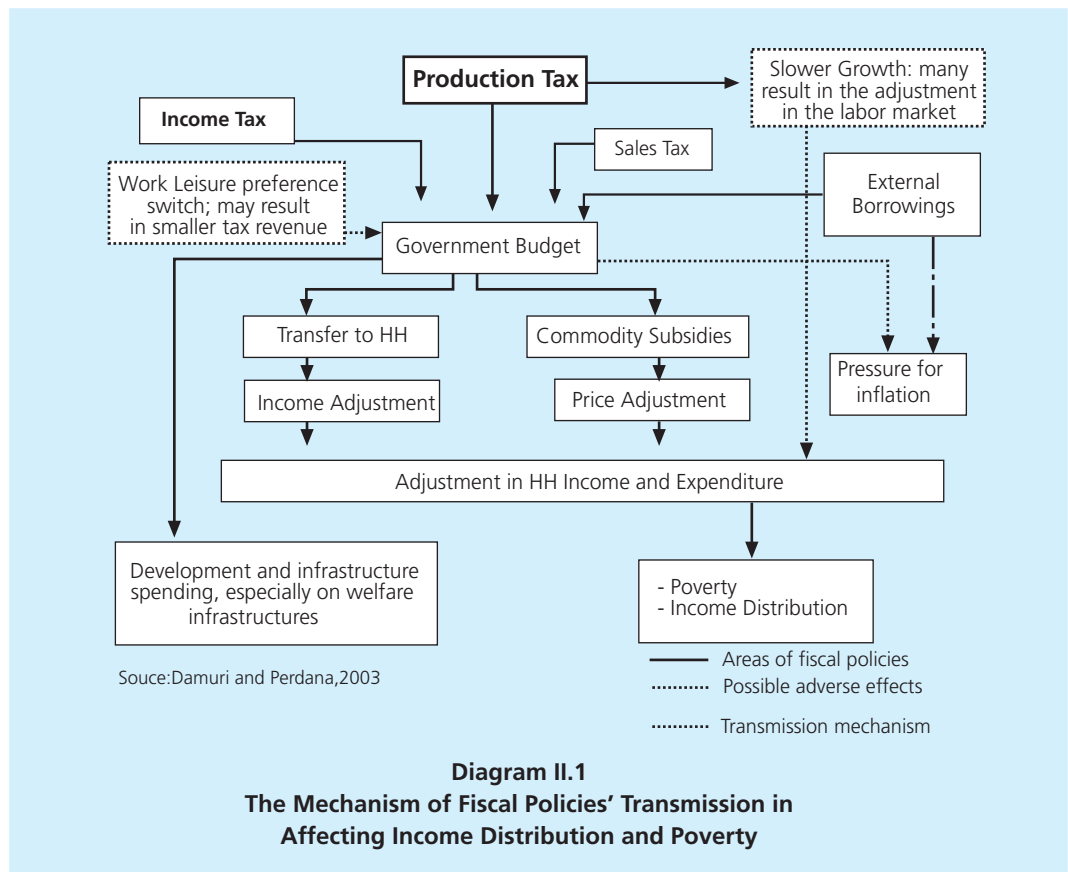
The method used is computing poverty line, consist of two components, they are food poverty line (GKM) and non-food poverty line. The measurement of poverty line are computed separately for urban and rural areas for each province. Poor people are those monthly per capita income is below the poverty line.

The food poverty line is the expenditure value of minimum need for food which is equivalent with 2100 kilocalories percapita per day. The basket of commodities of the basic need consists of 52 items, among others are rice, fish, meat, eggs, milk, vegetables, beans, fruits and oil.

III. METHODOLOGY

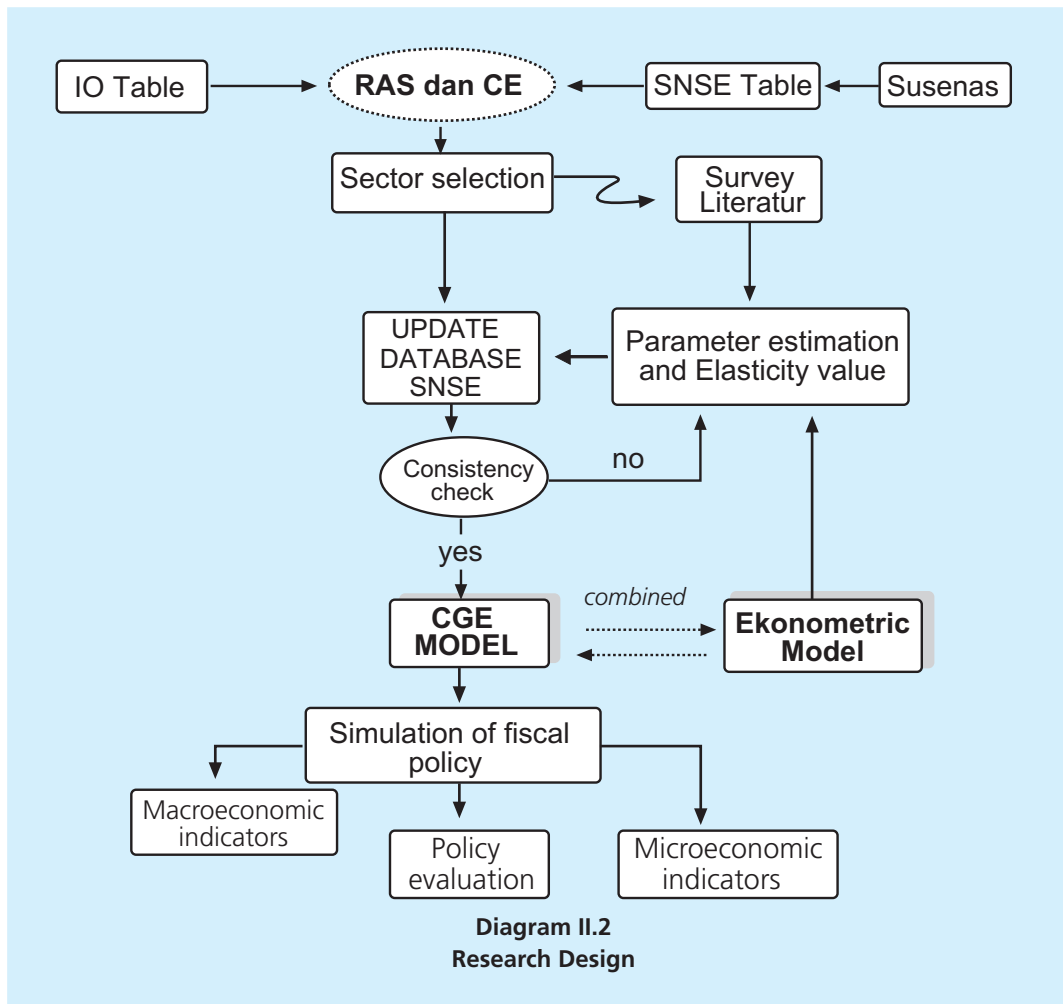
This study employs a Computable General Equilibrium (CGE) model, which was formulated by the International Food Policy Research Institute (IFPRI). This model refers to the standard of CGE model developed by Lofgren, et al. (2002), Decaluwe Decaluwé, et al. (1998; 1999), and Cockburn (2001). For the purpose of this study, the first step is identifying the assumption, structure, basic data, production function, closure and endogenous and exogenous variables. The next step is identifying the sectors that utilize basic data from Input-Output (IO) Table, Socio-Economic Balance Sheet System and the National Socio-Economic Survey. The mechanism of the fiscal policies' transmission which is the basis for this research can be summarized in Diagram II.1.

This study focuses on fiscal policy as follows: (1) non-direct tax, (2) government subsidy for electricity, gas and water; transportation and communication; and manufacturing sectors, and (3) direct transfer of payment to households. For the purpose of this study, we follow BPS classification of households, namely (i) rural agricultural labor, (ii) rural agricultural entrepreneur, (iii) rural low-income non-agricultural labor, (iv) rural non-labor force and undefined group, (v) rural high-income non-agricultural labor, (vi) urban low-income non-agricultural labor force, (vii) urban non-labor and undefined group, and (viii) urban high-income non-agricultural labor.



Identification of the structure of the production function is crucial for this study. The structure and the behavior of various production process can be formed of Leontief function, *constant elasticity of transformation (CET)*, and *constant elasticity of substitution (CES)*. Elasticities and other parameters of respective functions could be estimated outside the model or quoted directly from various previous studies. The next step is updating basic data from year 2003 to year 2005 using *Cross-Entropy* method. The data obtained, either from the estimation or the results of the past studies are validated or tested for its consistency, hence considered to be relevant.

Once the data and the model are in order, then the fiscal simulation will be carried out. The simulation conducted in this study is for a fiscal adjustment, such as taxes, subsidies, and transfer of payments to households. The outcomes of these simulations will then be evaluated, in terms of macro and micro terms. The macro conditions are the changes in gross domestic product, inflation rate, trade balance, and unemployment rate, while the micro side views through changes in income distribution and poverty in Indonesia. Diagram II.2 presents the concept of the research design.



III.1. Poverty Measurement and Income Distribution

To analyze poverty based on household groups, it is suggested that an income distribution formula based on the characteristic of household groups is used. This distribution relies on maximum and minimum income and on the skewness in income distribution. In order to bring this characteristic to the income distribution, beta distribution function is used as suggested by Decaluwé, et. al (1999), as follows:

$$I(y; p, q) = \frac{1}{B(p, q)} \frac{(y - mn)^{p-1} (mx - y)^{q-1}}{(mx - mn)^{p+q-1}} \tag{II.21}$$

Where

$$B(p, q) = \int_{mn}^{mx} \frac{(y - mn)^{p-1} (mx - y)^{q-1}}{(mx - mn)^{p+q-1}} dy \quad (II.22)$$

Parameter mx and mn are maximum and minimum income within a group. Parameters p and q would influence the form and the distribution skewness. This distribution based on certain distribution beta parameter which is estimated from various statistical parameters. The relation between parameter p and q in beta distribution function and various statistical parameters could be explained by using the following formula:

$$p = \bar{x} \left(\frac{\bar{x}(1 - \bar{x})}{s^2} - 1 \right) \quad \text{and} \quad q = (1 - \bar{x}) \left(\frac{\bar{x}(1 - \bar{x})}{s^2} - 1 \right)$$

where \bar{x} is the mean sample and s^2 is the variance sample which are derived by the following:

$$\text{mean sample: } \bar{x} = \frac{\sum_{i=1}^n x_i}{n} ; \quad \text{variance sample } s^2 = \frac{1}{n} \sum_{i=1}^n (x_i - \bar{x})^2$$

If $p > q$, then the distribution skewed to the left and this situation lead to larger disparity between p and q . The same applies when $q > p$, then the distribution skewed to the right that shows disparity increasing. If $p = q$, then the function is symmetric. These three conditions are true if the value taken by p and q is bigger than one. The distribution function as shown in equation (II.21) is used to evaluate poverty incidence in each group of household in the general equilibrium economy model. If the average of income is ψ , then income in each household in the group increases by ψ . By this rule, income distribution proportionally would change horizontally following the change in income.

The above procedure allows us to compare poverty rate created in the post- and pre-simulation using the measurement developed by Foster, Greer and Thorbecke (F-G-T), Pa. The measurement of Pa is expressed in Beta distribution. The F-G-T formula is:

$$P_\alpha = \int_{mn}^z \left(\frac{z - y}{z} \right)^\alpha I(y; p, q) dy \quad (II.23)$$

where α is poverty-aversion parameter, z is poverty line, and mn is minimum income intra-group while p and q are the parameter from beta function as defined before.

Poverty line measure as shown in the equation of monetary poverty line (II.24) is determined endogenously in the CGE model. It is postulated that the poverty line as determined by the basket of commodities shows the consumption of the basic needs. This is consistent with

Ravallion (1994) method in estimating absolute poverty, γ_{ch}^m . That is:

$$\text{Monetary Poverty Line: } \sum_{c \in C} PQ_c \cdot \gamma_{ch}^m \quad (II.24)$$

Since the price of commodity is determined endogenously in the model, then the nominal value of this basket is the poverty line. If the increasing in the price of a commodity follows certain external shock, then the poverty line, z , would increase (shifted to the right) and so would the poverty, ceteris paribus. The demand system determined in this model is based on a linear expenditure system (LES), that is:

$$PQ_c \cdot QH_{ch} = PQ_c \cdot \gamma_{ch}^m + \beta_{ch}^m \cdot \left(EH_h - \sum_{c \in C} PQ_c \cdot \gamma_{ch}^m \right) \quad (II.25)$$

where QH_{ch} is the quantity of commodity consumption c marketed by household h , and γ_{ch}^m is subsistence consumption commodity c marketed by household h , and β_{ch}^m is marginal share from consumption expenditure c marketed by households h .

III.2. Production Activity and Factor Market

In this model, each producer is assumed to maximize their profits. Profit is defined as the difference between total revenue and total costs of using factor of production and intermediate inputs, for a given level of technology. Production functions can be in any form such as Leontief, CES, Cobb-Douglas, and Translog, depends on its underlying theoretical and empirical assessment. The constant elasticity of substitution (CES) function is a function that is favored by certain sectors. Value added is determined by CES function from primary factors to allow the substitution between one factor say labor to capital and vice versa. On upper nesting form, the composite intermediate input is combined from each input in Leontief function, implies no substitution among intermediate input.

III.3. Institution

In the CGE model, institutions consist of households, firm, government and the rest of the world (RoW). Households receive income from the factor of production and transfer from other institutions. Transfer from RoW to the households is in foreign currency and treated exogenously hence fixed. In this model, direct tax and transfer to other domestic institutions defined as fixed share from household income, except for flexible share savings for chosen

households. Households consumption includes marketed commodity, purchased at the market price including commodity tax and transaction cost. Households consumption is allocated across different commodities according to demand function of Linear Expenditure System (LES), derived from the maximization of Stone Geary utility function (Dervis et. al. 1982, pp. 482-485).

The government collects tax and receives transfer from other institutions. In the version of basic model, all tax settled at fixed ad-valorem. The government uses this income to purchase commodity for its consumption and for transfer to other institutions. Government expenditure is fixed in terms of real quantity except government transfer to domestic institutions which is indexed to the consumer price index (CPI). The government saving is flexible and residually determined.

The last institution is RoW. Payment transfer between RoW with other domestic institutions and all factors are fixed in foreign currency. Foreign saving is the difference between expenditure and income in foreign currency.

III.4. Commodity Market

The CES function in the survey model is used as an aggregate function. The output demand from respective activities derived from cost minimization problem subject to certain offered quantity of output.. The next step, domestic aggregate output allocated between export and domestic selling with the assumption that the producer maximize selling under assumption of imperfect transformability between export and domestic selling. This is expressed by Constant Elasticity of Transformation function (CET). In the international market, export demand is infinitely elastic for certain world price. The total of market demand is the sum of domestically produced output and direct import.

The demand of import commodity is attained from international producer which is infinitely elastic on world price. Import price paid by the domestic consumer includes import tariff (at fixed ad-valorem rates) and certain transaction costs per unit import to deliver the commodity from the borders to the consumers. The transaction cost here is not ad-valorem. The assumption of imperfect transformability (between export and domestic selling) and imperfect substitutability (between import and domestic output sold domestically) lead this model relatively better in depicting empirical reality from most of the countries. These assumptions allow certain degree of independence of domestic economy from international price, hence avoid the unrealistic respond of export and import from economy shock.

III.5. Macroeconomic Balances

The CGE Model that is established includes three macro balances. These balances are current government balance, external balance (current account of the balance of payment, including trade balance), and Saving-Investment balance. For government balance, closure that is used is government saving which is residual flexible while all tax is fixed. Government consumption also fixed, either in the real term or as share of nominal absorption. For external balance, expressed by foreign currency, closure that is used is real exchange rate which is flexible while foreign savings (current account deficit) is fixed. If other components is given as fixed in external balance (transfer between RoW and domestic institutions), thus the trade balance is also fixed. *Ceteris paribus*, if foreign saving is endogenously determined, then depreciation from real exchange rate would correct this situation simultaneously either by decreasing expenditure on import and or by increasing income from export.

On Saving-Investment balances closure, we choose to use the investment driven. Real investment quantity is held fixed. In order to maintain the same level of real initial investment, the saving level in the base year of the non government institution is adjusted at one point with the same percentage quantity. Implicitly, this investment closure enable the government to implement the policy in order to produce private saving which is needed to finance certain real investment. The combination from these three closures in the macro-closure literature is known as Johansen Closures. The type of this closure has been used in CGE model developed by Leif Johansen (1960).

In summary, the closures utilized in this research is (i) government savings is fixed as well as direct tax (ii) the foreign savings is fixed while the exchange rate is flexible, (iii) the capital establishment is fixed as well as the real investment quantity.

III.6. Model Equation

In order to analyze fiscal policy in this study, the CGE standart model is used for open economy developed by Hans Löfgren from International Food Policy Reseach Institute (IFRI). This model is operated by using software GAMS (General Algebraic Modeling System). The equation in the model is devided into four blocks, namely price, production and trade, institutions, and obstacle systems.

The equations that have been built previously form the model of distribution and poverty in Indonesia. The following sample shows how the equations work process on the model run and produce a converged solution. Calibration process can be referred to as the process of mathematical manipulation of certain equations. Calibration process is performed to obtain

the distribution parameters and the efficiency parameters of the equation's function. For example, assume the economy has a production function reflected by the constant elasticity of substitution (CES):

$$y = \alpha \left[\beta X_1^{-\rho} + (1 - \beta) X_2^{-\rho} \right]^{-\frac{1}{\rho}} \quad (\text{II.26})$$

where α is an efficiency parameter in that it merely shifts the whole function, β is a distribution parameter that permits the relative importance of X_1 and X_2 , and is the substitution parameter. Pareto efficiency occurs when the general equilibrium is reached through the mechanism of a perfectly competitive market, i.e. when all the three functions - consumption, production, and product mix are in simultaneous equilibrium.

IV. RESULT AND DISCUSSION

The intended fiscal policy in this study covers only: (1) indirect taxes, (2) government subsidy on electricity, gas and water, transportation, and industry, and (3) direct transfer of payment to households. The impact of these fiscal policy measures will be discussed to assess the performance of some macroeconomic variables, such as Gross Domestic Product (GDP), consumer price index, trade balance, aggregate output, aggregate labor, investment rate, and household consumption.

IV.1. The Impact of Contraction and Expansion of Fiscal Policy on Indonesian Macro Economic Performance

Table II.1 shows the simulation results of various contraction and expansion of fiscal policy by 10 percent. Simulation 1 is an increase of indirect tax. The results of simulation 1 generally have a negative impact on Indonesian macroeconomic performance. This is represented by a decreasing in GDP by 0.005 percent. The decline in Indonesia economic performance is influenced by the decline in government consumption as well as private consumption, exports, and imports. Although the imports is declined but the export also declined as well which finally driven to a decline in GDP.

On the other hand, if the government conducted expansionary fiscal policy such as an increase in subsidy by 10 percent, as shown in simulation 2, the GDP increases by 0.106 percent. The provision of subsidy acts as an incentive to the producer which eventually lowers the price and increase demand (private and government). Interestingly, an increase in subsidy increases exports and investment.

Tabel II.1 Simulation Results of Expansion and Contraction of Fiscal Policy on Indonesian Economic Performace (%)

Variable	Simulation 1	Simulation 2	Simulation 3
Absorption	-0.010	0.141	-0.002
Private consumption	-0.026	0.059	-0.001
Investment	0.110	0.178	-0.004
Government Consumption	-0.124	0.807	0.001
Export	-0.040	0.310	-0.019
Import	-0.064	0.487	-0.021
GDP by expenditure	-0.005	0.106	-0.002
GDP by production	-0.005	0.106	-0.002

Simulation 1: An increase of indirect tax by 10% for the whole activity of economic sector

Simulation 2: An increase of government subsidy by 10% in all production sector

Simulation 3: An income transfer amounting Rp. 100000,- to rural household groups from the actual average income of respective households

Next, the impacts of simulation 3 which is a government transfer of payment amounting Rp. 10000,- to rural households are examined. The overall results show that transfer of payment to households has a small decline in real GDP. Real GDP decreases by 0.002 percent.

IV.2. The Impact of an Increase in Tax on Economic Performance

This sub-section overviews the impacts of expansion and contraction of fiscal policy on sectoral economic performance. For the purpose of this study, the analysis is focused on an increase in tax on the change in sectoral output, output price, and labor absorption.

IV.2.1. The Impact of an Increase in Tax on Sectoral Economic Performance

Table II.2 reveals the impact of an increase in tax by 10 percent on sectoral output, output price, and labor absorption. It is found that an increase in tax has a positive impact on various sectors with the exception of manufacturing industry; and trade, hotel, and restaurant. Manufacturing industry and trade, hotel, and restaurants show a negative impact of an increase in tax on output performance. An increase in tax results in an increase in output price for all sectors. This result shows that producers are able to pass the tax burden on consumers. An increase in tax also reduces labor absorption rates for two sectors, namely Manufacturing industry; and Trade, Hotel, and Restaurants. Even though producers are able to pass the tax burden to consumers in the form of higher output prices, the output for these two sectors are affected negatively. Consequently, their demand for labor also decrease as a result of an increase in tax.

Table II .2.
Simulation Results of an Increase in Tax by 10% on Sectoral Performance (%)

Sector	Output	Price	Labor
Sector	Output	Price	Labor
Agriculture	0.254	0.999	0.325
Mining and Quarrying	0.301	0.966	0.996
Manufacturing Industry	-0.317	0.993	-0.662
Electricity, Gas, and Clean Water	0.463	0.993	1.567
Construction	0.004	0.999	0.007
Trade, Hotel, and Restaurants	-0.189	1.009	-0.230
Transportation and Communications	0.020	1.006	0.040
Finance, leasing, and Business Service	0.184	1.010	0.572
Other Services	0.175	1.006	0.260

IV.2.2. The Impact of an Increase in Tax on Income and Poverty

The next effort is to analyze the impact of an increase in tax by 10 percent on the household utility, income, and expenditure. Table II.3 displays the results of the simulation. The results show that the impact of an increase in tax on utility varies depending on the classification of households. Rural agricultural labor and entrepreneur have their utility increased by less than 5 percent. However other household groups experienced a decrease in their utility by less than 1 percent.

An increase in tax has a negative impact on real income for all groups of household. As expected, an increase in tax can be translated into an increase in price, thus decline in the consumer's purchasing power. The declining in the purchasing power is in the same direction with the declining of household's expenditure, except for the households of the rural agricultural labor and entrepreneur.

Tabel II.3 Simulation Results on the Impact of an Increase in Tax on Utility, Income, and Expenditure of Households (%)

No	Household classifications	Utility	Income	Expenditure
1	Rural agricultural labor	0.341	-0.621	0.270
2	Rural agricultural entrepreneur	0.101	-0.888	0.060
3	Rural low-income non-agricultural labor	-0.055	-0.973	-0.085
4	Rural non-labor force and undefined group	-0.008	-0.925	-0.026
5	Rural high-income non-agricultural labor	-0.053	-1.002	-0.048
6	Urban low-income non-agricultural labor	-0.118	-1.014	-0.114
7	Urban non-labor force and undefined group	-0.065	-0.956	-0.038
8	Urban high-income non-agricultural labor	-0.092	-1.030	-0.072

Since an increase in tax has a negative impact on household's income, it is expected that the incidence of poverty might increase too. This study employs Foster-Greer-Thorbecke (F-G-T) index as a measure of poverty. Commonly, poverty is measured using monetary unit. The World

Bank’s standard for poverty line is US\$2/day or equivalent to Rp. 559,000/month. Poverty line is the monetary value of a basket of commodities which mirrors the consumption of basic needs. An increase in tax is expected to affect poverty ratio index (*head count index* or *poverty incidence*), poverty disparity index (*poverty depth*), and poverty intensity index (*poverty severity*) of household. Table II.4 reveals the results of the simulation of an increase in tax on poverty measures for various categories of household.

Based on poverty indicators (*head count index*, *poverty depth* and *poverty severity*), it is found that an increase in tax increases poverty intensity, poverty disparity, and poverty ratio for all groups of household. Generally, the impact of an increase in tax on poverty rate is higher on household in urban area compared to those in rural area.

Tabel II.4
Simulation Results on the Impact of an Increase in Tax on the change in Poverty

No	Household classifications	% Change		
		$\alpha = 0$	$\alpha = 1$	$\alpha = 2$
1	Rural agricultural labor	0.7787	1.4103	1.6409
2	Rural agricultural entrepreneur	1.4580	2.1222	2.4649
3	Rural low-income non-agricultural labor	1.4074	2.0999	2.5169
4	Rural non-labor force and undefined group	1.3666	2.0301	2.4236
5	Rural high-income non-agricultural labor	1.6037	2.2153	2.6600
6	Urban low-income non-agricultural labor	2.6043	2.7928	3.0850
7	Urban non-labor force and undefined group	2.2276	2.7046	2.9039
8	Urban high-income non-agricultural labor	2.7778	2.8869	3.1413

IV.3. The Impact of an Increase in Subsidy on Economic Performance

This section discusses the impact of an increase in subsidy on sectoral economic performance. With a simulation of government increases subsidy by 10 percent. It is expected that this increase in subsidy has a positive impact on sectoral economic performance because of subsidy lowers cost of doing business. Overall, an increase in subsidy by 10 percents resulted in an increase in GDP by 0.106 percent. The impact of subsidy on sectoral output, price, and labor absorption are discussed below.

IV.3.1. The Impact of an Increase in Subsidy on Sectoral Economic Performance

The simulation results of an increase in subsidy by 10 percent on output, price, and labor demand are displayed in Table II.5. An increase in subsidy has a positive impact on output for Manufacturing industry and public utility sector namely Electricity, Gas, and Clean water. Other sectors show a decline in output.

The impact of an increase in subsidy reveals a different picture on output price. An increase in subsidy resulted in a decrease in price for several sectors, i.e. Mining and Quarrying, Manufacturing industry, and public utility. An increase in output in manufacturing industry and public utility sectors has a positive effect on labor demand. Manufacturing industry is able to absorb 3.73 percent new workers and public utility sector (Electricity, Gas, and Clean water) creates 10.69 percent new job vacancy.

Tabel II.5 Simulation Results of an Increase in Subsidy on Sectoral Economic Performance (%)			
Sector	Output	Price	Labor
Agriculture	-0.798	1.966	-1.004
Mining and Quarrying	-0.943	-0.057	-2.950
Manufacturing Industry	1.724	-1.614	3.731
Electricity, Gas, and Clean Water	3.022	-5.730	10.693
Construction	-0.037	0.397	-0.033
Trade, Hotel, and Restaurants	-0.219	1.642	-0.256
Transportation and Communications	-0.557	0.823	-0.998
Finance, leasing, and Business Service	-0.631	0.870	-1.831
Other Services	-1.172	1.132	-1.696

Those sectors that experience an increase in price as a result of an increase in subsidy show a decrease in output. As such, labor demand is affected in a negative manner. Most likely government subsidy is relatively small compared to intermediate input price and therefore there is little impact on input price. The end result is a decline in output and an increase in price.

IV.3.2. The Impact of an Increase of Subsidy on Income and Poverty

This sub-section discusses the simulation results of an increase in subsidy by 10 percent on income and poverty among households as displayed in Table II.6. It is found that an increase in government subsidy has a positive impact on household income. However, household utility

Tabel II.6 Simulation Results of an Increase in Subsidy on Utility and Household Income (%)				
No	Household classifications	Utility	Income	Expenditure
1	Rural agricultural labor	-0.857	1.383	-0.636
2	Rural agricultural entrepreneur	-0.186	2.024	-0.145
3	Rural low-income non-agricultural labor	-0.045	2.227	0.189
4	Rural non-labor force and undefined group	0.107	2.157	0.095
5	Rural high-income non-agricultural labor	0.172	2.371	0.178
6	Urban low-income non-agricultural labor	0.193	2.309	0.239
7	Urban non-labor force and undefined group	0.220	2.207	0.100
8	Urban high-income non-agricultural labor	0.170	2.363	0.160

among rural agricultural labor, rural agricultural entrepreneur, and low-income non-agricultural labor shows a decline. A decrease in utility is related to a decrease in household expenditure for rural agricultural labor and rural agricultural entrepreneur households.

An increase in subsidy influences poverty rate among households as depicted by head count index, poverty depth, and poverty severity. These three indicators of poverty show a decreasing trend as a result of an increase in subsidy (Table II.7). The biggest downsizing lies on poverty severity particularly among household in the rural area. This finding shows that the role of subsidy is significant in reducing poverty in Indonesia.

Tabel II.7 Simulation Results of an Increase in Subsidy on the Change in Poverty (%)				
No	Household classifications	% Change		
		$\alpha = 0$	$\alpha = 1$	$\alpha = 2$
1	Rural agricultural labor	-2.131	-3.074	-3.547
2	Rural agricultural entrepreneur	-3.463	-4.672	-5.372
3	Rural low-income non-agricultural labor	-2.967	-4.664	-5.507
4	Rural non-labor force and undefined group	-3.047	-4.584	-5.408
5	Rural high-income non-agricultural labor	-3.856	-5.033	-6.000
6	Urban low-income non-agricultural labor	-4.138	-6.068	-6.627
7	Urban non-labor force and undefined group	-5.641	-5.922	-6.330
8	Urban high-income non-agricultural labor	-5.778	-6.235	-6.784

IV.4. The Impact of Income Transfer Policy on Indonesia Economic Performance

This section describes the simulation results of government policy to increase transfer of income by 10 percent on sectoral economic performance. Transfer of income is the allocation of government expenditure for poor household. The impact of that income transfer to sectoral economic performance, and income and poverty among household are described below.

IV.4.1. The Impact of Income Transfer on Sectoral Economic Performance

An increase in income transfer amounting Rp. 100000 to household has an impact on output, output price, and labor absorption rate. The results of this simulation are presented in Table II.8. It is shown that an increase in transfer of income to household has a positive impact on the output of several sectors - agriculture; public utility (electricity, gas, and water); transportation and telecommunication; and finance, leasing, and business service. However mining and quarrying; manufacturing industry; and trade, hotel, and restaurants sectors show a negative impact as a result of an increase in transfer of income to household. Transfer of

income also has a negative impact on output price for mining and quarrying; manufacturing industry; and construction sectors. An increase in the transfer of income has a positive impact on labor absorption rate of several sectors – agriculture (0.069%); provision of public utility (0.209%); transportation and communications (0.034); and finance, leasing, and business service (0.004%). The rest of the sectors either show a negative job creation or stagnant demand for labor. The trend in job creation for various sectors follows the demand for labor in terms of the sign of the coefficients.

Tabel II.8
Simulation Results of Income Transfer on Sectoral Economic Performance (%)

Sector	Output	Price	Labor
Agriculture	0.055	0.017	0.069
Mining and Quarrying	-0.002	-0.005	-0.008
Manufacturing Industry	-0.026	-0.010	-0.056
Electricity, Gas, and Clean Water	0.063	0.069	0.209
Construction	0.000	-0.003	0.000
Trade, Hotel, and Restaurants	-0.028	0.000	-0.035
Transportation and Communications	0.018	0.009	0.034
Finance, leasing, and Business Service	0.002	0.005	0.004
Other Service	0.000	0.001	0.000

IV.4.2. The Impact of Income Transfer Policy on Income and Poverty

The simulation results of income transfer from the government to household show a significant increase in utility, income, and expenditure among rural households as shown in Table II.9. An increase in real income among rural households increases their purchasing power and expenditure and thus their level of utility. However, the impact of an increase in transfer of

Tabel II.9
Simulation Results of Income Transfer Policy on Household Utility and Income (%)

No	Household classifications	Utility	Income	Expenditure
1	Rural agricultural labor	2.045	2.624	1.177
2	Rural agricultural entrepreneur	1.501	2.862	1.314
3	Rural low-income non-agricultural labor	1.452	2.861	1.409
4	Rural non-labor force and undefined group	1.280	2.855	1.385
5	Rural high-income non-agricultural labor	2.670	4.431	2.847
6	Urban low-income non-agricultural labor	-1.804	-0.186	-1.615
7	Urban non-labor force and undefined group	-1.899	-0.227	-1.683
8	Urban high-income non-agricultural labor	-1.934	-0.249	-1.769

Tabel II.10
Simulation Results of Income Transfer Policy on Poverty (%)

No	Household classifications	% Change		
		$\alpha = 0$	$\alpha = 1$	$\alpha = 2$
1	Rural agricultural labor	-4.385	-5.747	-6.608
2	Rural agricultural entrepreneur	-4.850	-6.539	-7.499
3	Rural low-income non-agricultural labor	-3.804	-5.953	-7.012
4	Rural non-labor force and undefined group	-4.037	-6.022	-7.088
5	Rural high-income non-agricultural labor	-3.933	-5.157	-6.147
6	Urban low-income non-agricultural labor	0.571	0.505	0.557
7	Urban non-labor force and undefined group	0.488	0.635	0.681
8	Urban high-income non-agricultural labor	1.000	0.688	0.749

income on utility, income, and expenditure among urban households shows a decremental effect. Table II.10 shows the simulation results of an increase in transfer of payment to household on poverty. It is found that an increase in transfer of income has reduced poverty incidence among rural households.

The objective of income transfer from the government to household is to reduce the number of poor people so that these people have access to basic needs. By undertaking this policy, the government expects that the income for each household will increase and the number of citizen that live below poverty line will decrease.

The policy of income transfer directly decreasing poverty rate particularly in rural area, as can be seen from an decreasing trend of poverty indicators such as head count index, poverty depth, and poverty severity except for urban household. This is a proof that income transfer has no strong influence to becoming a policy instrument in elevating regional economic performance.

IV.5. The Impact of Fiscal Contraction and Expansion Policy on Income Distribution

Beta density distribution function or also known as *beta distribution function* is used in order to examine the impact of human resource investment and income transfer on income distribution and poverty rate. The approach that is used in this research follows the suggestion of Decaluwe, *et al.* (1999), Cockburn (1999), and Agenor, *et al.* (2003), where they believe that their approach is more logical than other distribution measures. This study employs the Foster, Greer and Thorbecke (F-G-T) Indeks as a measure for poverty rate. This methods relatively more popular in poverty studies.

Table II.11 reveals the distribution of household by income group. The variation of minimum income ranges from Rp. 44,540 to Rp. 114,260 per month, where the lowest minimum income (Rp. 35,240) is for those in the category of non-labor and undefined group in the rural area. The variation of average income ranges from Rp. 543,840 (for rural agricultural labor) to Rp. 1,028,150 (high income non-agricultural household in urban area).

No	Household	Mean (Rp 000)	Minimum (Rp 000)	Maximum (Rp 000)	People (Rp 000)	Below Poverty Line (%)
1	Rural agricultural labor	543.84	44.54	999.91	2.88	57.23
2	Rural agricultural entrepreneur	555.13	58.54	1000.00	23.99	55.07
3	Rural low-income non-agricultural labor	559.91	47.14	6543.52	8.48	62.52
4	Rural non-labor and undefined group	565.32	35.24	6935.20	29.64	61.35
5	Rural high-income non-agricultural labor	560.28	68.15	4175.76	2.87	61.33
6	Urban low-income non-agricultural labor	1001.79	102.16	8878.63	6.99	27.35
7	Urban non-labor and undefined group	984.43	100.49	8994.67	22.80	26.98
8	Urban high-income non-agricultural labor	1028.15	114.26	9613.13	2.34	26.13

Source: Susenas, 2002

It is found that 29.64 percent of the population is under the category of non-labor and undefined group in rural area and 61.35 percent of this household lives below poverty line. This is followed by rural agricultural entrepreneur that accounted for 23.99 percent of the population and 55.07 percent of them is under poverty line. On the overall, majority of the rural people lives below poverty line. The urban poor is accounted for 26 percent of the population.

In order to analyze and evaluate income distribution based on household groups, *beta density distribution function* or *beta distribution function* is used for each household group and their respective income group. Parameter p and q are determined by the equation. These parameters influence income distribution disparity for respective household income group. As previously explained, when $p > q$ then the income distribution is relatively tend to be on the left side, which indicates that the inequality on income distribution increases. The same indication applies when $q > p$. If parameter $p = q$, then the function becomes symmetric and income is equally distributed.

Table II.12 displays the parameter required by *beta density distribution function* for respective household group. Parameter mx , mn , p and q are estimated using the data retrieved from the Nasional Economic Social Survey (SUSENAS) in 2002. The forms of income distribution for respective household group are as shown in Figures 3 - 10.

Tabel II.12
Parameter Values of Beta Density Distribution Function

No	Households	p	q	Minimum (mx) (Rp 000)	Maximum (mn) (Rp 000)
1	Rural agricultural labor	2.18	1.99	44.54	999.91
2	Rural agricultural entrepreneur	2.16	1.94	58.54	1000.00
3	Rural low-income non-agricultural labor	2.27	26.54	47.14	6543.52
4	Rural non-labor force and undefined group	2.30	36.03	35.24	6935.20
5	Rural high-income non-agricultural labor	2.29	16.14	68.15	4175.76
6	Urban low-income non-agricultural labor	1.23	9.00	102.16	8878.63
7	Urban non-labor force and undefined group	1.25	12.02	100.49	8994.67
8	Urban high-income non-agricultural labor	1.16	10.25	114.26	9613.13

Source: Susenas, 2002

Figures 1 and 2 show income distributions for rural agricultural and rural agricultural entrepreneur households, respectively. It can be seen that the income distributions for these two groups of household are skewed to the left. These findings indicate that for these two household groups the income distributions are imbalance in which there are so many low income households. In other words, for these groups of household segment, the income inequality is relatively low. This is proven by SUSENAS 2002 that the total of individual in respective household groups of rural agricultural labor and rural agricultural entrepreneur living below poverty line is relatively high, which is 57.23 percent and 55.07 percent, respectively. Other household groups (as depicted in Figures 5 - 10) have income distributions that are skewed to the right. These findings show that there are many individuals in these household groups have relatively high income. This situation also shows that income distribution is getting higher. This income distribution can be used to evaluate income distribution in each household group. If average income increases amounting y , then income in respective household in the group will also increase amounting y . Based on this argument, income distribution will move horizontally as income in respective household group changes.

Figure 3 is the simulation result for rural agricultural labor group in which an increasing in tax impacted on the increasing of inequality in income distribution, although it is relatively small. This is depicted by the proportional of *beta distribution function* which is moved horizontally from the left hand side to the lower part of the right hand side of poverty line. In other words, income distribution in household group of rural agricultural labor becomes more equal.

The same impact applies for household group of rural agricultural entrepreneur which is depicted in Figure 4. the subsidy and income transfer reduce the income distribution inequality, associated with the shifting of the curve moves horizontally from left to right below poverty

line. On the other hand, an increase in tax has an impact on higher income distribution inequality. However, the impacts of an increase in tax, subsidy, and transfer of income to other household groups are relatively insignificant to the changes in income distribution.

V. SUMMARY

In summary, the simulation results show that, *firstly*, in aggregate an increase in non-direct tax and transfer of income to rural household has a negative impact on macro-economic performance. *Secondly*, an increase in non-direct tax has mixed impacts on various sectors and household groups. Manufacturing industry; and trade, hotel, and restaurants sectors have a negative impact from an increase in non-direct tax. Generally, output price in every sector shows an increasing trend. The secondary and tertiary sectors experience a higher in price compared to those in the primary sector.

It is found that household utility among rural agricultural labor and entrepreneur has increased as a result of an increase in non-direct tax. However, other household groups show a decrease in utility. This is impacting on the increasing number of head count index or poverty incidence, poverty depth index and poverty severity index in respective household groups. The highest increasing index in respective household groups is poverty severity index. This is followed by poverty depth index and head count index.

Thirdly, an increase in subsidy resulting in the declining in price for mining and quarrying; manufacturing; and electricity, gas, and water sectors. The impact of an increase in subsidy on poverty shows a significant decreases, particularly in rural area.

Fourthly, the impact of an increase in transfer of income to the rural household shows a mixed results on output, output price, and labor demand. An increase in income increases output demand. Since the demand for input labor is a derived demand, thus there is an increase in the demand for labor. Transfer of income from the government to rural household positively influences household utility, income, and expenditure. However, it is found that the level of utility, real income, and expenditure among urban household have decreased. Income transfer policy directly decreases poverty rate particularly in rural area. It can be seen by looking at all poverty indicators such as *head count index*, *poverty depth* and *poverty severity* which has increased, except for urban household.

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APPENDIX

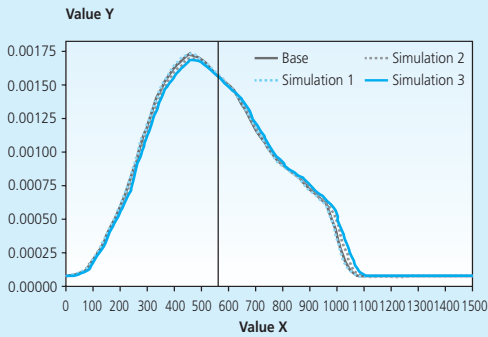


Figure 1
Income Distribution for Agricultural Employee

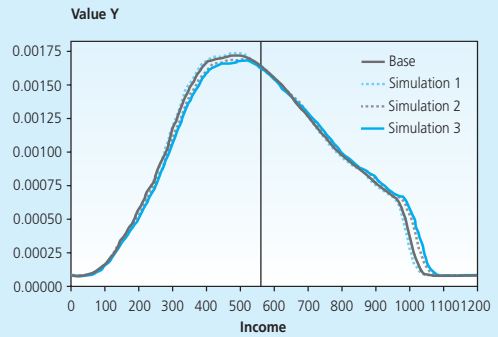


Figure 2
Income Distribution for Agricultural Employer

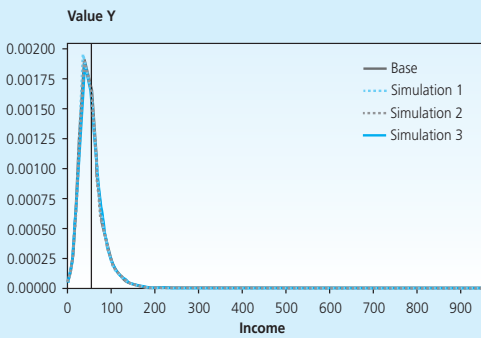


Figure 3
Income Distribution for Rural Low-Income Non-Agricultural

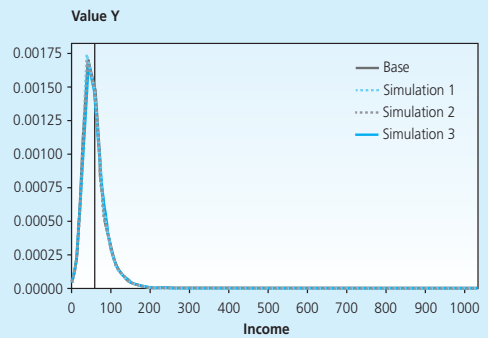


Figure 4
Income Distribution for Rural Non-Labor Force and Unaccounted Occupation

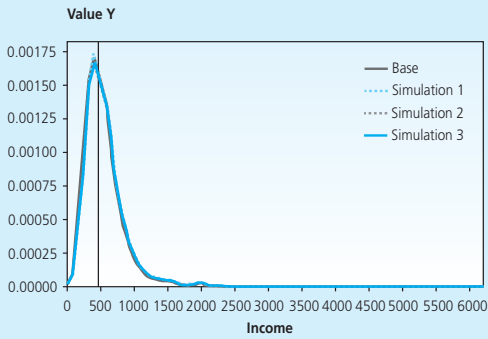


Figure 5
Income Distribution for Rural High-Income Non-Agricultural

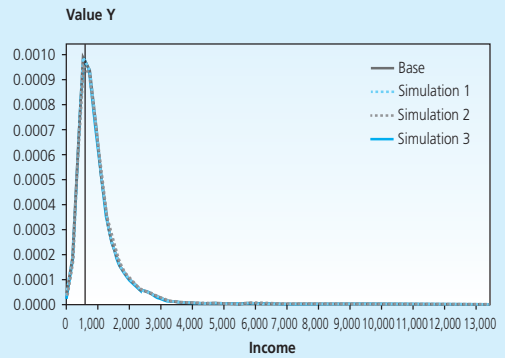


Figure 6
Income Distribution for Urban Low-Income Non-Agricultural

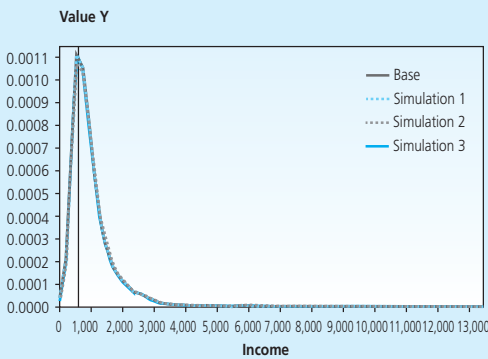


Figure 7
Income Distribution for Urban Non-Labor Force and unaccounted Occupation

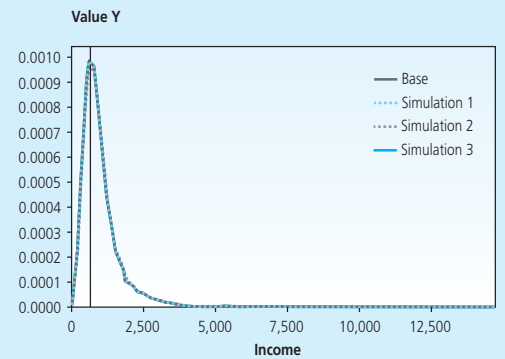


Figure 8
Income Distribution for Urban High-Income Non-Agricultural

INVESTMENT DECISION AND *FINANCIAL CONSTRAINTS*: EMPIRICAL STUDY ON INDONESIA STOCK EXCHANGE*

*Riskin Hidayat*¹

Abstract

This research aims to test the sensitivity level of liquidity and investment opportunity to investment decision between non-financially constrained and financially constrained firms. Sample in this research is the firm of non finance which enlist in Indonesia Stock Exchange from period 2003 to 2007, obtained sample 136 firms with 680 observations. Result of research refer that liquidity and investment opportunity have an influence on positive to investment decision. Liquidity is more sensitive to investment decision for financially constrained firms. Investment opportunity is more sensitive to investment decision for non financially constrained.

JEL Classification: E22, G32, O16.

Key words: Investment decision, liquidity, financially constraint.

¹ Riskin Hidayat [riesk_qjen@yahoo.co.id] is graduated from Magister Sains FEB-UGM and now a lecturer on STIE 'YPPI' Rembang.

I. INTRODUCTION

Investment decision is an important factor in corporate financial function. Fama (1978) stated that corporate value is purely determined by investment decision. The argumentation can be interpreted that the investment decision is important, because to reach the corporate goal which is maximizing stockholders' prosperity will only be generated through corporate investment activity.

The purpose on investment decision is to reach a high profit level with a certain level of risk. The high profit level with a manageable risk, it is expected to increase the corporate value, which means increasing the prosperity of stockholders. In other words, if in investing, a corporate can make a profit by utilizing the corporate resources efficiently, the corporation will earn a trust from investor to buy its stock. Thus the higher the corporate profit is, the higher the corporate value. It means the prosperity earned by stockholder will be higher.

Investment decision includes investment on short-term asset (current asset) and long-term asset (fixed asset). Short-term asset is usually defined as asset with less than one year time period or less than one business cycle, in this case that fund invested on the current asset is expected to be reimbursed in short-term or less than a year and is earned at once. The purpose of a corporation investing in a short-term is to be used as working capital and corporate operational. The examples of current asset are supply, receivable, and cash.

Meanwhile long-term asset or fixed asset is defined as asset with more than one year time period; in this case fund invested on long-term asset will be reimbursed step by step. The purpose of a corporation investing on a long-term asset is to increase the corporate value.

Investment decision on this research is a *capital expenditure* which is investment on fixed asset such as land or property, building, and equipment. Capital expenditure is fund expended by a corporation which is with this expenditure the corporate will earn benefit more than on year. Basic motive of capital expenditure is to expand, replace, or up date fixed asset or to look for any benefit that may be *less tangible* in a long-term. Capital expenditure is part of *capital budgeting*. According to Riyanto (1997) capital budgeting is the overall planning process and taking decision regarding to capital expenditure with more than one year reimbursement period.

Capital investment is one of an important aspect in investment decision beside asset composition determination. Decision of capital allocation into investment proposals which its benefit will be realized in the future should be well considered and prepared. The impact of future uncertainty, benefit earned is also uncertain, so that the investment proposal contains some risks. As the consequence, investment proposal should be evaluated and be connected with the expected risk and result.

According to Modigliani and Miller (1958) that a perfect market condition has no relation to investment decision and funding decision. According to Arifin (2005), even though the perfect market assumption is omitted, separation between investment decision and funding decision will keep occurring even there is a little modification which is manager has to use cost of capital average most weighs as *discount rate*. Even when the model structure is not relevant, because of either tax factor or other factors, still, there is no direct relation between investment and funding. The thing is investment program is firstly decided, and then funding can be decided after that. To ensure that investment is truly intended to maximizing corporate value, then investment decision should be independent towards funding decision.

Investment decision can not be directly observed by external party. Some of studies done in term of investment decision are from Myers (1977) who introduced *investment opportunity set*. Investment opportunity set gives an extended directions which is corporate value depends on its future expenditure. So that corporate prospect can be estimated from investment opportunity. Investment opportunity set is combination between assets in place and investment choice in the future with positive *net present value*.

According to Gaver and Gaver (1993), investment opportunity is a corporate value that its amount depends on expenditures determined by management in the future. In this case, it is currently the investment choices that are expected to generate higher profit. This statement is in accordance with Smith and Watts (1992) that stated that investment opportunity set is corporate value component which is the result from choices to invest in the future. According to Kallapur and Trombley (1999) that corporate investment opportunity can not be observed by external party so it needs a proxy to observe it. According to Modigliani and Miller (1958) that on a perfect market condition there is no relation between investment decision and funding decision, in this case there is a relation between liquidity rate and investment rate in many corporations. Fazzari, Hubbard, and Petersen (1988); Vogt (1994); Kaplan and Zingales (1997); Cleary (1999); Moyen (2004); Almeida, Campello, and Weisbach (2004)'s empirical study shows there is a connection between liquidity and investment decision on US corporations. The same thing was also found by Hoshi, Kashyap, and Scharfstein (1991) in Japan.

Empirical study in Indonesia shown by Agung (2000), Kristianti (2003), and Hermeindito (2004) that found that liquidity positively relates to investment. Instead, Prasetyantoko (2007) in his research shows that liquidity negatively relates to investment decision.

From the above empirical finding result, it shows that there is a difference between theory stating that investment decision and funding decision are independent from any practices done by corporation. Beside that, research result from Fazzari, Hubbard, and Petersen (1988); Vogt (1994); Hoshi, Kashyap, and Scharfstein (1991); Hermeindito (2004) shows that there is a different

sensitivity finding of corporate investment decision and liquidity when it is moderated by *financial constraints*. With research result from Kaplan and Zingales (1997); Cleary (1999); Kristianti (2003).

Fazzari, Hubbard, and Petersen (1988); Vogt (1994); Hoshi, Kashyap, and Scharfstein (1991); Hermeindito (2004)'s research shows that corporate investment decision is more sensitive on liquidity on *financially constrained* corporation that is further abbreviated as *FC*, compared by non *financially constrained* corporation that is further abbreviated as *NFC*. Instead, Kaplan and Zingales (1997); Cleary (1999); Kristianti (2003) found that corporate investment decision is more sensitive on liquidity on *NFC* corporation than *FC* corporation.

By the existing empirical evidences among Fazzari, Hubbard, and Petersen (1988) supported by oleh Vogt (1994); Hoshi, Kashyap, and Scharfstein (1991); Hermeindito (2004) with empirical research result from Kaplan dan Zingales (1997) supported by Cleary (1999) and Kristianti (2003), this research will further observe factors that differentiate the two different evidences, which by using *FC* and *NFC* variables as the moderator.

Financial constraints is a corporate limitation in earning capital from any available funding sources to invest. Kaplan and Zingales (1997) stated that *financial constraints* occur if corporation faces difference between capital cost from internal funding source and capital cost from external funding source.

Based on the above explanation and result of empirical research, then this research is intended to examine liquidity influence rate and investment opportunity on investment decision on *FC* and *NFC* corporation. *FC* Corporation is a corporation that has financial problem in having investment, while *NFC* Corporation is a corporation that has no financial problem in having investment.

Corporate investment decision is really influenced by investment opportunity, because the more investment opportunity that is profitable, the higher investment is done, in term of manager trying to grab the opportunities to maximize the stockholders' prosperity. If there is an investment opportunity that is profitable, then the *NFC* Corporation will easily take it to invest. It is caused by the *NFC* corporation has an easier access to the capital market, so that it can easily adjust its finance to investment that shows higher financial flexibility, or in other words the *NFC* corporation shows higher corporate value (Bhaddari, 1988; Chan and Chen, 1991; Fama and French, 1992). The *NFC* also tends to be longer, bigger, more mature, and understand market very well. It means that with the well-established corporate condition, then the *NFC* corporation is tends to be sensitive in doing investment on the investment opportunity.

According to Fazzari, Hubbard, and Petersen (1988); Vogt (1994); Kaplan and Zingales (1997); Cleary (1999); Moyon (2004); Almeida, Campello, and Weisbach (2004); Hoshi, Kashyap, and Scharfstein (1991); Agung (2000), Kristianti (2003), Hermeindito (2004); Prasetyantoko

(2007), corporate investment decision can also consider the availability of internal funding source which is cash flow. Investment decision made by corporation is influenced by the ability of the corporation to make cash that is able to fulfill both of long-term and short-term need or what is usually called as corporate liquidity. Corporation should keep the liquidity to avoid any disturbance, so it doesn't disturb the corporate activity process to invest and not to lose any trust from external party.

FC corporation tends to use liquidity to finance investment. It is caused by the *FC* corporation has a limited access to capital market and is relatively smaller, that shows financial constraints so it would be harder for the corporation to take the investment opportunity that is profitable to have investment. In other words, *FC* corporation has a lower corporate value.

According to Fazzari, Hubbard, and Petersen (1988) that the existing information asymmetric on the external funding (debt) will evoke more expensive external funding, that impacts *FC* corporation has less access to external funding. With the constraints, then the investment decision of *FC* corporation tends to be more sensitive on liquidity.

As mentioned above, there is a different result in term of liquidity influence rate on the investment decision when being moderated by *financial constraints*, especially research done by Kristianti (2003) and Hermeindito (2004) in Indonesia. Kristianti's research (2003) support thr Kaplan's and finding (1997) and Cleary (1999) that shows that liquidity is more influential on the investment decision on *NFC* corporation that *FC* corporation.

Instead, result of Hermeindito's research (2004) supports Fazzari's, Hubbard's, and Petersen's research (1998); Vogt (1994); Hoshi, Kashyap, and Scharfstein (1991) that shows that liquidity is more influential on investment decision on *FC* corporation than *NFC* corporation. According to those different research result, then this research is intended to do reconciliation for liquidity influence rate and investment opportunity on investment decision by putting in variable of *FC* and *NFC* as moderator.

The second part of this paper will discuss the theory and the derivation of 4 hypothesis tested in this paper, the third part discusses about methodology used and the forth part will explain the estimation and analysis result. Conclusion, implication, and suggestion will be the closure.

II. THEORY

There are three aspects that become analysis focus as an influencing factor of investment decision. Those aspects are: (i) liquidity aspect, (ii) investment opportunity, and (iii) financial

constraint aspect. According to Modigliani and Miller (1985) that in a perfect market condition, there is no relation between investment decision and funding decision. However the empirical evidence shows the existing interdependency between investment decision and funding decision, in this case there is a connection between liquidity rate and investment rate in many corporations.

The investment decision made by corporation is influenced by the ability of corporation in making cash that is able to fulfill the long-term and short-term need or what is commonly called as corporate liquidity. Corporation should keep its liquidity to avoid any disturbance on the corporate activity process to have investment and not to lose any trust from the external party.

Liquidity is an ability of a corporation to fulfill its obligation especially short-term obligation (Hanafi and Halim, 2005). According to Riyanto (1997), liquidating corporation is a corporation that has a big power so it is able to fulfill any of its obligation, this paying ability relates to production process establishment.

According to Zaplan and Zingales (1997), liquidity is an ability of a corporation to make cash in fulfilling both of long-term and short-term corporate's need. The definition explicitly shows whether with the available cash corporate experiences obstacle in finance its investment or not. A corporation is called having no problem in financing its investment only if the corporation can make cash to finance its investment.

In this research, liquidity gets proxy by *cash flow*. Cash flow usually consists of cash flow in and cash flow out. Cash flow out is usually used to have a new investment, meanwhile cash flow in is the result from the investment. According to Brigham and Ehrhardt (2005), cash flow report is a report explaining the impact of operational activities, investment, and corporate funding on cash flow in one accounting period.

Geczy, Minton, and Schrand (1997) stated that corporate cash flow with high volatile level has expenditure, research cost, and development, and advertisement cost that are cheaper. It means that the existing investment level difference will make a different volatility, depends on the corporate investment goal. Corporation doesn't usually debt or equity market to make cash flow volatility not sharp, because the cost getting in the capital market also relates to corporate cash flow volatility.

The Fazzari, Hubbard, and Petersen (1988); Vogt (1994); Kaplan and Zingales (1997); Cleary (1999); Moyon (2004); Almeida, Campello, and Weisbach (2004)'s research show that there is a correlation between liquidity and investment decision in the US corporations. The same thing was also found by Hoshi, Kashyap, and Scharfstein (1991) in Japan.

Empirical study in Indonesia shown by Agung (2000), Kristianti (2003), and Hermeindito (2004) that found liquidity is positively correlated to investment decision. Instead, Prasetyantoko

(2007) in his research shows that liquidity is negatively related to investment decision. Based on the explanation, then the first hypothesis tested in this paper is the liquidity is positively related to investment decision.

Myers (1977) stated that investment opportunity is a combination between assets in place and investment choice in the future with positive NPV. The *assets in place* affiliation with the investment will be influential on capital structure. Gaver and Gaver (1993) stated that investment opportunity is a corporate value which its amount depends on expenditures determined by management in the future, in this case the expected investment choices will make a higher *return*.

According to Chung and Charoenwong (1991) that growth essential for a corporation is the existing investment opportunity that is more profitable. If there is a profitable investment opportunity, then manager will try to take the opportunities to maximize the prosperity of stockholders. It is caused by the more investment that is profitable, then investment done will be higher.

In this research, proxy from investment opportunity is *book to market* ratio. *Book to market ratio* is a book value ratio towards stock price. Corporation that has a *book to market* ratio that is high indicates that corporate growth cycle will be better in the future, so that it will have a high investment opportunity, thus corporation can easily invest because investors will be interested to buy the corporate's stock.

The Fazzari, Hubbard, and Petersen (1988); Vogt (1994); Kaplan and Zingales (1997); Cleary (1999); Almeida, Campello, and Weisbach (2004); Prasetyantoko (2007)'s research shows that investment opportunity is positively influential on the investment decision. Instead, Moyaen research (2004) shows that investment opportunity is negatively influential on the investment decision. Thus, the *second* hypothesis proposed in this research is investment opportunity with that is positively influential on investment decision.

According to Myers and Majluf (1984) that central proportion with capital information asymmetric base is very expensive. Myers and Majluf (1984) further explained that dividend is *sticky*, which means dividend increase is done if manager is sure to allocate a permanent cash flow (both of internal and external) that is sufficient in the future. Dividend decrease is done if corporation faces high *financial constraints*, externally it can not keep the permanent cash flow that is sufficient to finance investment. That is why *FC* corporation relies much on internal funding source, it tends to adjust dividend based on the available investment opportunity.

According to Jansen and Meckling (1976) that manager excitedly use internal capital to finance its investment because internal capital can reduce the supervisor involvement from

stockholders or external party on the investment decision made by manager Fazzari, Hubbard, and Petersen (1988) stated that *FC* corporation tends to be more sensitive towards internal funding (liquidity) in having investment. The tendency is caused by the existing information asymmetric on the external funding, so the external funding (debt) is more expensive than internal funding impacting on less access belongs to *FC* corporation to external funding source.

The Fazzari, Hubbard, and Petersen (1988); Hoshi, Kashyap, and Scharfstein (1991); Schaller (1993); Almeida, Campello, and Weisbach (2004)'s research shows that *FC* corporate investment decision is more sensitive towards liquidity compared by *NFC* corporation. Instead, Kaplan and Zingales (1997) and Clary (1999)'s research shows that investment from *NFC* corporation is more sensitive towards liquidity compared by *FC* corporate investment.

Moyen's research (2004) shows when using classification based on dividend *pay out*, *cash flow*, and Fazzari, Hubbard, and Petersen criteria, *FC* corporation is more sensitive towards liquidity compared by *NFC* corporation in having investment. Instead, when using Cleary index and Kaplan and Zingales criteria, it is found that *NFC* corporation is more sensitive towards *cash flow* compared by *FC* in having investment.

Empirical evidence in Indonesia is shown by Agung (2000) that found the existing liquidity positive relation with investment decision. Kristianti (2002) in her research shows that liquidity is more sensitive towards investment decision on *NFC* corporation compared by *FC* corporation. Instead, Hermeindito (2004) found that liquidity is more sensitive towards investment decision on *FC* corporation than on *NFC* corporation. Prasetyantoko (2007) also showed that liquidity is negatively influential on investment. Referring to this explanation, then the third hypothesis tested in that liquidity is more influential towards investment decision on *financially constrained* corporation than non *financially constrained* corporation.

According to Jensen and Meckling (1976) that dividend policy and investment opportunity is a management controlling mechanism that can be substitution which its application is depending on the availability of internal funding source than external funding source through investment opportunity. A corporation that has a high internal funding source is controlled through high dividend payment so that the corporation can be classified as *NFC*. Thus *NFC* corporation can easily adjust funding source for investment that shows higher financial flexibility and tends to have an easy access to external capital market, or in other words *NFC* corporation shows higher result (Bhaddari, 1988; Chan and Chen, 1991; Fama and French, 1992).

Prasetyantoko(2007) in his research shows that investment opportunity is positively influential on investment decision. Kaplan and Zingales (1997); Cleary (1999) found that investment decision of *NFC* corporation is more sensitive on investment opportunity than on

FC corporation. Instead, Moyer (2004) found that generally, investment opportunity is negatively influential on investment on both *NFC* and *FC* corporation. Almeida, Campello, and Weisbach (2004) shows that investment opportunity is more sensitive on *FC* corporation than on *NFC* corporation. With the assumption, then hypothesis which explains investment opportunity is more influential on investment decision on *non financially constrained* corporation than *financially constrained* corporation, is the forth hypothesis tested in this paper.

III. METHODOLOGY

III.1. Data and Variable Conceptualization

Data needed in this research is corporate financial statement from 2003 to 2007. Population in this research is public corporation listed in Indonesian Stock Exchange (BEI) and the research sample is non financial public corporation listed in Indonesian Stock Exchange (BEI). Data is obtained from BEI and ICMD (*Indonesian Capital Market Directory*). Sample distribution criteria in this research is non financial corporation listed in BEI that publish its financial statement from 2003 to 2007 consistently.

Independent variable in this research is liquidity that gets proxy with *cash flow* and investment opportunity that gets proxy with *book to market*. To measure *cash flow* and *book to market*, it is described as follow:

$$\text{Cash flow} = \frac{\text{netincome} + \text{depreciation and / or amortization} + \text{tax payment difference that is being delayed}}{\text{fixed aset}}$$

Fixed assets in this research is land, building, equipment, and supply. *Cash flow* is divided with fixed assets to control corporate scale difference effect.

$$\text{Book to market} = \frac{\text{equity book value}}{\text{equity market value}}$$

Dependent variable in this research is investment. Investment in this research is *net capital expenditure* and is accumulated during period t, formulized as follow:

$$\text{Investasi} = \frac{(\text{fixed assets}_t - \text{fixed assets}_{t-1})}{\text{fixed assets}}$$

Moderation variable in this research is financial constrained that is classified into two parts, *non financially constrained (NFC)* dan *financially constrained (FC)*. In this research, to

classify *NFC* corporation and *FC* corporation, it uses four steps by observing dividend policy, cash flow, debt (*leverage*), and investment opportunity. The first classification is based on dividend policy. Some of research use dividend payment ratio from (Fazzari, Hubbard, and Petersen, 1988; Vogt, 1994; Kaplan and Zingales, 1997; Cleary, 1999; Kristianti, 2003; Moyer, 2004; Almeida, Campello, and Weisbach, 2004; Hermeindito, 2004). Corporation with low dividend rate is categorized as *FC* corporation, while high dividend rate corporation is categorized as *NFC*. Fazzari, Hubbard, and Petersen (1988) stated that there are two possible explanations why corporation pays low dividend. First, corporation is facing external funding source cost that is more expensive because the existing information asymmetric so it uses most of profit to finance its investment than paying higher dividend. Second, corporation doesn't earn sufficient profit to pay dividend. Corporation paying dividend is categorized as *NFC*, and corporation that is not paying dividend is categorized as *FC*.

Corporation that is categorized as *FC* that can not pay the dividend doesn't mean that they have no ability to do that, but there might be other needs such as having investment, so that it needs a second classification which is by considering cash flow. On the second classification as used by Moyer (2004), corporation that has a higher bigger cash flow from the cash flow average of all samples is categorized as *NFC*, while corporation that has a smaller cash flow from the cash flow average of all samples is categorized as *FC*. Corporation with the big cash flow tends not to have a problem funding, instead corporation with the smaller cash flow tends to have obstacles in its funding.

To maximize *NFC* and *FC* accurate corporate classification result, corporation that categorized as *financially constrained* on the second classification is continued to the third classification which is by looking the investment opportunity that belongs to the corporation. Investment opportunity here gets proxy with *book to market* ratio as used by Hovakimian and Titman (2006) in classifying *NFC* and *FC* corporation. A corporation is categorized as *NFC* if its *book to market* ratio is lower than the average of *book to market* ratio of all samples and a corporation is categorized as *FC* if its *book to market* ratio is higher than the average of all samples. A corporation with a low *book to market* means that the corporation has a lower book value than its market value, or in other words, the corporation has a higher market value than its book value that reflects *NFC* corporation. Thus *NFC* corporations can easily get external funding source because it has a high security value than its book value, so that investors are interested to buy the corporate's security.

Furthermore, to ensure and to get more accurate result in classifying *NFC* and *FC* corporations, the *financially constrained* corporations on the third classification is continued to the fourth classification as done by Lang, Ofek, and Stulz (1996); Hovakimian and Titman

(2006) by observing a corporate's debt. A corporation with a high debt rate tends to hard to get access to any external funding source and instead, a corporation a low debt rate tends to easily access the external funding source. Therefore in this research, a corporation with low debt ratio of all samples then is categorized as *NFC*, while corporation with a higher debt ratio than the average of all samples debt ratio then is categorized as *FC* corporation. From those four steps, it can be clearly seen on Figure 1.

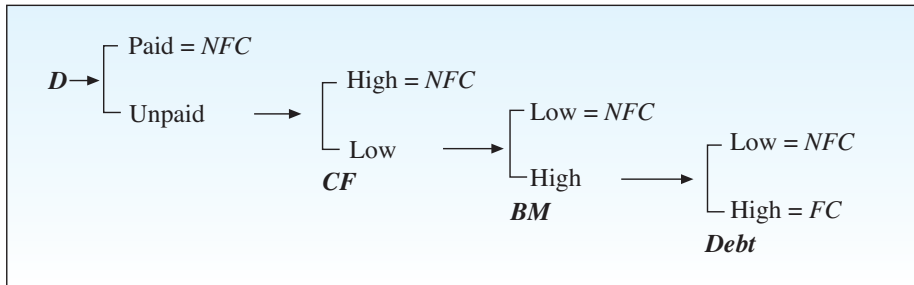


Figure III.1.
Financially Constrained and Non Financially Constrained corporate classification

In this case, *D* is dividend; *CF* is cash flow; *BM* is book to market ratio from investment opportunity; *Debt* is borrowed fund; *NFC* is non financially constrained; and *FC* is financially constrained.

Thus corporation categorized as *NFC* is when the corporation pays dividend, has a high cash flow, low *book to market*, and low debt. Meanwhile, corporation is classified as *FC* if it doesn't pay dividend, has a low cash flow, high *book to market*, and high debt. This research also uses controlling variable which is debt (*leverage*) measured by:

$$DER = \frac{\text{Total of Debt}}{\text{Total of Equity}}$$

III.2. Estimation Technique

Empirical model stated in this paper is:

$$INVAT_{it} = \beta_0 + \beta_1 CFAT_{it} + \beta_2 BM_{it} + \beta_3 D_{it} + \beta_4 CFAT_{it} * D_{it} + \beta_5 BM_{it} * D_{it} + \beta_6 DER_{it} + u_{it}$$

Where *INVAT* is investment on *capital expenditure* that divided by fixed assets, which is dependent variable; *CFAT* is *cash flow* divided by fixed assets which is proxy from liquidity and *BM* (*Book to market*) which is a proxy from investment opportunity is dependent variable; *D* is dummy *FC* and *NFC* corporate variable, 1 is *FC* variable and 0 is *NFC* variable; *CFAT*D* is interaction between

CFAT with dummy variable and *BM*D* is interaction between *BM* and dummy variable which is moderation variable; and *DER* (*debt to equity ratio*) is controlling variable. Cash flow and investment are divided by fixed assets to control corporate scale different effect. Index *i* which shows *i* and *t* corporation is period.

IV. RESULT AND ANALYSIS

According to sample distribution criteria which is non financial corporation listed in Indonesian Stock Exchange and publish its financial statement from 2003 to 2007 consistently, obtained sample amounting 217 non financial corporation during five years with the number of observation amounting 1.085. From the 217 samples, there are 57 corporations with insufficient data because there is no tax data that is delayed and 24 corporations with *outlier* data because it has a cash flow, book to market, equity, and negative investment value so that they are taken out from the sample. So this last research result is 136 non financial corporations during five years with the number of observation amounting 680. Table III.1 shows samples distribution process.

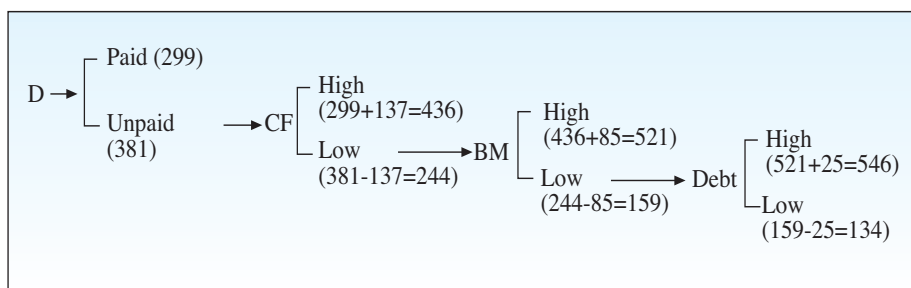
Criteria	Number of Corporation
1. Non Financial Corporation listed in Indonesian Stock Exchange and publish its financial statement consistently during 2003-2007 period	217
2. Taken out because of insufficiency *)	(57)
3. Taken out because the data is outlier **)	160
Last Sample	(24)
	136

Note:

*) no delayed tax

***) cash flow, book to market, equity, and negative investment value

In this paper, to classify corporation categorized as *FC* and *NFC*, it is seen from dividend, *cash flow*, *book to market*, and *debt*. Corporation categorized as *FC* is when corporation doesn't pay dividend, has lower cash flow than the sample average, and has a higher book to market and debt than sample average. Meanwhile, a corporation categorized as *NFC* is when corporation pays dividend, has a higher cash flow than the sample average, and has lower *book to market* and *debt* than the sample average. The *FC* and *NFC* corporation in this research are moderation variable using *dummy*, which are: 1 is for *FC* corporation and 0 is for *NFC* corporation. Classification result categorized as *FC* and *NFC* can be seen on Figure 2.



Gambar III.2.

Classification result of Financially Constrained and Non Financially Constrained corporations

The picture shows the first classification observed from dividend payment status; there are 299 corporations paying dividend and 381 that don't pay dividend. On the second classification, corporations that don't pay dividend are further classified as based its *cash flow* condition; on this step it shows that corporation that has higher cash flow than the sample average increases from 137 to 436 and the one that smaller than the average decreases from 137 to 244 corporations. On the third classification, a corporation with low cash flow is re-observed its *book to market*, classification results shows, the number of corporations with lower *book to market* from the sample average increases from 85 to 521 corporations, meanwhile corporations that have higher book to market from the average decreases from 85 to 159 corporations. On the last classification corporation with high *book to market* is re-observed its *debt*, classification results show that corporation with lower *debt* than the sample average increases from 25 to 564 and corporations with debt above the sample average decreases from 25 to 134 corporations, while corporations categorized as *NFC* are 564.

From the above classification, to know the difference between *FC* and *NFC* corporations, it uses difference test with *independent sample t-test*. The result of *FC* and *NFC* difference test can be seen on the table III.2 below.

Table III.2 Corporate Financially Constrained and Non Financially Constrained difference test result				
Variable	Mean FC	Mean NFC	Mean Difference	t value
CFAT	0.8154	1.1976	-0.3822	-4.867 ***
BM	6.6650	3.8180	2.8470	12.639 ***
DER	0.7097	0.4154	0.2943	12.555 ***

Source: data managed

Note :

*** Significant on level 1% (2,326)

CFAT (cash flow divided by fixed assets), BM book value equity divided by market value equity) in multiplication, DER (debt total divided by equity total) in percent.

Difference test result on table III.2 shows that there is different average between FC and NFC corporations on all CFAT, BM, and DER variables. Negative coefficient symbol on CFAT shows that NFC corporate cash flow is higher than FC corporations, meanwhile positive BM and DER variables which means that book to market and debt of FC corporation is higher than NFC corporation.

Model estimation result is given on table III.3. This model has passed the classical assumption (Gujarati, 2003) including normality test, autocorrelation test, multicollinearity test, and heteroscedasticity. Data normality test uses non parametric statistical test from Kolmogorov-Smirnov (K-S) amounting 1,313 and significance amounting 0,064. It shows residual data is normally distributed (Ghozali, 2001).

Autocorrelation test is done by using statistical Durbin Watson (DW). With the number of observation 680 and independent variables which is 6, it gets d1 value amounting 1,707 and du amounting 1,831. The autocorrelation test shows DW value amounting 1,857 which is between du and 4-du, then there is no autocorrelation in this model.

Multicollinearity test is done by observing VIF value, if VIF value is closed to 1 then there will be no multicollinearity on regression equation. Multicollinearity shows that VIF value CFAT variable (1,069), BM (1,156), and DER (1,250) are closed to 1, meanwhile VIF value D variable (5,344), CFAT*D (2,653), and BM*D (3,939) is bigger than 1 but still in a normal limit, so that overall, it can be said that there is no correlation among independent variables.

Independent Variable	Coefficient	t value
Constant	0.049	9,102 ***
CFAT	0.018	8,796 ***
BM	0.001	1,981 **
D	-0.026	-2,496 ***
CFAT*D	0.011	1,759 **
BM*D	-0.014	-3,143 ***
DER	0.027	3,668 ***
R ²	0.131	

Note :

Estimation is done by using data panel estimation technique; fixed effect model (FEM).

***) Significant on level 5% (1.645) and

**) Significant on the level 1% (2.326).

CFAT (Cash flow divided by fixed assets) is proxy from liquidity and BM (equity book value divided by equity market value) is proxy and investment opportunity which is independent variable ; D(dummy variable, 1 for financially constrained corporation, 0 for non financially constrained corporation); CFAT*D (interaction between CFAT and dummy of financially constraint corporation) and BM*D (interaction between BM and dummy of non financially constrained corporation) which is moderation variable; and DER (debt total divided by equity total) is controlling variable.

The last classical assumption test is the heteroscedastisity done by Park test. From the Park test, it obtained a significance result CFAT variable (0,193), BM (0,864), D (0,481), CFAT*D (0,377), BM*D (0,254), and DER (0,866) which means it bigger than 0.05, so that in this model there is no heteroscedastisity that guarantees parameter obtained is the most efficient parameter.

It shows that the 4 proposed hypothesis in this paper are supported by estimation result. The research result shows that hypothesis 1 and 4 are significant on level 1% which in this case CFAT variable has a postive coefficient, meanwhile moderation variable BM*D which is interaction between BM and dummy NFC corporation has a negative coefficient. For hypothesis 2 and 3, BM variables and moderation variables CFAT*D which is interaction between CFAT and dummy of FC corporation has a positive coefficient and is significant on level 5%.

Nevertheless, it should be underlined thatdetermination coefficient (R^2) of model is relatively small amounting 0,131 that shows 13,1 % investment decision variation can be explained by variation from six independent variables CFAT, BM, D, CFAT*D, BM*D, and DER. And the rest (86,9%) is explained by other causes beyond model.

With high liquidity, corporation has an opportunity to invest higher on capital expenditure which is investment on fixed assets such as land or property, building, and supply. Nevertheless, with the high liquidity, it will be sensitive to *agent conflict occurs*. According to this theory, manager is excited to use internal capital to finance investment because internal capital can minimize the stockholders' supervision involvement or external party on investment decision made by manager. Manager tends to choose project that is harder to be supervised by external party, so it gives *more space* for manager to take a decision that benefit him. Manager is also excited to *keep free cash flows* than sharing it to the stockholders. The more *free cash flows* are, the more managers' freedom in controlling corporate resources.

Beside that, according to Myers and Majluf (1984) that the existing information asymmetric, then internal funding source is cheaper than external funding source like debt, so that the corporation tends to choose internal funding rather than external funding. The result of this research is in accordance with Fazzari, Hubbard, and Petersen (1988); Hoshi, Kashyap, and Scharfstein (1991); Vogt (1994); Kaplan and Zingales (1997); Cleary (1999); Agung (2000); Kristianti (2003); Moyen (2004); Almeida, Campello, and Weisbach (2004); and Hermeindito (2004)'s research. By this research, it shows that there is interdependency between investment decision and funding decision.

Corporate investment decision is closely related to investment opportunity belongs to a corporation. The result of hypothesis 2 in this research supports the statement, in this case that there is a positive investment opportunity influence on investment decision. This research is in

accordance with Fazzari, Hubbard, and Petersen (1988); Vogt (1994); Kaplan and Zingales (1997); Cleary (1999); Almeida, Campello, and Weisbach (2004); and Prasetyantoko (2007)'s research. According to Gaver and Gaver (1993), investment opportunity is a corporate value with amount depending on expenditures determined by manager in the future, in this case investment choices expected to make a higher profit. If there is a profitable investment opportunity, then manager will try to take those opportunities to maximize the stockholders' prosperity. The more profitable investment opportunity is, the more investment done by a corporation.

Liquidity influence and investment opportunity on investment decision will be different when being moderated by *FC* and *NFC* corporations. It is shown by hypothesis 3 and 4. The result of hypothesis 3 shows that liquidity is more influential on investment decision on *FC* corporation than on *NFC* corporation. According to Fazzari, Hubbard, and Petersen (1988), because the existing information asymmetric on external funding, so that external funding like debt is more expensive impacting *FC* corporation has less access to external funding source. Beside that, *FC* corporation is relatively small, that shows financial limit so that it will be hard for corporation to take investment opportunity that is profitable for investment. In other words, *FC* corporation has a low corporate value. Thus, *FC* corporation tends to be more sensitive on liquidity in having investment. The result of this research is in accordance with Fazzari, Hubbard, and Petersen (1988); Hoshi, Kashyap, and Scharfstein (1991); Schaller (1993); Almeida, Campello, and Weisbach (2004); and Hermeindito (2004)'s research.

Instead, the result of hypothesis 4 shows that investment opportunity is more influential on investment decision on *NFC* corporation than on *FC* corporation. The result of this research is in accordance with Kaplan and Zingales (1997); Cleary (1999); Kristianti (2003)'s research. According to Jensen and Meckling (1976) that dividend policy and investment opportunity is a management controlling mechanism that can be substitution more depends on its application from the availability of internal funding source than external funding source through investment opportunity.

A corporation that has a high internal funding source is controlled through high dividend payment so that the corporation can be classified as *NFC*. Thus *NFC* corporation can easily adjust its funding source to have investment that shows bigger financial flexibility and tends to have easier access to external capital market. In other words, *NFC* corporation shows a high corporate value (Bhaddari, 1988; Chan and Chen, 1991; Fama and French, 1992). It means that *NFC* corporation is more sensitive towards investment opportunity in having investment.

V. CONCLUSION

From hypothesis test, then the conclusion from this research are explained as follow:

1. That liquidity is positively influential on investment decision. This influence shows that by a high liquidity, a corporation can have a higher investment opportunity on capital expenditure which is investment on fixed assets such as property, building, and supply.
2. That investment opportunity is positively influential on investment decision. If there is a profitable investment opportunity, then manager will try to take those opportunities to maximize stockholders' prosperity which means increasing corporate value. Thus, the more profitable investment is, the more investment will be done.
3. That liquidity is more influential on investment decision on *FC* corporation than *NFC* corporation. It is caused by the existing information asymmetric on external funding, so that external funding like debt is more expensive from internal funding impacting on *FC* corporation has less access to external funding source. It shows that investment decision of *FC* corporation is more sensitive on liquidity.
4. That investment opportunity is more influential towards investment decision on *NFC* corporation than on *FC* corporation. It because *NFC* corporation tends to have an easy access to external capital market so that it can easily adjust its funding sources to have investment that shows bigger financial flexibility. It means that *NFC* corporation is more sensitive towards investment opportunity in having investment.

This research shows the existing positive influence of liquidity towards investment opportunity, or in other words there is an interdependency among funding decisions which is liquidity with investment decision on Indonesian corporations especially corporation that become sample. Corporate investment decision is closed to investment opportunity. The result of this research supports the statement, that there is a positive influence of investment opportunity towards investment decision on Indonesian corporations especially corporations that become samples.

When liquidity influence and investment opportunity on investment decision are put into *FC* and *NFC* variable as moderation variable , then the result of the research shows that liquidity is more influential on investment opportunity on *FC* corporation than on *NFC* corporation. The implication is *FC* corporation will use liquidity to have investment. This result also shows that investment opportunity is more influential towards investment decision on *NFC* corporation than on *FC* corporation. If there is a profitable investment opportunity, then *NFC* corporation will take those opportunities to have investment. It is because *NFC* corporation has easier access to external funding corporation because it has a bigger financial flexibility, more expert, and longer. Thus, in having investment *NFC* corporation tends to be more sensitive on investment opportunity.

It should be underlined that this research has a limitation which is a development space for further research. The first thing is the number of limited samples, which is 136 non financial corporation during 5 years from 2003-2007 with the 680 observations. For the next research can add samples with a longer period. Second, many samples don't contain tax accounting value that is delayed in cash flow accumulation, so that many data are taken out. The future research should use cash flow proxy in other calculation. Beside that, the small sample number is also caused by the existing *outlier* data because it has a *cash flow*, *book to market*, *equity*, and *negative* investment value. Third, this research just uses two independent variables which are liquidity and investment opportunity. The future needs to add other independent variables that are relevant such as debt, so that it can be compared between internal funding source and external funding source moderated by *FC* and *NFC* corporation. Forth, sample is pooled so that one corporation categorized as *FC* corporation in this year can become an *NFC* corporation in next years. It should make a *Robustness test*, by *hold-out sample* way. The thing tested is just samples which in five or three years orderly are in the category.

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CO-MOVEMENT 4 PERIOD ASEAN CURRENCY 1997-2005 A THEORY APPLICATION NAMELY *OPTIMAL CURRENCY AREA* USING *VECTOR ERROR CORRECTION MODEL*

Moch. Doddy Ariefianto
*Perry Warjiyo*¹

Abstract

Starting from the Optimum Currency Area (OCA), this paper utilize the Vector Error Correction Model (VECM) to identify the dynamic short term and the long term co-movement between the ASEAN 4 currencies, including their existing fundamental mechanism. There are at least 3 important findings, (i) the co-movement between the ASEAN 4 currencies is not proved empirically, (ii) the theory of OCA does not robust in explaining the co-movement pattern in ASEAN, and (iii) the existance of OCA is a global phenomena, indicated from the significance of Yen currency on the ASEAN 4. These findings led to a conclusion of this paper that the ongoing economic integration as well as the financial one in ASEAN are not enough to form a unified monetary arrangement nor a common currency in this region.

JEL Classification : F02, F36, F33, C32

Keywords : Co-Movement, *Optimum Currency Area*, *Vector Error Correction Model*.

¹ Doddy Arifianto is Mandiri Bank Economist Senior (moch.ariefianto@bankmandiri.co.id and), Dr. Perry Warjiyo is Economic Research and Monetary Policy Director of Bank of Indonesia, (perry_w@bi.go.id).

I. INTRODUCTION

This research investigates the fundamental factor/mechanism working behind the *co-movement* (if exist) on a currency pair. It is exactly expected that by using currency fixed by market, the existing fundamental mechanism can be clearly seen. It is caused by the minimum distortion i.e. in a form of central/government bank interference.

The implication of existing *co-movement* can be economical and political. From the economic side, if a group of countries apparently have currencies that tightly correlating, those countries can implicitly unify their currencies. In other words those countries can release their monetary power and give it to a super-national board (in a unified economic arrangement).

One of the most successful union is the existing *European Monetary Union*, (EMU) and single currency with *European Central Bank* (ECB) as their central bank. However the process of unifying monetary has been occurring for decades. *Treaty Of Rome* (1957) can be said as the starting point that put the base/phase that must be sailed through in order to establish a European economic community. One of important studies doing research to the readiness of OCA prerequisites in ASEAN and European Union versus comparison done by Bayoumi and Mauro (1999). They explain that ASEAN countries have achieved the same level with European Union before Maastricht tractate 1991 in some aspects as follow:

1. Intra regional trade (measured by internal trade share on GDP).
2. Trade composition based on product type. By economic transition occurs, all countries (excluding Singapore) have a tendency as manufacturing countries.
3. Economic shock pattern. Even though the shock impact is bigger in ASEAN, the recovery process is faster in this area. Thus, we can say that net income form the economic shock tends to be neutral.

Nevertheless, they found some factors considered decrease the ASEAN unified currency affinity. Those factors are:

1. Culture diversification and political system in ASEAN tend to be higher than European Union
2. Significant trade diversification. Even though US, Japan, and European Zone are the primary trade partner, each proportion is heterogenic. It implies that each ASEAN country has a specific shock on a certain level.
3. *OCA index* (Eichengreen dan Bayoumi, 1996) shows the ASEAN countries readiness is lower than European countries on pre-Maastricht tractate. It shows the divergence is a correlation direction ASEAN currency towards one of the main currency in the world. Singapore, Malaysia, dan Philipine are suitable with USD block, meanwhile Indonesia and Thailand are suitable with JPY block.

This result confirmed the Frankel and Wei empirical finding (1994), Kim and Ryou (2001), and Alesina et al (2002) that problem faced in unifying ASEAN currencies is there is no single *anchor* currency for those ASEAN currencies.

From institution side, official activities regarding to existing OCA can be said as rare. Some of regional cooperation board has existed in this region i.e. ASEAN, AFTA, and SEACEN, ASEAN was established in 1967. However discourse in term of tighter regional agreement through monetary agreement (and unified currency) has just been appeared after ASEAN monetary crisis in 1997. Before this era, a monetary agreement seemed to be stuck because of the heterogenic exchange rate regime in ASIA (Wilson, 2002).

In 1997, Japan offered an idea to establish Asian Monetary Fund (AMF). It is the form of an awareness regarding to the need of *emergency* fund that can be directly used anytime (if it is needed). It can be a kind of disappointment to IMF's slow respond in overcoming crisis in ASIA. The idea got hard complaint from IMF (with US as the prime stakeholder) and it is finally failed to establish. To replace it, in an ASEAN+3 frame an agreement in term of providing *emergency* fund was implemented in a form of *swap* agreement. This initiative is well-known as *Chiang Mai Initiatives*. Though this forum, it seemed to be a development to an ASIAN obligation instrument.

From the unified currency effort side, countries in this area seem to be more "stiff". Even under Hanoi Plan Action on December 1998, ASEAN leaders agreed to begin a feasibility study on unified currency adoption. However in 2001, a formal project for this research began (Wilson, 2002). The project is known as *Kobe Research Project*.

Even in a decision maker level the unified monetary agreement moved slowly, pre-condition for ASIAN countries has actually existed. Eichengreen and Bayoumi (1996) in one of their study explained that Eastern Asian region has fulfilled OCA standard prerequisite and already had the same readiness with European zone. Bayoumi and Mauro (1999) has prposed the same thing by requiring a political commitment to ensure that the project will be succesful. Other proposal that can be seen are Wilson (2002), Mundel (2003), and Branson and Healy (2005).

Theoretical requirements and condition in which the unified currency is beneficial is a subject of *Optimum Currency Area* (OCA) theory. Modern OCA theory is comprehensively explained by Robert Mundell (1961) in his paper seminar with the tittle "*A Theory Of Optimum Currency Areas*". The thory briefly examines a group of county can get a bigger benefit by releasing their own currency utility and (together) adopt other currency or determine a fixed exchange regim (especially among OCA's member currency).

A bigger benefit can occur because of several things i.e. significant internal trade transaction among OCA's members, high production factor mobility, business cycle correlation, etc. In this condition, advantage that can be achieved by using their own currency (seignorage and independency of monetary policy) is lower compared by advantage achieved by unifying currencies (low transaction cost, stability and credibility of policy).

By assuming all those conditions are fulfilled, this research is conducted to identify existing OCA in ASIA especially among countries such as Indonesia, Singapore, Philippine, and Thailand (ASEAN4). Specifically, the problems of this research are done by answering three questions, *first*, Is there any *co-movement* that is statically useful or meaningful for ASIAN countries currencies? *second*, Are some criteria that are referred to OCA theory such as inflation diversity, national income, interest rate, and the number of circulating money among countries can be used as a clarifying factors from the *co-movement* of those ASIAN countries' currencies?; *third*, Is the ASIAN countries' currencies *co-movement* most likely a phenomenon of global currency exchange rate (JPY)?

The second part of this paper will discuss about theory point of view, theoretical model, and some of prime literature studies in terms of OCA establishment. The third part will discuss about methodology especially empirical model used to answer the three proposed research question. The forth part will discuss about result and analysis, and summary and suggestion of policy will be the closure.

II. THEORY

Classical thought regarding to unified economy (in a form of unified currency) can be tracked at least since John Stuart Mill (1848, page 176), in which he wrote

".....so much barbarism, however still remains in the transactions of most civilized nations that almost all independent countries choose to assert their nationality by having, to their own convenience and that of their neighbors, a peculiar currency of their own."

Mill's paradigm (as well as other classical economists) was based on a world in which all its economic aspects are flexible. Thus an economic shock can actually be overcome through real variable adjustment (i.e. production factor movement) without involving a nominal variable (i.e. exchange rate). For instance, if demand from country A drastically decrease (because of the shifting of world consumption pattern), then the production factor of the country can be used to other production (either domestic or in other countries) and by that, there will be a new

equilibrium. The adjustment was assumed occur shortly (because of no obstacles) so the substantial nominal variable deviation would no longer stand.

The more modern and comprehensive thought regarding to OCA theory was explained by Robert Mundel *paper seminar* with the tittle *A Theory Of Optimum Currency Areas* in 1961. OCA theory kept developing from here, in which by following structure from Mongeli (2002), it can be divided into some phases as follow²:

1. First phase (1960s until the beginning of 1970s). This phase is categorized by world situation that generally adhere a fixed exchange rate (*Bretton Wood*) and devisa supervision. Ideas come up to ask the benefit and the cost between fixed exchange rate and flexible exchange rate regime and the possibility of economic integration (especially Europe). Form this period, criteria came up and has to be fulfilled to optimize the economic integration benefit. Mundel (1961), Ingram (1962), McKinon (1963), Kenen (1969), Grubel (1970), Mintz (1970), Fleming (1971), and Corden (1972) are some of the beginning paper in term of OCA.
2. Reconsiliation phase (1970s). In this phase, OCA theory was develop by using cost benefir versus thought frame. (see Corden, 1972 and Mundell, 1973). If some areas (or som countries) are identified as OCA, then those areas can do unified currencies (unified monetary agreement). This fiscal implication can give a benefit but certainly has a cost. Warjiyo (2004) made a summary upon the benefit and the cost that can be seen in table IV.1.

Table IV.1 Benefit and Cost of Economic Integration	
Benefit	Cost
1. Micro efficiency increase due to extending money utility 2. Macro stability recovery and development due to price stability and fund access that is bigger than financial integration 3. Positive externality from transaction cost and lower cadangan devisa and policy coordination that is more effective	1. Some wekanesses on micro level especially on the first level of integration 2. Limited choice of policy instrument to stabilize macroeconomy 3. Discipline problem: existing incentive for the member (countries) to do deviation from joint economic tractate.
Source : Warjiyo (2004)	

3. *Reasement* phase (1980s until 1990s). Based on "*One Market, One Money Report*" report (Emerson et al, 1992), it was found that some aspects from OCA theory (the old one) needs to be adjusted. Those aspects include:
 - a. Uneffective monetary policy on long term output (*short run Phillips Curve phenomenon*). It reduced the cost from the lost independent monetary. (Impact of economic integration).

² See Horvarth (2003) and Hawkins and Mason (2003) to an OCA theory survey in a different points of view.

- b. The need of high credibility to help reduce inflation control cost in OCA member states
 - c. Exchange rate adjustment is not effective in influencing real sector. It was caused by the existing transmission process through *capital account*.
 - d. The single currency impact is getting smaller on labor market that caused by contract negotiation decentralization on corporate level.
4. Empirical phase (1990s). The effort to operate OCA increase by the existing European Union project (with their single currency: Euro). It can be said that European Union is a very important "landmark" for OCA theory development. In this phase, OCA theory developed through an empirical test towards theoretical model and characteristics (i.e Frankel and Rose (1996), Alesina et al (2002), and Baele (2004)).

In accordance with OCA theory development, OCA definition developed too. The latest and the most comprehensive definition given by Mongeli (2002) in which OCA is defined as

"Optimal geographic domain of a single currency, or of several currencies, whose exchange rates are irrevocably pegged and might be unified. The single currency, or the pegged currencies can only fluctuate in unison against the rest of the world"

It can be seen here that OCA has two key words which are (i) *OCA domain* defined as sovereign country that decides to adopt single currency or prevailing permanently fixed exchange rate (among OCA member country), (ii) *Optimality*, defined as character in which the benefit of macroeconomic adjustment (internal and external) from the respective exchange rate (by OCA domain) will decrease compared by the use of unified currency or bilateral exchange rate that is fixed and permanent. In other words, a group of countries will establish OCA if benefit given by OCA's membership is bigger than the lost caused by monetary policy control lost.

In order to optimize the unified currency, it needs to fulfill some certain characteristics. These characteristics shows the required condition so the OCA's benefit earned by its member can be optimized. Table IV.2 explains the OCA's characteristics (Mongeli, 2002).

On the latest decade, there is a development of contemporary thought in OCA theory. Unlike the previous thought pattern in which joint monetary area can be optimal the member states fulfill the requirements of OCA characteristics, Frankel and Rose (1998), precisely stated instead: OCA characteristics are endogenous. In other words, a group of countries could not fulfill one or more OCA characteristics *ex ante* but unifying monetary will be optimal *ex post*. Research that they did in 20 industrial countries gave an empirical support. Moreover, Corsetti and Pesenti (2002) gave a formal model about this aspect that had came up from the general equilibrium theory, and is called as OCA *self validating* model.

Table IV.2
Optimum Currency Area Requirements

No.	Karakteristik OCA	Persyaratan Untuk OCA
1.	Price and Wage Flexibility	Price and wage flexibility in and among OCA countries minimize exchange rate adjustment if shock occurs
2.	Production factor mobility	Production factor mobility, including labor, among OCA countries minimize the production factor price adjustment and exchange rate on the shock
3.	Financial market integration	Financial integration in a form of capital mobility (FDI, portfolio investment, investment) among OCA countries enables shock adjustment through capital flow.
4.	Economic openness level	Economic openness among OCA countries that is high will maximize international price transmission to domestic price.
5.	Production and consumption diversification	Various labor, economic sector, and production among OCA countries minimize Term of Trade adjustment
6.	Inflation rate equality	Inflation equality (in a low and stable meaning) among OCA countries push the term of trade stability and balance the current account.
7.	Fiscal integration	Fiscal transfer system among OCA countries enables fund distribution to a country that needs it.
8.	Political integration	Political willingness strengthens the joint commitment obedience, cooperation in any economic policy, and organizational relations among OCA countries

Source : Mongeli (2002)

II.1. Theoretical Model

The theoretical frame of this study was established (*flexible price monetary approach*, FLMA)³. FLMA began from criticism on exchange rate determination using *flow* approach of balance payment. Mussa (1979) stated that exchange rate determination should have been approached by using asset price approach (because exchange rate is relative price of domestic currency towards other currencies).

If the exchange rate is considered as an asset, then there will be implications as follow:

1. Expectation factor will important in determining exchange rate. It occurs because money *durability* is high. Thus expectation change in the future will influence the current exchange rate.
2. Due to asset is a stock concept, then equilibrium is defined as a situation in which currency demand stock will be equal with the money supply stock. Thus balance of payment *flow* can not be used in determining exchange rate because it is just a situation of disequilibrium that is temporal. It is the central spot from the thought of monetary approach towards exchange rate proponent.

³ Frenkel (1976), Mussa (1976) and Bilson (1978) papers can be considered as FLMA model pioneer.

3. Real factor can influence exchange rate, but just through money demand factor.
4. *Empirical regularities* which is: (1) *spot rate and forward rate* have a tight correlation, (2) exchange rate with *random walk* attitude (from market efficiency hypothesis, see Fama (1970), (3) *forward rate* can be used as an exchange expectation and (4) relevant new information will change the current exchange rate.

Before examining more about model in detail, it is firstly assumed several things (MacDonald, 1988 and Gartner, 1993):

1. World economy is divided into two, domestic and world with the relevant macroeconomic variables.
2. *Small economy* which means domestic economic variable value has no impact on world economy
3. Domestic and world economy are always in *full employment* condition.
4. Good and service market always achieve the equilibrium condition (if there is a shock)
5. Domestic and foreign financial market have the same characteristics.
6. Fulfillment of *uncovered interest rate parity*.
7. Price flexibility and purchasing power parity/PPP prevail.
8. *Constant Real Exchange Rate*.

Notation Convention for variable within the model:

y : national income	r : domestic interest rates
y* : world income	r* : world interest rates
s : exchange rate (in x of the domestic currency loy currency world)	M : domestic money supply
p* : world price level	M* : world money supply
p : domestic price level	\dot{s} : depreciation rate
g : domestic government spending	

All the above notations (excluding interest rate) are in natural logarithm form ($y = \ln(Y)$; Y = national revenue in Rupiah)⁴.

4 This kind of modelling gives a comparative statistical interpretation benefit. In a natural logarithm form, coefficient that is generated from the first derivation of a variable towards other variable is an elasticity. For example $y = ax$, then $d/dx (y) = a$ $d/dx (x) = 1/y$ $y' = a$ x'/x so $a = y'/y : x'/x$ which is an elasticity.

FLMA model can be simply explained in the following equations:

1. Real sector equation (IS Curve):

$$y = \delta(s + p^* - p) + \gamma y^* + \beta r + g \quad (IV.1)$$

Where $\delta > 0$ (Marshall-Lerner Condition is fulfilled), $\gamma > 0$, $\beta < 0$

2. Monetary Sector:

$$m - p = \phi y - \lambda r \quad (IV.2)$$

$$m^* - p^* = \phi y^* - \lambda r^* \quad (IV.3)$$

With assumption: $\phi > 0$, $\lambda > 0$ (Cagan money demand)

3. Asset Market (Uncovered Interest Parity):

To get an exchange rate that guarantee equilibrium on the above three markets, we can do some mathematical operations as follow:

$$r = r^* + E(\dot{s}) \quad (IV.4)$$

Rearrange equation IV.1 as

$$p - p^* = s + \frac{1}{\delta}(-y + \gamma y^* + \beta r + g) \quad (IV.5)$$

From equation IV.2 and IV.3 we can get

$$\begin{aligned} p - p^* &= m - \phi y + \lambda r - (m^* - \phi y^* + \lambda r^*) \\ &= (m - m^*) - \phi(y - y^*) + \lambda(r - r^*) \end{aligned} \quad (IV.6)$$

Rearrange equation IV.5 and substitute equaiton IV.6

$$\begin{aligned} s &= (p - p^*) - \frac{1}{\delta}(-y + \gamma y^* + \beta r + g) \\ s &= (m - m^*) - \phi(y - y^*) + \lambda(r - r^*) - \frac{1}{\delta}(-y + \gamma y^* + \beta r + g) \\ &= (m - m^*) - \phi(y - y^*) + \lambda(r - r^*) + \frac{1}{\delta}y - \frac{\gamma}{\delta}y^* - \frac{\beta}{\delta}r - \frac{g}{\delta} \\ &= (m - m^*) + \frac{1 - \phi\delta}{\delta}y + \frac{\phi\delta - \gamma}{\delta}y^* + \frac{\lambda\delta - \beta}{\delta}r - \lambda r^* - \frac{g}{\delta} \end{aligned} \quad (IV.7)$$

By substituting equation IV.4 into equation IV.7 we can get

$$\begin{aligned} s &= (m - m^*) + \frac{1 - \phi\delta}{\delta} y + \frac{\phi\delta - \gamma}{\delta} y^* + \frac{\lambda\delta - \beta}{\delta} (r^* + E(\dot{s})) - \lambda r^* - \frac{g}{\delta} \\ &= (m - m^*) + \frac{1 - \phi\delta}{\delta} y + \frac{\phi\delta - \gamma}{\delta} y^* - \frac{\beta}{\delta} r^* + \frac{\lambda\delta - \beta}{\delta} E(\dot{s}) - \frac{g}{\delta} \end{aligned} \quad (IV.8)$$

With assumption *real exchange rate* is constant, then the equations can be re-written as

$$s = (m - m^*) + \frac{1 - \phi\delta}{\delta} y + \frac{\phi\delta - \gamma}{\delta} y^* - \frac{\beta}{\delta} r^* + \frac{\lambda\delta - \beta}{\delta} \left[E(\dot{p}) - E(\dot{p}^*) \right] - \frac{g}{\delta} \quad (IV.9)$$

Finally, because economy is assumed in full employment condition, then inflation expectation will be same with the circulating money development expectation, or

$$s = (m - m^*) + \frac{1 - \phi\delta}{\delta} y + \frac{\phi\delta - \gamma}{\delta} y^* - \frac{\beta}{\delta} r^* + \frac{\lambda\delta - \beta}{\delta} \left[E(\dot{m}) - E(\dot{m}^*) \right] - \frac{g}{\delta} \quad (IV.10)$$

Exchange rate attitude can be derived as follow:

$$\frac{\partial s}{\partial m} = 1 + \frac{\lambda\delta - \beta}{\delta} \frac{dE(\dot{m})}{dm} > 1^5; \quad \frac{\partial s}{\partial m^*} = -1 - \frac{\lambda\delta - \beta}{\delta} \frac{dE(\dot{m})}{dm^*} < 0; \quad \frac{\partial s}{\partial r^*} = -\frac{\beta}{\delta} > 0$$

$$\frac{\partial s}{\partial g} = -\frac{1}{\delta} < 0 \quad (IV.11)$$

and

$$\frac{\partial s}{\partial y} \text{ and } \frac{\partial s}{\partial y^*} \text{ can take any values}$$

The above FLMA model has just discussed 4 from 8 OCA characteristics, which is Financial Market Integration, Economic Openness Level, Inflation Rate Equality, and Fiscal Integration. Thus this model is not completed yet. To discuss about exchange attitude towards COA that aren't included yet, the above model can be re-extending. It is done as follow:

5 Exchange rate respond towards development change of circulating money number more than proportional (1:1). Is called *magnification effect* by Bilson

1. The use production function $Y = F(X)$ which is a special class from CRTS production function (*Constant Return To Scale*), which is Cobb-Douglas⁶ production function. In the log linear function form, it can be written as

$$y = \sum_{i=1}^n \alpha_i x_i \quad \sum_{i=1}^n \alpha_i = 1 \quad ;^7 \quad (IV.12)$$

Where $x_i = \ln(X_i)$

2. By assuming that corporation is (1) *price taker* (in a perfect market) and (2) single goal: maximizing profit, then we can formulize producer problems mathematically as follow:

$$\begin{aligned} \text{Min } & \mathbf{w}\mathbf{x} \\ & \mathbf{x} \geq 0 \\ \text{st } & f(\mathbf{x}) \geq \mathbf{y} \end{aligned} \quad (IV.13)$$

where \mathbf{w} : input price vektor (and $\mathbf{w} \gg \mathbf{0}$), \mathbf{y} is output vektor desired. Solution of this problem is

$$\mathbf{w} \geq \mathbf{\ddot{e}}\nabla f(\mathbf{x}^o) \quad \text{and} \quad \mathbf{w} - \mathbf{\ddot{e}}\nabla f(\mathbf{x}^o) = \mathbf{0} \quad (IV.14)$$

Where $\Delta f(\mathbf{x})$ is *gradient vector*: $\frac{\partial f(\mathbf{x})}{\partial \mathbf{x}}$

From this solution we can implicitly define \mathbf{x}^o input price function (\mathbf{w}) and output (\mathbf{y}) or $\mathbf{x}^o = \mathbf{x}^o(\mathbf{w}, \mathbf{y})$ (IV.15)

3. By substituting IV,15 into IV.12 then we get

$$y = \sum_{i=1}^n \alpha_i x(\mathbf{w}, \mathbf{y})_i \quad ; \quad \sum_{i=1}^n \alpha_i = 1 \quad (IV.16)$$

Atau dalam kondisi optimisasi adalah

$$y = \sum_{i=1}^n \alpha_i x(\mathbf{w})_i \quad ; \quad \sum_{i=1}^n \alpha_i = 1 \quad (IV.17)$$

6 General form of Cobb-Douglas function is $Y = A \prod_{i=1}^n X_i^{\alpha_i}$, with assumption of CRTS: $\sum_{i=1}^n \alpha_i = 1$ so and thus the function can be re-

written as, $Y = A \prod_{i=1}^n X_i^{\alpha_i}$; $\sum_{i=1}^n \alpha_i = 1$

7 Proof: $Y = A \prod_{i=1}^n X_i^{\alpha_i}$; ; with assumption $A = 1$ and by taking log value then the production function can be re-written as

$\ln(Y) = \sum_{i=1}^n \alpha_i \ln(X_i)$ where $\sum_{i=1}^n \alpha_i = 1$. Consistent with convention, where the lower case is logarithm from, then $\mathbf{y} = \sum_{i=1}^n \alpha_i x_i$;

$\sum_{i=1}^n \alpha_i = 1$ as desired.

4. Hasil yang terakhir ini dapat disubsitusikan kembali ke pers. IV.10 dan memberikan

$$s = (m - m^*) + \frac{1 - \phi\delta}{\delta} \sum_{i=1}^n \alpha_i x_i(w) + \frac{\phi\delta - \gamma}{\delta} \sum_{i=1}^n \alpha_i^* x_i^*(w) - \frac{\beta}{\delta} r^* + \frac{\lambda\delta - \beta}{\delta} \left[E(\dot{m}) - E(\dot{m}^*) \right] - \frac{g}{\delta} \quad (\text{IV.18})$$

Equation IV.18 completes the overall discussion about exchange rate attitude from OCA characteristics. As seen the existing component $\sum_{i=1}^n \alpha_i x_i(w)$ and $\sum_{i=1}^n \alpha_i^* x_i^*(w)$ shows price and wage flexibility, production factor mobility, and production and consumption diversification.

As the summary, model that has been derived above can be interpreted as follow:

1. Exchange rate is a negative function on the difference between domestic and foreign circulating money. With assumption rational expectation, magnitude from difference variable of the number of circulating money will be bigger than static expectation condition.
2. The shock on supply side (wage, business cycle, trade cooperation, etc) has an undetermined impact on exchange rate. It is a logic consequences which is agregat output parameter from model can not have a certain sign.
3. Foreign interest rate increase will negatively impact the domestic exchange rate.
4. The impact of fiscal expansion is positive for domestic exchange rate.

It needs to emphasize that this model assumes that the world consisting of two countries, the next generalization on many countries' condition needs a note. Theory frame as explained above is valid if ASEAN 4 has a same *anchor* currency (i.e. USD or JPY). In this condition, the one getting role as foreign party is US or Japan. A variant concerning double *anchor* (currency basket) can be also adapted along the currency basket is identical for all ASEAN4 countries.

With the term the above assumption is fulfilled, this model can explain the aggregate movement of ASEAN4 currency (if proven statistically significant). It can be explained as follow:

1. Notate s_j first as j 's exchange rate (assumed as OCA member consisting n countries) towards a currency considered as *benchmark* (i.e. USD).
2. The existing OCA on the group of countries can characterized by fulfilling the following equation

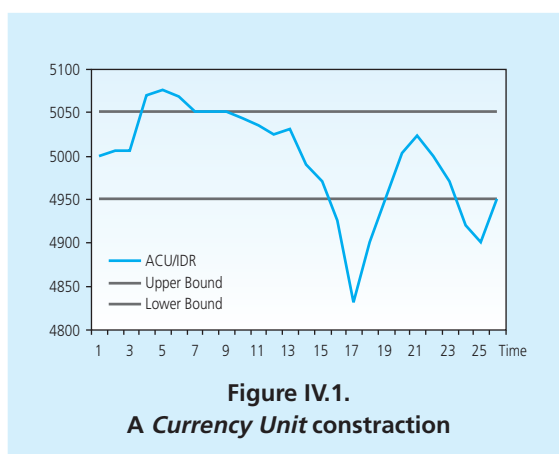
$$s = w_1 s_1 = w_2 s_2 = \dots = w_n s_n \quad (\text{IV.19})$$

where s is OCA's unified currency which is currencies function of OCA member (s_i ; $i = 1, 2, \dots, n$) and w_i is currency weigh s_i within s .

3. If currencies of a group of country is OCA, then coefficient w_i should have the same mathematical sign (positive). *Magnitude* can be different depends on the economic significance.
4. Implication from FLMA is macroeconomic variable movement has to be consistent with the exchange rate, because

$$s = w_1 s_1 [(m_1 - m^*), (y_1 - y^*), \dots] = w_2 s_2 [(m_2 - m^*), (y_2 - y^*), \dots] = \dots \\ = w_n s_n [(m_n - m^*), (y_n - y^*), \dots] \quad (II.20)$$

In other words, policy or country's economy that is not consistent will make the country out from OCA⁸.



Graphically, the concept that has just been explained above can be concluded in Figure IV.1. As seen here, if Indonesia joined in the commitment of ASEAN4 unified currency (let say its currency is ASEAN *Currency Unit*, ACU), then IDR versus ACU movement should be in the range that has been agreed. If IDR moves out of the range continuously, then the commitment (and ability) of IDR to keep being the ASEAN4 monetary agreement member will be questioned.

Moreover, as the consequences the OCA currency must move parallelly with *anchor* currency. The writer will explain it through an illustration. Let say Indonesia and Thailand are ACU member with conversion rate 1 ACU = IDR 1000 and 1 ACU = 10 THB. Both countries is known have the same *anchor* on USD with exchange rate 1 USD = IDR10.000 and 1 USD = 100

⁸ As seen later, the writer put the inflation variable and interest rate separately into model. It potentially evokes a multicollinearity problem. Nevertheless, as seen on the formal model explained here, inflation needs to be put to be a proxy from the inflation expectation. If the expectation is perfect then it can be expected a multicollinearity that occurs is light (ignorable)

THB. Now, the internal (towards ACU) and external (towards USD) exchange rate are consistent. But if the change of external exchange rate occurs, especially IDR, i.e. 1 USD = IDR 5000 and other are fixed, then there will be an *arbitrage* chance. Externally, exchange rate of 1 THB = IDR 50, meanwhile through ACU 1 THB = IDR 100. Benefit without risk can be gained by buying THB by IDR (through USD) and (concurrently) sell it through ACU.

II.2. Some of Previous Empirical Study

One of the OCA empirical study that is very influential is from Frenkel and Wei (1993). They try to see the existing trade block and currency block based on gravitation theory. This theory gave a ready hypothesis test: trade intensity and co movement of currency is (1) linear with economic size and (2) reverse to distance. The taken sample includes 63 countries all around the world (Europe, Western Hemisphere, and Asia zone) with any observation period that are not identical. By using estimation technique on the *first difference* they found that currency of a country commonly has a tight relation with the prime world currency (USD, Yen, and Deustchmark). For Europe zone, Deustchmark is dominant and for western hemisphere and ASIA is USD.

A study that specially focus on the ASIAN currencies (IDR, THB, PHP, SGD, KRW, MYR) towards the two world currencies which are USD and JPY is done by Takagi (1996). He used a descriptive approach through episodes observation in which JPY fluctuatively moved along 1980-1995. Here he thought that JPY's role may be more significant than econometric estimation (especially the study result of Frenkel and Wei (1993)) but not simetric. When JPY experienced a depreciation depression, ASIAN currencies tends to follow it. In other words, there were an increase in JPY weigh in determining the exchange rate of ASIAN currency, when JPY experienced depreciation. Takagi (1996) stated that it happened in order to keep the competitve export. Instead, if JPY tends to be stable, the weigh will be much more on USD. The last is assumed to stabilize the domestic inflation stability.

Other methods in calculating relation among currencies was done by Kim and Ryou (2001). They tried to estimate the world prime currencies weigh (USD, JPY, and Deustchmark) in determining the exchange rate of some ASIAN countries (Korea, Singapore, Malaysia, Indonesia, Thailand, Philipine, Hong Kong, and Taiwan). The weigh was calculated by doing OLS regression between i towards USD, JPY, and Deustchmark in the denominator (*Special Drawing Right/SDR*). They found that ASIA can not be chategorized as a single currency block (i.e. USD or JPY). Moreover they assumed that the *setting* of the countries' exchange rate determination is toward the currency basket.

The above studies generally do a separated research between exchange rate *co-movement* and macroeconomic variable co-movement or just observe one aspect only. It is a weakness. Interaction between exchange rate and macroeconomic variable can be in two ways, all of them are endogenous variable. Thus a research on exchange rate co-movement only without involving macroeconomic variable will end on misspecification problem.

Other weaknesses of the previous research is in the methodology aspect. All empirical research given above was estimated by using OLS (or its variant). OLS technique use has some weaknesses as follow:

1. *Spurious regression*. A research is generally done by using *time series* data. Special characteristics from this data is the existing autocorrelation phenomenon (current variable value can be explained by the variables value in the past. Thus LS estimation between two variables with its data that has the characteristics would make spurious regression problem. (Gujarati, 2003).
2. *Endogeneity*. LS technique assumed the existing clear relation direction. So when Y is regressed towards X, then in the model, it is assumed at once that X is clarifying variables and Y is clarified variables. Many relations among economic variables that are simultaneous, so according to Sims (1980), those variables should have been treated on the *equal footing*
3. *Ad hoc process*. Macroeconomic variables is usually *nonstationary / integrated* on orde 1 or 2 (Nelson and Plosser, 1982). Whereas LS will be valid only if variable used is *stationary*. To overcome this problem, the previous research is done by using *first differenced*. Sims (1980) argued this technique because he assumed that it can waste any valueable information on the data.
4. *Short term vs long term*. By using LS technique, relation obtained isn't certainly long term, it might be even prevailing in sample period. Thus, it needs a technique that can show the existing equilibrium and linear realtions among variables that are *nonstationary* but has a *stationary error* that is called *cointegration*. (Enders, 1995)

In this paper, the writer tries to do some recoveries based on the above mentioned weaknesses. The recovery includes:

1. Modelling that involves exchange rate *co-movement* (versus two *currency anchors* which are USD and JPY) and other macroeconomic variables *co-movement* (which are price rate, interest rate, national output, and circulating money). Nevertheless the writer limits relation form as the exchange rate is dependent variable and macroeconomic variable as an independent variable (exogenic). Thus model used is for (1) identification of the existng exchange rate *co-movement* and (2) the use macroeconomic variable as a controlling variable (that is why OCA theory is valid as a clarifying)

2. Estimation technique recovery, by reason as mentioned above, this paper doesn't use OLS. To replace it, it uses an econometric technique that is called as *vector error correction model/* VECM (Johansen, 1988)⁹.

III. METHODOLOGY

The research hypothesis is tested by estimating relation model among variables in *vector error correction model* (VECM) as given by equation IV.21.

$$\Delta Y_t = \sum_{i=1}^{k-1} \Gamma_i \Delta Y_{t-i} + \Pi Y_{t-k} + \Phi X_t + \mu + \varepsilon_t \quad (\text{IV.21})$$

To estimate this model, the writer uses The Johansen method (1988). The empirical model should be able to show that OCA characteristics variable (X_t) is very influential on ASEAN4 exchange rate *co-movement*. It is done by taking out some of OCA characteristics as a controlling variable that is assumed exogenous towards the exchange rate. Because OCA is defined as an area in which the use of unified currency would give an optimal result, then the impact of a shock or a policy on a currency is equal to other currencies.

For instance, if Thailand Monetary Authority decided to increase the number of circulating money (monetary expansion), it would not just weaken THB towards USD (based on FLMA), but all ASEAN4 countries' currency. It is the most ideal OCA's form (let say a *strong form OCA*). In a weak form, OCA is estimated exist, only with the existing co-integration. It is caused the limited OCA characteristics variable involved as controlling / exogenous variable.

The characteristics will be automatically answered if the equilibrium that is gained has the same direction, i.e. $IDR = _ SGD$; where $_ > 0$. The most tight OCA's form requires $_ = 1$. Thus here, the writer considers that OCA has been identified along $_ > 0$ and statistically significant. Hereafter the writer was also interested to know the possibility of the existing other *anchor* currencies, in which in this paper JPY is choosen. To avoid representation complexity, JPY variable (towards USD) is used as exogenous variable. Certainly, if this variable has positive and significant coefficient, then ASEAN4 currency has *anchor* on JPY too.

The variables used can be explained as follow¹⁰:

1. IDR, SGD, PHP, and THB: exchange rate with convention 1 USD is equal to X domestic currency.

9 VECM is a class from *Vector Auto Regressive Model* that is introduced by Sims (1980). This method is a development from simultaneous equation used atheoretically.

10 Variabel yang digunakan adalah dalam bentuk log. Notasi X didepan setiap variabel merujuk pada Indonesia (ID), Singapura(SG), Philipina(PH) dan Thailand(TH) sedangkan t adalah periode.

2. XUS_INF_t : difference between ASEAN4 versus US
3. XUS_IRT_t : difference of interest rate change between ASEAN4 versus US
4. XUS_GRW_t : difference of real GDP growth between ASEAN4 versus US
5. XUS_MIC_t : difference of growth between M1 ASEAN4 versus US
6. JPY_FX : first difference from log JPY ($JPY_t - JPY_{t-1}$).

Number of variables used in this study is 21 variables. Data that has a monthly frequency with observation period includes 1997:09 to 2005:09 (97 observation).

OCA testing is done in 2 steps. The first step is bivariate OCA testing that just involved two ASEAN4 currencies. Overall, there are 6 bivariate OCA combination as follow:

1. OCA1: endogenous variable: IDR, SGD dan exogenous variable: IDUS_INF, IDUS_IRT, IDUS_GRW, IDUS_M1C, SGUS_INF, SGUS_IRT, SGUS_GRW, SGUS_M1C dan JPY_FX.
2. OCA2: endogenous variable: IDR, PHP dan exogenous variable: IDUS_INF, IDUS_IRT, IDUS_GRW, IDUS_M1C, PHUS_INF, PHUS_IRT, PHUS_GRW, PHUS_M1C dan JPY_FX.
3. OCA3: endogenous variable: IDR, THB dan exogenous variable: IDUS_INF, IDUS_IRT, IDUS_GRW, IDUS_M1C, THUS_INF, THUS_IRT, THUS_GRW, THUS_M1C dan JPY_FX.
4. OCA4: variabel endogen: SGD, PHP dan variabel eksogen: SGUS_INF, SGUS_IRT, SGUS_GRW, SGUS_M1C, PHUS_INF, PHUS_IRT, PHUS_GRW, PHUS_M1C dan JPY_FX.
5. OCA5: variabel endogen: SGD, THB dan variabel eksogen: SGUS_INF, SGUS_IRT, SGUS_GRW, SGUS_M1C, THUS_INF, THUS_IRT, THUS_GRW, THUS_M1C dan JPY_FX.
6. OCA6: variabel endogen: PHP, THB dan variabel eksogen: PHUS_INF, PHUS_IRT, PHUS_GRW, PHUS_M1C, THUS_INF, THUS_IRT, THUS_GRW, THUS_M1C dan JPY_FX.

The second step is done by modelling all the above 21 variables: 4 currencies, 16 OCA exogenous, and JPY_FX (let say as Complete OCA Model).

It is done to obtain more comprehensive description about the existing OCA in ASEAN4. If there is a consistency on OCA either in bivariate or complete model, it gives stronger description on how OCA was established.

1. The form of relation is short-term, if the co-integration variable / *error correction term* is not significant.
2. The form of relation is long-term, if the co-integration variable / *error correction model* is negative and significant¹¹.

To make a VECM estimation, the writer follows the steps as suggested by Enders (1995) and A.V. Hardiyanto (2004):

¹¹If *Error Correction Term* is significant and positive, the existing relation is explosive and it means that the system is not convergent

1. The test of integration degree. It is to ensure that variables in analysis doesn't have any different integration order.
2. Choose the *Auto Regressive Vector* based on *lag length criteria*.
3. Conduct a *Cointegration Test*
4. Estimation and Investigation of the process result of *Vector Error Correction* in term of the relation of *normality criteria* and *classical test*.
5. Conduct a restriction and a test that parameter that is found has matched with hypothesis.

Research hypothesis is tested by observing whether the characteristics are fulfilled on VECM below:

1. The existing joint movement among ASEAN4 currencies. It shown by *Impact Matrix* (II), where the adjusting coefficient a_i is negative and significant. It means there is a long term equilibrium relation and a mechanism in which a deviation of equilibrium relation will be balance.
2. OCA theory can explain *co-movement*: OCA characteristics which are inflation difference, national revenue, interest rate, and the number of circulating money among countries can be used as a clarifying factor from the ASEAN currencies *co-movement*. It occurs if:
 - a. All coefficient of ASEAN4 price rate difference with US are positive and significant.
 - b. All coefficient of ASEAN4 interest rate difference with US are positive and significant.
 - c. All coefficient of ASEAN4 real GDP difference with US can be either positive or negative but the important one is direction consistency and is significant¹²
 - d. Coefficient difference of ASEAN4 circulating money with US is positive and significant.
3. Global influence: ASEAN4 currencies has anchor currency that is identical (USD, JPY, or USD and JPY). It shown by coefficient matrix of short term relation (Γ_1) and cointegration relation vector (β) that have the same coefficient symbol (positive) and is significant. The alternative: if the coefficient is not significant but the JPY coefficient is significant (by taking any symbols) then *anchor* for currencies in this area is JPY. The rejection to both of the conditions can be interpreted by OCA absence defined towards USD and/or JPY *anchor*. In the other hand if those both *anchors* are significant then ASEAN4 currencies is considered have a kind of yoke on a currency basket where either USD or JPY place the dominant portion.
4. If the intended coefficient on point 1, 2, or 3 are not different from zero or it obtains a divergent result, then it concludes that the requirements of OCA from this study are not fulfilled.

¹²Based on the coefficient 10 equation from GDP differences (ASEAN4 versus US) is $\frac{1 - \phi\delta}{\delta}y + \frac{\phi\delta - \gamma}{\delta}y^*$, the parameter

value can not be determined early because the value of δ , γ and ϕ is unknown. It emphasizes on consistency, exchange rate respond. If in IDR, GDP increase is depreciative then on GDP, THB, and PHP should be depreciative too

In term of hypothesis verification, it explains that:

1. Bivariat model and complete model is a hypothesis verification phasing thus bivariate model will be a support for complete model. In other words, coefficient algebraic symbol and significance obtained should be same.
2. If differences between the two models, then it is seen model with the higher statistical significance size wholly or partially.
3. The next summary is done statistically. If the partial model has a better statistical size, then it can be concluded that OCA empirical support is low in ASEAN4 level. In this case, OCA is defined better bilaterally.
4. Inexpediency on hypothesis is considered as a gradation on OCA requirements. *Maintained hypothesis* is the existing OCA in ASEAN4. This hypothesis got the strongest support if all coefficient have the appropriate algebraic symbol and is statistically significant. The more algebraic symbols or coefficient that are not significant, the bigger deviation gradation on the existing OCA.

IV. RESULT AND ANALYSIS

Result and analysis part will explain the estimation result and analysis on the empirical finding. The first sub section will explain the pretest result and model validation consisting of stationarity and cointegration variable testing that ae used (including lag optimal selection). In the Pre Test and Model Validation part, there is a stability and classical assumption disobedience. In the second sub section, it will discuss about the co movement phenomenon and the variable that infulences it. At the end of this discussion, we have some opinions in term of the exisiting OCA and evaluation (assestment) on the empirical requirements fulfillment that has been obtained.

IV.1. Pre Test and Model Validation

Table IV.3 shows that (excluding IDR) Exchange rate variable is integration degree 1 (I(1)). Here we thought IDR got problems namely *near stationary*. As explained by Harris (1995), one of the problem in unit *root testing*, is the low *power* and *size* form the technique testing. Thus, it seems better to consider that IDR data characteristics is *non stationary*.

Testing on the stationarity characteristics from exogenous variable shows that these variables are I(1). First differencing is enough to change the characteristics of data to be stationary (see table IV.4).

Table IV.3
Integration Degree Testing on Exchange Rate Variable

No.	Variable	ADF				Phillips-Perron				Conclusion
		Model	Lag	t stat	p value	Model	Bandwidth	t stat	p value	
1	IDR (Lv)	Constant	5	-3.76	0.005	Trend	8	-5.04	0.000	I(0)
	IDR (1d)	None	4	-4.42	0.001	Constant	12	-7.52	0.000	
2	SGD (Lv)	Constant	4	-1.19	0.677	Constant	5	-3.60	0.008	I(1)
	SGD (1d)	None	3	-10.32	0.000	Trend	18	-8.48	0.000	
3	PHP (Lv)	Trend	1	-2.76	0.216	Constant	1	-2.47	0.125	I(1)
	PHP (1d)	Constant	0	-7.60	0.000	Constant	6	-7.46	0.000	
4	THB (Lv)	Constant	5	-2.05	0.266	Constant	4	-3.21	0.022	I(1)
	THB (1d)	None	4	-4.13	0.000	None	22	-7.33	0.000	
5	JPY (Lv)	Constant	5	-1.54	0.507	Constant	4	-2.00	0.284	I(1)
	JPY (1d)	None	4	-5.58	0.000	None	3	-7.44	0.000	

Table IV.4
Integration Degree Testing on Exogenous Variable

No.	Variable	ADF				Phillips-Perron				Conclusion
		Model	Lag	t stat	p value	Model	Bandwidth	t stat	p value	
1	IDUS_INF (Lv)	Constant	4	-3.75	0.00	Constant	9	-3.92	0.00	I(0)
	IDUS_INF (1d)	Constant	3	-12.15	0.00	Constant	65	-22.40	0.00	
	SGUS_INF (Lv)	Constant	1	-9.65	0.00	Constant	4	-13.14	0.00	
	SGUS_INF (1d)	Constant	5	-8.32	0.00	Constant	18	-46.67	0.00	
	PHUS_INF (Lv)	Constant	0	-7.56	0.00	Constant	4	-7.52	0.00	
	PHUS_INF (1d)	Constant	5	-7.40	0.00	Constant	50	-43.70	0.00	
2	THUS_INF (Lv)	Constant	2	-4.05	0.00	Constant	2	-7.14	0.00	I(0)
	THUS_INF (1d)	Constant	5	-6.67	0.00	Constant	54	-29.47	0.00	
	IDUS_IRT(Lv)	Constant	0	-4.09	0.00	Constant	1	-4.05	0.00	
	IDUS_IRT(1d)	Constant	1	-9.57	0.00	Constant	9	-13.09	0.00	
	SGUS_IRT (Lv)	Constant	0	-6.46	0.00	Constant	2	-6.47	0.00	
	SGUS_IRT(1d)	Constant	5	-6.55	0.00	Constant	20	-27.68	0.00	
3	PHUS_IRT(Lv)	Constant	1	-5.86	0.00	Constant	4	-9.68	0.00	I(0)
	PHUS_IRT(1d)	Constant	3	-7.65	0.00	Constant	15	-42.68	0.00	
	THUS_IRT(Lv)	Constant	1	-4.76	0.00	Constant	4	-7.45	0.00	
	THUS_IRT(1d)	Constant	4	-6.76	0.00	Constant	15	-27.75	0.00	
	IDUS_GRW(Lv)	Constant	3	-3.10	0.03	Constant	94	-5.32	0.00	
	IDUS_GRW(1d)	Constant	5	-8.23	0.00	Constant	20	-20.36	0.00	
4	SGUS_GRW (Lv)	Constant	5	-5.50	0.00	Constant	10	-10.07	0.00	I(0)
	SGUS_GRW(1d)	Constant	5	-7.64	0.00	Constant	41	-14.77	0.00	
	PHUS_GRW(Lv)	Constant	5	-5.40	0.00	Constant	32	-7.26	0.00	
	PHUS_GRW(1d)	Constant	2	-18.94	0.00	Constant	20	-20.52	0.00	
	THUS_GRW(Lv)	Constant	5	-10.83	0.00	Constant	1	-4.51	0.00	
	THUS_GRW(1d)	Constant	5	-10.91	0.00	Constant	2	-10.66	0.00	
4	IDUS_M1C(Lv)	Constant	0	-9.99	0.00	Constant	2	-9.99	0.00	I(0)
	IDUS_M1C(1d)	Constant	4	-7.86	0.00	Constant	57	-80.84	0.00	
	SGUS_M1C (Lv)	Constant	0	-12.47	0.00	Constant	2	-12.59	0.00	
	SGUS_M1C(1d)	Constant	4	-7.41	0.00	Constant	23	-63.37	0.00	
	PHUS_M1C(Lv)	Constant	0	-10.18	0.00	Constant	6	-10.32	0.00	
	PHUS_M1C(1d)	Constant	5	-7.10	0.00	Constant	31	-56.06	0.00	
4	THUS_M1C(Lv)	Constant	3	-4.19	0.00	Constant	5	-9.14	0.00	I(0)
	THUS_M1C(1d)	Constant	1	-12.44	0.00	Constant	3	-21.74	0.00	

With this kind of data characteristics, in which the endogenous variables is I(1) and exogenous variable (*first difference form*) is stationary, then the use of VECM technique has fulfilled its first requirements. All variables here already have the same integration degree. The next analysis step is done by selecting the *optimal lag*.

Just like *unit root* testing, optimal lag is chosen by firstly choosing the maximum lag that is estimated doesn't have autocorrelation characteristics anymore. Here, the formula from Said-Dickey is re-used (1984), that gives a maximum lag by 5 (see table 5). Information criteria calculation for each OCA model (bivariate and complete model) shows optimal lag is on the lag 5. Exception exist on IDR-PHP bivariate, that gives equal preferences between lag 4 and lag 5. Beside fulfilling the optimal requirements, VAR with the chosen lag fulfills the stability requirements too.

Table IV.5 Optimal Lag Selection and Stability Requirements				
No.	OCA Type	Lag Optimal	Criteria	Stability
1	IDR-SGD	5	LR, FPE, AIC, HQ	Yes
2	IDR-PHP	5	FPE, AIC	Yes
		4	LR, HQ	
3	IDR-THB	5	LR, FPE, AIC, HQ	Yes
4	SGD-PHP	5	LR, FPE, AIC, HQ	Yes
5	SGD-THB	5	LR, FPE, AIC, HQ	Yes
6	PHP-THB	5	LR, FPE, AIC	Yes
7	Complete Model	5	LR, FPE, AIC	Yes

The previous obtained lag will be used as the chosen lag in cointegration testing. Cointegration testing procedure is done by using Johansen technique (1988) which is cointegration testing VAR basis. This technique uses *reduced rank* to determine the number of cointegration equation that exist in the analyzed variable.

Cointegration testing result is sensitive towards deterministic component that is assumed on the model (Johansen, 1995). There are 5 kinds of model with considered deterministic component as follow¹³:

1. The data doesn't have any deterministic trend and the cointegration equation doesn't have any intercept
2. The data doesn't have any deterministic trend and the cointegration equation has intercept
3. The data has linear trend and the cointegration equation that just have intercept

¹³The best model that considered reflect the cointegration equation will be seen from information criteria value (used AIC and SIC). The chosen model is model with the lowest information criteria on cointegration lag

4. The data and the cointegration equation have the linear trend
5. The data has the quadratic trend and the cointegration equation have the linear trend.

As displayed on table IV.6 , excluding on the SGD-PHP bevariate, Johansen's cointegration testing (1988) shows a significant result. There is at least a cointegrated equation on bevariate:

Table IV.6 Johansen Cointegration Testing (1988) on OCA model ASEAN4						
No.	OCA	Model 2 AIC	AIC	Model 3 AIC	SIC	Number of Cointegrated Press Statistical Testing
1	IDR-SGD	-9.8943	-9.0666	-9.8943	-9.0666	(Trace=2; Max Eigen=2)
2	IDR-PHP (lag 5)	-8.7211*	-8.0313*	-8.707	-7.9896	(Trace=1; Max Eigen=1)
	IDR-PHP (Lag 4)	-8.5005*	-7.9249*	-8.4999	-7.8967	(Trace=1; Max Eigen=1)
3	IDR-THB	-9.0973*	-8.4075*	-9.078	-8.3606	(Trace=1; Max Eigen=1)
4	SGD-PHP	-12.0247	-11.4729	-12	-11.393	(Trace=0; Max Eigen=0)
5	SGD-THB	-12.4584*	-11.7686*	-12.4366	-11.7192	(Trace=1; Max Eigen=1)
6	PHP-THB	-11.0815	-10.3917*	-11.0917*	-10.3743	Model 2: (Trace=0; Max Eigen=0) Model 3: (Trace=1; Max Eigen=0)
7	Complete Model	-21.8359*	-19.3802*	-21.7763	-19.2378	Model 2: (Trace=1; Max Eigen=1) Model 3: (Trace=2; Max Eigen=1)

* Chosen model

IDR-PHP, IDR-THB, SGD-THB and complete model. Cointegration model gives a weak result for PHP-THB pair and is negative for SGD-PHP. Meanwhile for complete model, conclusive testing shows at least there is a single cointegration model

This result gives the first indication in term of the support for hypothesis on the existing OCA in ASEAN4 area. Nevertheless the stricter conclusion should be still obtained through the existing *error correction* mechanism that is significant.

Excluding PHP-THB bevariate, all bivareate OCA model have moderate *goodness of fit* (R^2) model (0.5 to 0.65) (see tabel IV.7). *Goodness of fit* highest level belongs to IDR-THB

Table IV.7 Goodness Of Fit Model OCA					
No.	OCA Type	R ²	F Stat	AIC	SIC
1	IDR-SGD	0.61	5.88	-2.90	-2.34
2	IDR-PHP (lag 4)	0.58	6.01	-2.87	-2.37
3	IDR-PHP (Lag 5)	0.65	6.98	-3.01	-2.45
4	IDR-THB	0.66	7.11	-3.02	-2.47
5	SGD-PHP	0.64	6.69	-6.43	-5.88
6	SGD-THB	0.64	6.27	-6.41	-5.83
7	PHP-THB	0.34	1.93	-5.14	-4.59
8	Complete Model	0.78	5.22	-3.10	-2.05

bivariate (lag 4) with R^2 value amounting 0.58. The independent variable here concidely explain 50%-65% of variaiton occuring on dependent variable. Complete model OCA has the *goodness of fit* that is higher from bivariate model. The R^2 here is amounting 0.78, is significantly above the OCA bivariate.

IV.2. The ASEAN Currencies Co Movement and The Determining Factor

From table IV.8, it is seen that just 14 from 88 (16%) of the coefficient that is estimated passes the partial significance testing on $\alpha = 5\%$. It shows the first indication about the weak data support towards the existing *co movement* that is statistically valuable.

Algebraic symbol on the short-term *co-movement* coefficient is not homogenous. This condition is not in accordance with the hypothesis, in which even in short term it is expected the currency moves paralelly (and thus it has a positive coefficient). In some certain bevariates, short-term co-movement coefficient that is not significant is negative (see OCA IDR-PHP lag 5 coefficient D(PHP(-3)) amounting -0.6699) .

The above tendency prevails either OCA bivariate or OCA complete model. Thus it can be said that short-term equation doesn't support the existing *co-movement*.

From table IV.9, the exisitng adjusting mechanism (*error correction model*) on SGD-THB and PHP-THB bivariate don't get any supporting data. It is seen from the low statistc *t* coefficient

No.	OCA Type	D(IDR(-1))	D(IDR(-2))	D(IDR(-3))	D(IDR(-4))	D(IDR(-5))	D(SGD(-1))	D(SGD(-2))	D(SGD(-3))	D(SGD(-4))	D(SGD(-5))
1	IDR-SGD (D(IDR))	0.1428 [1.1984]	0.0665 [0.6947]	-0.0773 [-0.8249]	0.0498 [0.5871]	0.0941 [1.0926]	-0.0972 [-0.1732]	-0.5629 [-0.9954]	-0.8789 [-1.5325]	-0.9344 [-1.683]	-0.0633 [-0.1147]
2	IDR-PHP Lag 4 (D(IDR))	0.0113 [0.1175]	-0.0334 [-0.3939]	-0.0467 [-0.5454]	0.0742 [0.9585]	-	-	-	-	-	-
	IDR-PHP Lag 5 (D(IDR))	0.1507 [1.5137]	0.0432 [0.5014]	-0.0704 [-0.8708]	0.1024 [1.3892]	0.0348 [0.4682]	-	-	-	-	-
3	IDR-THB (D(IDR))	0.1581 [1.4844]	-0.0739 [-0.6798]	-0.0666 [-0.6667]	0.1451 [1.5273]	-0.156 [-1.6545]	-	-	-	-	-
4	SGD-PHP (D(SGD))	-	-	-	-	-	0.01789 [0.2002]	-0.1392 [-1.5561]	-0.0645 [0.0862]	-0.0597 [-0.7334]	-0.0325 [-0.3881]
5	SGD-THB (D(SGD))	-	-	-	-	-	0.112 [1.0325]	-0.3001 [-2.7131]	-0.0032 [-0.0286]	0.0957 [0.8865]	0.0749 [0.6837]
6	PHP-THB (D(PHP))	-	-	-	-	-	-	-	-	-	-
7	Complete Model (D(IDR))	0.1988 [1.6803]	-0.1137 [-0.9705]	-0.0832 [-0.7294]	0.1157 [1.0400]	-0.1942 [-1.7041]	-0.0593 [-0.0743]	-0.501 [-0.6792]	0.0378 [0.0453]	1.4449 [2.0682]	0.3633 [0.5058]

Table IV.8 (continued)
Short-term Co-movement coefficient (statistic *t* in parenthesis)

No.	OCA Type	D(PHP(-1))	D(PHP(-2))	D(PHP(-3))	D(PHP(-4))	D(PHP(-5))	D(THB(-1))	D(THB(-2))	D(THB(-3))	D(THB(-4))	D(THB(-5))
1	IDR-SGD (D(IDR))	-	-	-	-	-	-	-	-	-	-
2	IDR-PHP Lag 4 (D(IDR))	-0.5431 [-1.5639]	-0.1261 [-0.3781]	-0.8632 [-2.6815]	-0.7693 [-2.2665]	-	-	-	-	-	-
	IDR-PHP lag 5 (D(IDR))	-0.165 [-0.4867]	-0.2186 [-0.6500]	-0.6699 [-2.1834]	-0.7491 [-2.3654]	0.6855 [1.9922]	-	-	-	-	-
3	IDR-THB (D(IDR))	-	-	-	-	-	-0.0395 [-0.1214]	0.4991 [1.4577]	-0.5733 [-2.2427]	-0.7511 [-2.9383]	0.8182 [2.8642]
4	SGD-PHP (D(SGD))	0.01923 [0.3021]	-0.1092 [-1.9025]	-0.0829 [-1.4239]	-0.0472 [-0.8419]	0.0061 [0.1082]	-	-	-	-	-
5	SGD-THB (D(SGD))	-	-	-	-	-	-0.0468 [-0.8009]	0.0318 [0.5850]	-0.1081 [-2.0400]	-0.1165 [-2.2324]	-0.0414 [-0.7796]
6	PHP-THB (D(PHP))	0.3174 [2.4877]	-0.0943 [-0.7277]	0.0013 [0.0098]	-0.1457 [-1.1328]	0.1712 [1.3600]	0.1194 [1.085]	-0.0211 [-0.2225]	-0.0369 [-0.4090]	0.1093 [1.2422]	-0.1213 [-1.4219]
7	Complete Model (D(IDR))	-0.7742 [-1.7848]	-0.2095 [-0.5340]	-0.2714 [-0.6612]	-0.5506 [-1.3721]	0.08764 [0.2174]	0.4888 [1.0032]	0.7178 [1.5312]	-0.4772 [-1.1365]	-1.0004 [-2.6631]	0.6205 [1.4401]

error correction/cointegrating term amounting (respectively) -0.5004 and -1.2001 that is lower deeply under the critical *t* on the standard *level of significance* (5% and/or 1%). It is quite not in accordance with the cointegration testing result that shows at least 1 (one) cointegrated equation (see table IV.6).

In the other hand, estimation result of SGD-PHP bevariate is not consistent by cointegration testing. The negative and significant cointegration coefficient is not in accordance with the cointegration testing result (Trace dan Max-Eigen stastic) that shows 0 (zero) cointegration relation.

This paper uses a rather conservative approach. Result that tends to be contradictive on the above three bevariate encourages the writer to conclude that there is no equilibrium relation among Singapore-Thailand (SGD-THB), Singapore-Philippine (SGD-PHP), and Philippine-Thailand (PHP-THB) currency.

Meanwhile for other bevariate which are the pair of Indonesia-Singapura (IDR-SGD), Indonesia-Philippina (IDR-PHP) dan Indonesia-Thailand (IDR-THB) currencies and complete model, we can accept the hypothesis in terms of existing that is valueable. For this models, cointegration coefficient has been appropriate with the hypothesis and is significant on the standard level. Thus for this currency's pair, *error correction* representation can be valid.

Equilibrium equation coefficient that is obtained generally from bevariate OCA estimation has fulfilled the hypothesis (equilibrium equation coefficient is positive). There is an exception

Table IV.9
Equilibrium co-movement coefficient, error correction and OCA variable
(t statistic in parentheses)

No.	OCA Type	Cointegrating Equation				COINT TERM	Exogen					
		IDR	SGD	PHP	THB		IDUS_INF	IDUS_IRT	IDUS-GRW	IDUS_M1C	SGUS_INF	SGUS_IRT
1	IDR-SGD	1	-0.8769 [-1.1715]	-	-	-0.2657 [-3.8786]	0.9437 [1.8748]	0.179 [2.1899]	0.6722 [1.5189]	0.4859 [2.6415]	-3.3066 [-2.5947]	-0.0159 [-0.1940]
2	IDR-PHP(lag 4)	1	-	-0.3757 [-2.8848]	-	-0.3138 [-4.2400]	1.6684 [3.2020]	0.2237 [2.8359]	0.2981 [0.4478]	0.6614 [3.6140]	-	-
3	IDR-PHP(lag 5)	1	-	-0.367 [-3.059]	-	-0.335 [-4.5047]	1.7442 [3.3681]	0.1499 [1.8919]	0.3728 [0.5300]	0.4186 [2.3139]	-	-
4	IDR-THB	1	-	-	-1.0615 [-2.8546]	-0.2893 [-3.8595]	1.4855 [2.7707]	0.0387 [0.4921]	0.0999 [0.2408]	0.3807 [2.1956]	-	-
5	SGD-PHP	-	1	0.5468 [2.3807]	-	-0.029 [-2.7646]	-	-	-	-	-0.3414 [-1.5960]	0.0107 [0.8596]
6	SGD-THB	-	1	-	-0.6633 [-5.9703]	-0.0211 [-0.5004]	-	-	-	-	-0.4413 [-1.8344]	0.0279 [2.2656]
7	PHP-THB	-	-	1	-4.0494 [-3.7281]	-0.0127 [-1.2001]	-	-	-	-	-	-
8	Complete Model	1	2.4204 [3.3525]	-0.1709 [-1.5639]	-1.9277 [-3.6049]	-0.3563 [-3.207]	1.809 [2.9445]	0.0972 [0.9962]	0.0148 [0.0198]	0.4566 [2.3692]	-2.2786 [-1.6799]	0.1101 [1.2972]

Continued

No.	OCA Type	Exogen										
		SGUS-GRW	SGUS_M1C	PHUS_INF	PHUS_IRT	PHUS-GRW	PHUS_M1C	THUS_INF	THUS_IRT	THUS-GRW	THUS_M1C	JPY_FX
1	IDR-SGD	0.4466 [0.7320]	-0.4181 [-1.7001]	-	-	-	-	-	-	-	-	0.4946 [1.9843]
2	IDR-PHP(lag 4)	-	-	-0.82 [-0.8346]	0.0395 [0.9461]	0.1102 [0.4719]	-0.1086 [-0.5656]	-	-	-	-	0.5607 [2.2329]
3	IDR-PHP(lag 5)	-	-	-1.2067 [-1.2934]	0.0262 [0.6744]	0.1582 [0.6696]	-0.0649 [-0.3472]	-	-	-	-	0.383 [1.5815]
4	IDR-THB	-	-	-	-	-	-	0.5465 [0.3569]	-0.0015 [-0.0221]	-0.4884 [-1.346]	-0.0389 [-0.2507]	0.3524 [1.4925]
5	SGD-PHP	-0.0597 [-0.4695]	0.0211 [0.4958]	0.0143 [0.0883]	0.0133 [1.9096]	0.0422 [1.3503]	0.0115 [0.3610]	-	-	-	-	0.2945 [7.2381]
6	SGD-THB	0.0106 [0.1023]	0.0168 [0.3844]	-	-	-	-	0.0859 [0.2659]	-0.0128 [-1.1746]	-0.0047 [-0.0774]	0.0426 [1.5405]	0.3036 [6.7928]
7	PHP-THB	-	-	0.1266 [0.4384]	0.0063 [0.4638]	0.0147 [0.2925]	-0.0084 [-0.1263]	-0.5296 [-1.0422]	-0.0033 [-0.1685]	0.0811 [0.6795]	0.0803 [1.3817]	0.2097 [2.7799]
8	Complete Model	0.5088 [0.6473]	-0.6607 [-2.4424]	-0.6794 [-0.6773]	0.0719 [1.728]	-0.2894 [-0.9515]	0.1887 [0.9499]	1.1167 [0.5940]	-0.1289 [-1.7411]	-0.1309 [-0.3052]	-0.1979 [-0.1709]	0.3006 [1.1183]

on SGD-PHP bivariate where the obtained coefficient is negative, in this case is $SGD = -0.5468$ PHP. In other words SGD exchange rate (towards USD) decreases (getting stronger) when PHP increases (getting weak). It is different from hypothesis expecting relation with the same coefficient symbol. Meanwhile for IDR-SGD bivariate, coefficient of long-term relation is not significant.

Magnitude of OCA bevariate is various enough. For instance IDR-THB almost corresponded one by one. One percent of inlation (decrease) of IDR exchange rate will be followed by one percent inlation (decrease) of THB value. The biggest respond is given by PHP-THB bevariate amounting 4.0494 while the smallest is IDR-PHP amounting 0.3737.

On the bevariate OCA in which IDR is an independent variable, controlling variable coefficient itself is generally in accordance with hypothesis and has the proper significance level. For instance, OCA bevariate IDR-SGD, either interest rate different variable or the number of circulating money (towards US) has a positive influence on the exchange rate and is significant on the standard α . Other controlling variables on the bivariate OCA has coefficient that is in accordance with the hypothesis even the significance level that has to be used is aggressive ($>10\%$). Exception exists on the growth difference variable, in which no bivariate OCA where this variable is significant.

On other bivariate OCA, some of the controlling variable coefficient themselves have a wrong symbol (for instance SGUS_INF variable on OCA bivariate SGD-PHP and PHPUS_M1C on OCA bivariate PHP-THB). Coefficient significance is not generally equal. It can be seen for example on OCA bivariate SGD-PHP, in which no single controlling variable can be said significant on the standard level. The only bivariate OCA beyond IDR that has its own controlling variable coefficient that is significant is SGD-THB (which is SGUS_IRT).

Coefficient symbol from foreign¹⁴ controlling variable is not generally consistent with hypothesis. On some bivariate OCA and certain variables, the sigh that it has been in accordance with hypothesis, see for example THUS_INF on OCA IDR-THB. In the other hand, variable symbol is not just in accordance with hypothesis, it happens for example on OCA bivariate SGD-THB (THUS_IRT variable). Beside that the significance requirements of foreign controlling variables isn't achieved (on the standard level). An exception is on SGUS_INF variable on OCA bivariate IDR-SGD that is significant on $\alpha = 5\%$.

In a complete model, in which IDR is a dependent variable on the equilibrium equation, controlling variable itself: IDUS_INF and IDUS_M1C, has an appropriate symbol with hypothesis and is significant on the standard level (1% and 5% each). Other variables (IDUS_IRT and IDUS_GRW) have the appropriate symbol with hypothesis but is not significant.

Meanwhile, foreign controlling variable symbol is not consistent with the hypothesis. For example on some variables, PHUS_M1C and THUS_INF, the change of the impact is already in

¹⁴ Foreign controlling variable is an exogenous variable that is related to independent variable in the right side of cointegrated equation. On OCA bivariate IDR-SGD, these variables are all exogenous variables SGUS_X where X is Inflation Rate (INF), exchange rate (IRT), growth (GRW), and the number of circulating money (M1C)

accordance as expected. But the contrariwise thing occurs on some other variables, i.e. SGUS_M1C and THUS_M1C that are contradictory with the hypothesis. Here, excluding SGUS_M1C variable, foreign controlling variable is not significant on $\alpha = 5\%$.

Exogenous variable coefficient symbol of JPY exchange rate (towards US) is positive on all OCA bivariate. It is already in accordance with the hypothesis. On some OCA bivariate (IDR-SGD, IDR-PHP(lag=4), SGD-PHP, SGD-THB and PHP-THB, coefficient that is obtained is significant on standard α (5%). While on OCA bivariate IDR-PHP (lag=5) and IDR-THB, JPY exogenous variable doesn't seem have any significant clarifying influence.

The biggest respond from JPY change belongs to IDR-PHP bivariate (amounting 0.5607), while the smallest (by keep concerning coefficient significance) belongs to PHP-THB bivariate (amounting 0.2097).

On OCA complete model, the JPY's impact is consistent with OCA on bivariate level. Nevertheless, JPY variable on OCA complete model is not significant. Thus it can be said by considering all *co-movement*, there is no reason to accept that equilibrium relation can be explained by the JPY movement.

IV.3. The Existing OCA and Its Requirements Assessment

From the VECM estimation and cointegration testing that are already reported above, it seems that a *co-movement* in a strong form in South East Asia can not be supported by data. It can be seen from (1) weak significance from the *co-movement* coefficient of short term equation and (2) divergen *error correction term* estimation result and long-term *co-movement* coefficient.

The weak coefficient significance of short-term equation shows the low interaction ability among ASEAN4 currencies that is observed. Nevertheless, it is quite strange, the *error correction term* coefficient apparently has a relatively better performance. Economic interpretation in this case is even though the short term ASEAN4 currencies interaction is weak (they move independently), but there is a correction mechanism if they are beyond the parity.

On long-term equation side, an assumption regarding to *co-movement* on ASEAN4 currencies that have stronger supporting data than short-term equation. A better significance level is obtained for equilibrium *co-movement* coefficient for OCA bivariate: IDR-SGD, IDR-PHP, IDR-THB and OCA are completed. While on OCA bivariate: SGD-THB, PHP-THB and SGD-PHP, the existing phenomenon doesn't have any significance that is needed.

Moreover by considering OCA bivariate in which IDR is dependent variable, then the existing *co-movement* for ASEAN4 currencies with USD currency *anchor* are valid. Some of

equilibrium relations that can be explained to justify it are

- a. IDR-SGD, each appreciation/depreciation amounting 1% on SGD (towards USD) will be accompanied by appreciation/depreciation amounting 0.88%¹⁵ on IDR
- b. IDR-PHP, each appreciation/depreciation amounting 1% on PHP (towards USD) will be accompanied by appreciation/depreciation amounting 0.37%(lag 5)-0.38%(lag4) on IDR
- c. IDR-THB, each appreciation/depreciation amounting 1% on THB (towards USD) will be accompanied by appreciation/depreciation amounting 1.06% on IDR

The next OCA bivariate development by involving other ASEAN4 currency completely gives a support to the existing exchange rate *co-movement*. For complete model of partial interpretation¹⁶, relation that occurs is appreciation/depreciation on PHP amounting 1% will be accompanied by appreciation/depreciation amounting 0,17% on IDR. While appreciation/depreciation THB amounting 1% will give impact amounting 1.93% on appreciation/depreciation of IDR. An exception exists on SGD because the movement direction belongs to it is opposite (and is significant). Here 1% appreciation/depreciation of SGD will be accompanied by depreciation/appreciation of IDR amounting 2.42%.

For *error correction* representation, the adjusting process on the disequilibrium time can be decreased for each of currencies as follow:

1. IDR-SGD = 3.77 months (there is an adjustment amounting 26.57% from disequilibrium condition every month)
2. IDR-PHP (lag 4) = 3.19 months (there is an adjustment amounting 31.38% from disequilibrium condition every month)
3. IDR-PHP (lag 5) = 2.99 months (there is an adjustment amounting 33.35% from disequilibrium condition every month)
4. IDR-THB = 3.46 months (there is an adjustment amounting 28.93% from disequilibrium condition every month)
5. Complete model = 2.78 months (there is an adjustment amounting 35.63% from disequilibrium condition every month)

A glance from this analysis, it is seen that there is a possibility of existing co-movement that is statistically significant among ASEAN4 currencies. The basic currency is USD. This finding supports the Frankel and Wei studi result (1994) that assumes that ASIAN area has a basis to USD. Exchange rate determination orientation that tends to be on USD is strong that is assumed in order to control the inflation (*cost push inflation*)

¹⁵ Nevertheless SGD coefficient on equilibrium equation that is not significant.

¹⁶ Partial interpretation especially occurs on a regression equation with more than two variables. Partial is an impact that would be observed on the bonded variable is the impact of one independent variable change by assuming other independent variables are constant

Furthermore, the existing co-movement is also influenced by beyond USD currency, in which it propose an alternative JPY on this paper. As reported on the first part before, coefficient uniformity (and good and sufficient significance) of JPY variable on all OCA (either bivariate or complete) strengthen this assumption. The positive relation between ASEAN4 currencies and JPY has made an assumption of relation movement among countries in this area with Japan as the rival (especially in the trade aspect).

Further implication is the possibility of the existing anchor currency which is a currency basket, where both USD and JPY are dominant component. It strengthen the empirical finding done by Kim and Ryou (2001). This JPY dominant role is actually indicated by Frankel on his studi in 1992, in which because economic and non economic factor (agenda from washington), it is assumed that the Japanese role in ASIA will increase.

As the conclusion, it can be said here that the existing *co-movement* among ASEAN4 currency is not strongly supported by data. It is caised by (1) weak significance on short-term co-movement coefficient and (2) error correction coefficient symbol that is not homogenous and long term *co-movement*. Nevertheless, this study has revealed a possibility of the existng OCA. It is shown by the homogenous JPY coefficient symbol (with moderate significance). Further study by using a composite anchor may be better reveals the existing OCA.

Several things that might make monetary approach variable failed to get role as controlling variable on some OCA models are

1. Restriciton among countries that are not valid, assumption of the same function of money demand among countries doesn't get any empirical support (Boothe and Glassman, 1987)
2. Money demand and supply function are not a stable function (Frankel, 1981).

By restricting OCA model with IDR as an unfree variable. Then it is seen that national output difference variable (IDUS_GRW) is never an influential variable. Related to argumantation from Frankel (1981), then transactional influence from income on cash in hand is getting smaller. It occurs by the increase of technology use, in which the need of holding money in cash will decrease.

Interest rate variable (and also interest rate expectation through inflation) has the biggest influence in the role as controlling variable. Unlike the general expectation that tends to consider that interest rate increase is appreciative. Interest rate increase here is depreciative. If a country uses an *interest rate targeting* and interest rate is determined above the equilibrium interest rate, then there will be *excess money supply*(relative on foreign currency) and as the consequence, this currency will experience depreciation.

The OCA's variable ability in explaining OCA with IDR as a bonded variable seems to be bonded by Alesina's finding et al (2002). Their analysis on price co-movement and output on some world's area conclude that there is an area defined as USD area.

Thus as a conclusion, economic analysis and interpretation on OCA's characteristics ability in explaining ASEAN4 currencies *co-movement* is limited. This characteristics is just sufficient if it is used to explain to explain OCA model where IDR gets role as a bonded variable. In other words, the chosen OCA characteristics can not become a general clarification for all ASEAN4 countries. It is assumed that there is a different mechanism in determining IDR exchange rate compared to other ASEAN4 countries.

V. CONCLUSION AND SUGGESTION

Estimation result shows that ASEAN4 OCA in an idela form doesn't seem obtain a strong empirical support. Nevertheless, research that has been done keeps giving interested result as follow:

1. *Co-movement* that is identified among ASEAN4 currency is not *rebut*. Based on the short-term perspective, hypothesis is failed to be fulfilled (either in symbol side or significance) while from long-term, hypothesis is not fulfilled even though the obtained estimation result is better.
2. Variable ability/OCA's characteristics in explaining the *co-movement* can be explained as follow:
 - a. On bivariate model in which IDR is a bonded variable terikat (IDR-SGD, IDR-PHP and IDR-THB), coefficient symbol and controlling variable significance level/OCA characteristics itself (i.e. IDUS_INF) generally has an appropriate symbol with the hypothesis and is significant.
 - b. On other bivariates (SGD-PHP, SGD-THB and PHP-THB), either single or foreign controlling variable doesn't support hypothesis. Relating to *error corection* coefficient that is not significant (see point 1.b above), it seems that both of *co-movement* and OCA are not identified in this bivariate model.
3. The xisitng OCA is also a global phenomenon. It is indicated from coefficient symbol homogeneity and significance either equilibrium equation (showing USD anchor) and JPY variable as an alternative anchor beyond USD.

Result that is obtained from this reserach has some policy implication as follow:

1. Empirical finding shows the Rupiah's role is acimetric. IDR is *weak currency* surrounded by other *strong currencies*. The relation of IDR on the regional currency co-movement (ASEAN4)

suggest the decision maker to pay attention on the shock that is happening in some neighboring countries.

2. Monetary variable (the number of circulating money and interest rate empirically gets role in determining IDR exchange rate. Thus, the authority (Bank of Indonesia) needs to pay attention to its monetary process to prevent any shocks on the exchange rate. Instead, the monetary policy can actively gets role in proceeding exchange rate to be consistent with economic stability.
3. The mechanism/factors of exchange rate determination that are not homogenous among ASEAN4 countries shows that specific-domestic shock is still dominant (*idiosyncratic shocks*) in determining exchange rate. It implies that the orientation of the decision maker should tend to the domestic condition.
4. There is an indication of the role increase of global variable, especially from Japan. Thus the decision maker has to anticipate the economic condition movement in some prime world area beyond USA, especially Japan. This proactive role is necessary so every shock can be anticipated early.

This study has explained some urgent and interested empirical finding regarding to oCA in ASEAN4. Further development can be done in the two direction, (1) Controlling variable/ OCA characteristics addition that assumed strong in influencing all currencies that are observed through a certain statistical criteria and (2) The use of *anchor* which is a composite from the prime world's currency.

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INFLUENCE ANALYSIS OF SOCIAL VALUES ON THE NUMBER OF ISLAMIC MONEY DEMAND IN INDONESIA

*Daisy Ebrinda Gustiani, Ascarya, Jaenal Effendi*¹

Abstract

As one of the existing instruments in the economic system of Islam, Zakat Becomes Important to Investigate its influence in the Formulation of monetary policy in Indonesia, especially relating to the amount of money. This paper analyzes whether Zakat will of affect, the money demand of Islam in Indonesia, by applying the Vector Error Correction Model (VECM) on monthly data During 2001 to 2007. This paper derives Trust interesting results on both conventional and Islamic money demand in Indonesia. In general, the result confirms the Domination of conventional economic system, one relative to the Islamic (Sharia), while the social value does not significantly affect the money demand in Indonesia.

JEL Classification: C32, E41, P52

Keywords: Money demand, social values, Islam, the VAR / VECM

¹ Ebrinda Daisy Gustiani adalah mahasiswa pasca sarjana PSTTI Universitas Indonesia (ebrinda_dg@yahoo.com); Ascarya adalah senior researcher di PPSK Bank Indonesia (Ascarya@bi.go.id); Jaenal Effendi adalah dosen FEM Institut Pertanian Bogor (jaenal.economics@ipb.ac.id).

I. INTRODUCTION

Money as an exchange tool had been well-known since 4000 BC, in Islam world, money functioning as an exchange tool is dinar (gold money) and dirham (silver money) that had been used since Islam came on the hemisphere especially in *muamalah*, zakat, or diyat (fine payment) activities. Standardization of both dinar and dirham money follow Hadits by Rasulullah SAW narrated by Abu Daud in which the weigh is based on Makkah people, and the measurement is based on Madinah people. In 642 AD, Khalifah Umar bin Khattab formally standardized the dinar and dirham weigh and measurement which is 7 dinars is equal with 10 dirhams. According to Chapra (1996), the comparison ration between dinar and dirham is 1:10.

Money is also used to do one of Islam's worship and one of the monetary instruments containing social value such as infaq, shadaqah, and waqaf, as Karim (2007) in viewing economic stability through Chapra money demand equation. There are actually three roles played by zakat in economic prespective, they are as an income and welfare redistribution, a stabilizer of economic, and a development instrument and empowerment of *dhuafa* (poor people).

In case of zakat, infaq, shodaqoh, and wakaf in Indonesia, they have an extraordinary potency because according to Statistic Centre Board (BPS,2000) the Muslim population is 85% of all Indonesian. According to the research done by Language and Culture Center of UIN Syarif Hidayatullah, cash potency is about 14,2 trillion rupiahs and good potency is about 5,1 trillion rupiahs annually.

Development of Syariah Banking in Indonesia is represented in Islamic Banking or is abbreviated as ib socialized by Bank of Indonesia. After considering some Syariah Banking development aspects, we have to know the characteristics of Islamic economy or finance that have a social value. According to Chapra (1996), the one categorized as social value is all things that are not prohibited by Islam and have a social value (zakat, infaq, wakaf, and shodaqoh) influencing money demand, thus other proposed monetary instruments by Chapra for Islamic economic system is Islamic M1 development target consisting currency and clearing account money and Islamic M2 consisting M1 added by mudharabah saving and mudharabah deposit investment; Public Share of Demand Deposit; Statutory Reserve Requirement and Credit Ceiling. Social values instrument influence the target of Islamic M2 and M1 development, that is M1 which is a non-interest loan used to provide residence, health facilities, and education for poor people.

From the above monetary instruments, we can clearly see the essential differences from those two systems in which in conventional economic system we recognize interest whereas in Islamic economic system, we recognize a profit share (*mudharabah*) system and it must perform

a social value. After having a previous research regarding to interest and profit share concepts, thus the writer will empirically prove whether *social values* concept influence monetary stability and we can see it through its influence towards money demand in Indonesia. Furthermore, we will discuss about theory points of view, the third part is data source and research methodology used and the forth part is analysis result and discussions. At the end, we will have conclusion and suggestion.

The purposes of this research are 1) to analyze Islamic money demand function (M1 and M2) on finance / banking system specialized on currency, wadi'ah clearing account, *mudharabah* saving, and *mudharabah* investment deposit in Syariah banking and 2) to analyze the influence of social values in money demand function and to know the whether significant connection or affection between the number of circulating money exist in Islamic economic system with the *social values* instrument.

The second part of this paper discusses about the theory and points of view of existing literature and the third part will discuss about methodology. The forth part discusses about the estimation result and tentative conclusion analysis will be given at the end of the paper.

II. THEORY

II.1. Difference between Islamic and Conventional Economic System

Difference of economic systems above can be represented in three economic systems. They are capital, Islam, and Marxism economic systems. The comparisons can be seen in Table V.1. below.

Tabel V.1 Comparisons of Capital, Islam, and Marxism economic system			
Compared Aspect	Conventional		Islam
	Capitalism	Marxisme	
Philosophy in production, distribution, and consumption	Laissez Faire that explains freedom and invisible hand	Class struggle and contradiction among classes	Faith to Allah and life after death, and just look for Allah's bless and mercy
Principle of ownership and interaction access	Absolute ownership and free market	Ownership belongs to government so the access is restricted	Right of use is not ownership (only until death) and balance and justice
Operational	Free from entry/exit (in perfect competition) or free to determine a price in monopolistic market	Iteration and collective work pattern	Existing Zakat and Wakaf instruments, riba prohibition and Qirad Mudharabah

Source : Iqbal (2007)

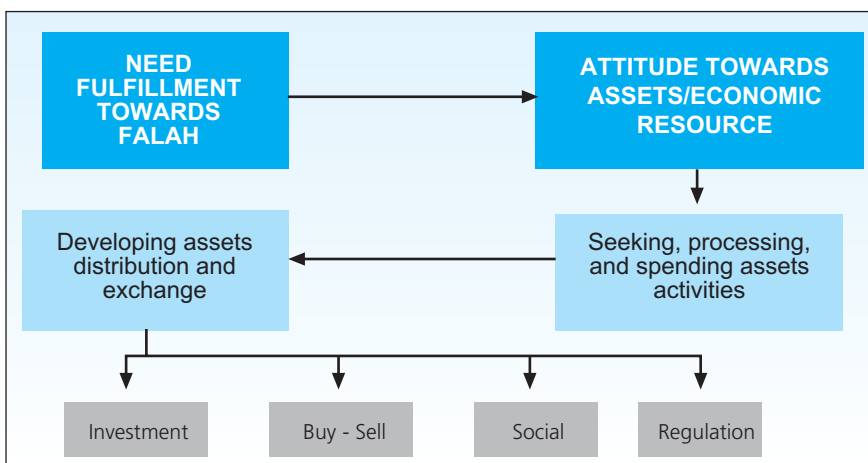
II.1.1. Difference among Capital, Marxism, and Islamic Economic System

There are some points of view in understanding differences and opinions regarding to economic system, but we can generally differentiate into system coming from Al-Qur'an and not coming from Al-Qur'an and Hadits.

Karim (2004) explained that there are four developing economic system in the world nowadays, they are capitalism, socialism, communism, and Islam. Capital economic system is a system dominated by capital with profit motive in which money is everything. In the capital economic system, there is a freedom of doing economic activities with its widely used interest instrument. One of capital economic characteristics is individual actions with no centralized economic plan.

Socialism economic system doesn't recognize any private ownership, just public ownership. The existing industries are just for public interest or social service motive. One of the socialism economic system characteristics is *central planning* of the economy, fair income distribution establishment, and any vital assets belong to the public. Marxism is a kind of communism in which consumption and production arranged collectively emphasizing on social program and education, come from science, and deny the God. Thus, they allow any practices to gain collective happiness.

Unlike Islamic economic system, on Figure V.1, we can see how people act to assets and economic resource that just focus on earning, processing, and spending assets. Through the action, it implies assets development, assets exchange, assets distribution. Sakti (2007).

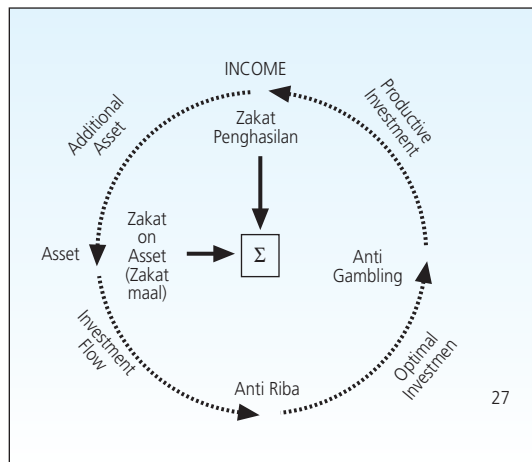


Source : Sakti (2007)

Diagram V.1.
Characteristics based on Islamic Economic System

Earning assets in Islam can be done through economic activities. It can be done by investment activity or *mudharabah* and *musyarakah*, buy and sell activity such as *murabahah*, *ijarah*, *istisna*, *salam*, and *rahn*. Whereas any people who have no access to both previous activities, they can earn the assets through other instruments in economic mechanism of Islam such as social activities (*infaq*, *shadaqah*, hibah and gift) and regulation activities (zakat, heritage, *kharaj*¹, and *jizyah*²).

In general, Himawan (2005) explained that Syariah economic system is a system using zakat approach, prohibiting *riba* (loan payment with extra interest) and *maisyir*, or in other words we can say it is a *sunnatullah* economic system encouraging investment flow by optimal zakat and anti *riba* productivity, and anti gamble as seen in Figure V.2 below.



Source : Himawan (2007)

Diagram V.2.
Flow Theory

If we concern on the development, there are 4 economic opinion development, (Karim, 2004). They are foundation period (The beginning of Islam-450H / 610-1059 AD), development period (1068-1446 AD), declining period (1446-1931 AD), and resurrection period (1932-2000s AD). Tradition and practice during Rasulullah SAW period using Islamic principles is Allah SWT as the truly owner, and human as khalifah in the world; all things that human earn are based on Allah’s permission; wealth must circulate and mustn’t be piled up; economic exploitation in any situations is omitted and to apply heritage system as a wealth redistribution instrument. In Rasulullah period, Islamic economic system was applied by accelerating money circulation,

1 *Kharaj* is tax on agriculture land

2 Poll tax that early Islamic rulers demanded from their non-Muslim subjects

establishing baitul maal, and forming fiscal policy. In acceleration the money circulation, Rasulullah SAW prohibited the tendency of preventing dinar and dirham came out from the circulation; money interest; preventing stuck money from stockholder and eliminating monopoly practice after *Fath Al-Makkah*.

Beside that, Baitul Maal establishment could be seen from its income such as Kharaj, Zakat, Khums, Jizyah, and other payment like kaffarah. We could also see the Baitul Maal expenses used to spread Islam, culture and education, science development, infrastructure development, army establishment, and social welfare service. Moreover, one of Rasulullah's fiscal policy is to increase GDP by Muhajirin and Anshar union and to apply job vacancy policy for Muhajirin people by implementing *Muzara'ah, Musaqah, and Mudharabah*.

After Rasulullah SAW leadership ended, Khulafaur Rasyidin began. Started from Khalifah Abu Bakar Ash-Shiddiq, the economic practice concerned much on the accuracy of zakat accumulation, wealth from different people could not be aggregated, the aggregated wealth could not be separated, and distribution is directly to Baitul Maal (no saving). Then the economic practice during Khalifah Umar bin Khattab was a regular and permanent Baitul Maal establishment and its brands in province capital cities; to make Baitul Maal as a daily executor of fiscal policy of Islamic country; to make a kind of saving in Baitul Maal as an emergency back up, to make Baitul Maal properties as Muslim's wealth and the decision maker was The Khalifah. Beside that he also established the first Diwan Islam which is called as al-Divan; introduced other country's income such as *foy* (assets plundered from war), *ushr*, *Nawaib*, ransom for war prisoner. During Khalifah Umar bin Khattab governance, there were some classifications between country's income and expenses.

During the next Khalifah governance, Ustman bin Affan, the economic activities were broaden by increasing the expenses on marine and military, increasing expenses on pension allowance, and development for the new occupied areas, giving responsibility the zakat estimation to muzakki, and allowing land exchange. However, the economic practices done by the previous khalifahs were keep being continued. After Khalifah Utsman bin Affan governance ended, the next khalifah, Ali bin Abi Thalib changed the system of zakat collection, eliminated marine expenses, distributed Baitul Maal directly and introduced people's money distribution by adopting weekly distribution system.

II.1.2. Conventional Monetary System

Conventional monetary system begins with the conventional economic theories developed long time ago. The development of economic thought starting from pre-classical school of

economics, classical economics, Marxism, neo-classical; historical; Institutional; Keynes; monetarists, *supply siders* and *the rationale expectation* progressing onward to the present. The development of conventional monetary system primarily in terms of demand for money, are very clear at the time of monetarist school birth, which is based on the opinion keynessian criticism about the need for government intervention in directing and guiding the economy as desired. The figures are divided into two groups, namely young and old groups. One of the most underlie the development of this genre is Milton Friedman who sees that the role of government is necessary for a more effective economy.

Moreover the main aspect of monetarist principles is where the monetary developments is one important element in production development, employment and prices. Monetary flow is also suggested that the growth in money supply represents a reliable element in monetary developments. In his article, Friedman (1970), stated that changes in the money supply is very influential on the level of inflation in the long term and also the behavior of real GNP. Beside that, monetarist stated that there were some market power and resource influence stating that the decline interest rates would encourage investment and lower prices will encourage consumption level (*the Pigou effect*).

Another thing is the opinion of the monetarist economic regarding to economic fluctuations due the expansion money supply caused by expansionary policies taken by the government. We can see that monetarist run the economy from the monetary side which is the opposite of the Keynesian school.

II.1.3. Islamic Monetary System

The monetary system is closely linked to monetary instruments, one of them money, then before to understand about it, we need to understand the concept of money in Islam. According to Al-Ghazali, money is the measurement standard (unit) to avoid fraud and cheating, money is needed to solve the problems of a barter system, dinars and dirhams is the master when compared to other kinds of wealth and the main characteristics of money is like a mirror that reflects the color but he himself doesn't not have a color in accordance with the concept of neutrality of money.

According to Ibn Taymiyyah, money is the standard value (*mi'yar al-amwal*) and is a medium of exchange, besides the money was never intended to be consumed. The money was used to obtain other goods (medium of exchange) and is not for sale. Ibn Taymiyya argued about the concept of *fulus* volume (money) should be proportional to the volume of transactions where the price level is determined, and this concept in the conventional theory is called the

quantity theory of money. Meanwhile, according to Ibn Khaldun, money is the standard measurement and also a *store of value*. According to Ibn Khaldun, gold and silver are a form of money that are not easily fluctuate and relatively stable.

After knowing the concept of money in Islam, then according to Beik (2007), we need to know the concept of central banks and monetary policy based on Islamic principles. The objective of monetary policy in Islam is the achievement of *full employment* conditions in which all factors of production can be optimized to use, ensuring the stability of the currency and price (inflation control) and the tool of redistribution of wealth where wealth is synergized between financial sector and real sector. Meanwhile, the central bank function is to regulate the circulation of money and control the money supply, as *financial market* regulators and ensure the honesty of the *profit* and *loss* statements of the banking sector and carry out regular audits.

The function of the central bank through monetary instruments such as changing the *high-powered money*, through the reserve ratio, liquidity ratio, sales and purchases of *Central Deposit Certificates* and other valuable documents, changing the profit-sharing ratio; set *qard hassan ratio* and controlling the exchange rate.

In Ascarya (2006), there are three fundamental differences over the Islamic monetary system with a conventional monetary system, as shown in Table 2.2. below. The first and the most distinguishing difference is interest system in the conventional economic system while the Islamic economic system offers profit sharing (*profit and loss sharing*), sharing system ensures justice and no party that is crippled in a bear losses when the shareholder cooperate with entrepreneurs to do business. The profit and the loss are beared together.

In a second difference, in the conventional side, there is *fractional reserve banking* system where banks are only required to store the backup in a certain percentage of the collected deposits. With this system, bank has the ability to create another type of *fiat money*, ie bank money (demand deposits, including electronic money), and this happens also when banks make loans. Thus, the system also gives *seigniorage* profit that is unfair that through this system they are given an authority to create new money.

Tabel V.2 Differences in Islamic and Conventional Monetary System	
Conventional	Islam
Interest Instrument <i>Fractional reserve banking system</i> Fiat money use	Profit and Loss Sharing Concept <i>100 percent reserve banking system</i> <i>full bodied/fully backed money</i>

Source : Ascarya (2006)

Whereas in the Islamic economic system there are 100% *reserve banking system*, where this system does not provide opportunities for banks to create new money, because the entire backup must be saved to the central bank. Maximum bank financing can only be channeled to the size of initial deposit only. This causes no new buying power that is created (no *seigniorage*), it does not contain elements of usury (*riba*) and no party is harmed.

Fiat money is something (usually in the form of paper or coin) is recognized as legal tender in a country after being set by the government which does not have a reserve value based on its nominal value. Issuance of fiat money raises new purchasing power from something that does not exist. This gives an unfair advantage (*seigniorage*) for parties who are authorized to publish it and can be categorized as usury.

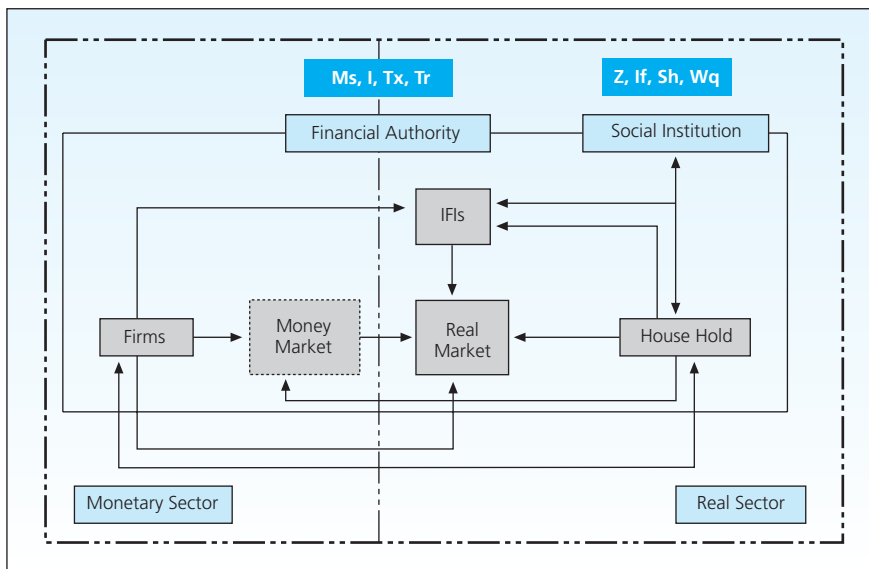
While the money in Islam is money (gold and silver) that has intrinsic value equal to its nominal value or number of the gold reserves held by parties who issues it. Because no new purchasing power created (no *seigniorage*), so it does not contain elements of usury.

Because Indonesia still uses dual monetary system and banking, then that becomes the main differences between Islamic and conventional monetary system which is the existence of profit-sharing concept in Islam that negate the interest.

II.2. Contemporary Islamic Monetary Policy

Islamic Finance in essentially describe real economic activity using various types of transactions such as trade, investment, and financial services. Through Figure 2.3, we can see that in *dual economic system* in many Muslim countries, Islamic finance became amplifying elements balancing the monetary sector, and even strengthening the structure of the real economy. Several things to note is the portion or the contribution of Islamic finance and social sectors if it wants to apply to the national economy.

It can be seen in the picture above that the form of Islamic monetary instrument is the policies that could activate the real sector or press idle money to get into the real sector. In the picture above is the money supply M_s ; i is the interest rate; T_x is a tax; T_r is a subsidy; Z is a charity; I_f the infak; Sh is shadaqah and W_q is the Wakaf



Sumber : Sakti (2007)

Diagram V.3.
Economic Structure of Contemporary Islam.

II.3. Theory of Money Demand

Money demand equation in Chapra (1996) described one variable that has not been used in the theory of demand for money is a social variable values, shown in the equation below:

$$Md = f(Y_s, S, \pi) \tag{V.1}$$

Where Y_s indicate the goods and services in accordance with need fulfillment and productive investment that is in harmony with Islam. Meanwhile, S describes the values - moral and social values (including zakat) which will affect the process of resource allocation and distribution, which will affect the demand for money which is not used for *conspicuous consumption* (over-consumption activities, luxury and speculation). In his research, Umer Chapra has not been able to prove empirically equation 1.2 above, and the hypothesis about the influence of *social values* to total demand for money does not explain whether it effects negatively on long-term or short term.

Previously, according to Mishkin (2001) money as the *money supply* is defined as something that is generally accepted as means of payment for goods and services or debt repayment. The money demand function according to Keynes are:

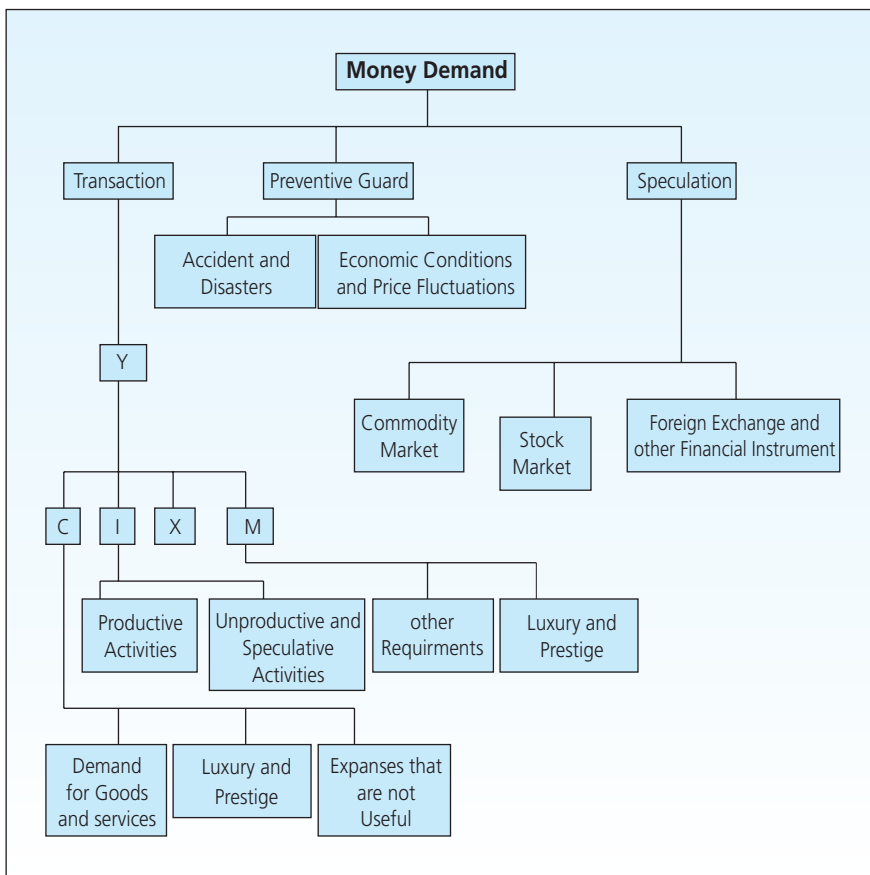
$$Md = f(i, Y) \tag{V.2}$$

where i is a function of the interest rate that varies inversely with the demand for money and real national income Y is a positive influence on money demand. To request the Islamic money on dual banking system, explained in Kaleem (2000), where there is a return variable rate of Sharia as a substitution for interest rates, so that:

$$\ln M_{ISLR}_t = \alpha_0 + \alpha_1 \ln Y_t + \alpha_2 \pi_t \tag{V.3}$$

Where M_{ISRL} is the equilibrium of Islamic real money and Y_t is national revenue.

In Figure V.4 below, it explains the motives of someone saving money, such as, for transaction, anticipation and speculation. However demand is meant by Chapra (1996) in Islamic money demand equation is the demand for money transactions and anticipations.



Source : Chapra (1996)

Diagram V.4.
The principal element of Money Demand

Where there is no element in the transaction for which luxurious consumption or indicate the status or symbols and activities that are not useful. Moreover the investment must be productive, while imports have done to meet the needs that can not be fulfilled by the countries themselves. The speculative activities in the Islamic money demand equation is an activity which is not allowed.

II.5. Wisdom and Benefit of Zakat

In Hafiddudin (2002) opinion, zakat in terms of language has a meaning, namely *al-barakatu* (blessing); *al-namaa* (growth and development); *ath-thaharatu* (purity) and *ash-shalahu* (greatness). The definition of zakat in general is part of the property under certain conditions; that Allah has the owner give it to the one who deserve; with certain requirements as well. Understanding the relationship of zakat literally and terminologically are very close that the property that was issued will be a blessing; grow; develop and grow; holy and good.

Chapra (1985) said that zakat has a positive impact in increasing the availability of funds for investment because the payment of zakat on wealth and property that are saved will encourage taxpayers to seek income from their wealth, so they can pay zakat, without reducing their wealth. Thus, in a society that values of Islam have been internalized, deposits of gold and silver and unproductive wealth tends to be reduced in order to increase investment and generate greater prosperity.

Generally, there are seven lessons and benefits of zakat in Hafiddudin (2002), as a manifestation of faith in Allah SWT; to help the mustahik; as a pillar of charity together (*jama'i*); as one source of funds for the development of facilities and infrastructure owned by Muslims (means of worship, education, health, social and economic) development tools and the quality of Muslim resources; to socialize proper business ethics; as an instrument of income distribution and a strong courage for people to do zakat. Some benefits such as zakat, preventing the accumulation of wealth on the one hand that automatically makes people motivated to invest. Zakat is also a comprehensive institution for the distribution of wealth because it involves the property of every Muslim after reaching nisab. Zakat that is well-managed will be able to open employment and business area as well as assets mastery by Muslims.

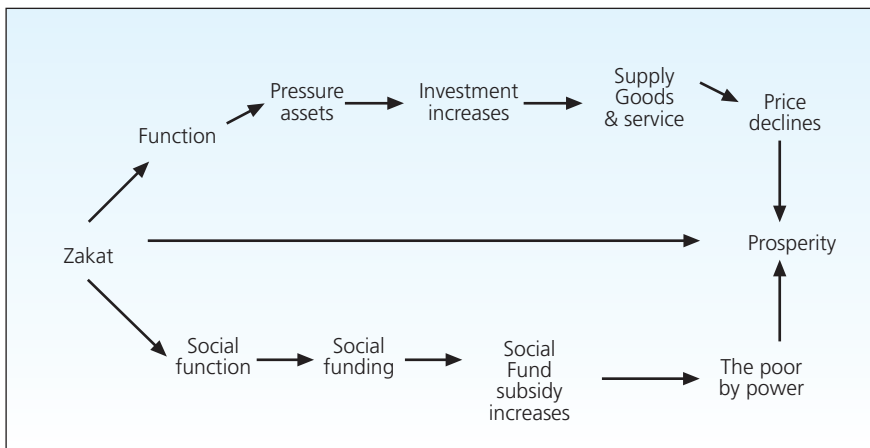
Saefuddin (1986) states that the charity is well managed it is possible to build economic growth, as well as distribution of income, *economic with equity*

Benefits in terms of instilling morals like the glory of nature, a sense of tolerance and toleration to the person paying the zakat, zakat payers are usually identical with the nature of

Rahmah (mercy) and being tender to his brother, who did not have sufficient need fulfillment and contain aspects of the purification of morals.

If we see the *faedah ijtima'iyah* (social aspect), the Zakat is a means to assist in fulfilling the lives of the poor who constituted the majority of most countries in the world; Providing support to the Muslims strength and lifting them. It can be seen in groups recipients of zakat, one of which is the mujahidin *fi sabilillah*; Zakat can reduce social jealousy; zakat will encourage economic growth and the blessing would be abundant and paying zakat means to expand the circulation of property or money, because when wealth is spent then the circulation will be expanded and more party can take the benefit.

Himawan (2005) explained that zakat functions is a solution to inflation as shown in the figure that zakat has a control and social function. Where zakat can lower piled up treasure rate, so it becomes the investment flow. If the flow of investment is high then the procurement of goods and services will also be increased, this led to lower prices. On the other hand zakat and its social function gives subsidies to increase the mustahik purchasing power that will take turn to create welfare.



Source : Himawan (2005)

Diagram V.5.
Zakat functions of Inflation

II.6. Thought Framework

The connection between the formulation of the problem and research objectives can be seen from the research framework in Figure 2.6. where the demand for money in Islam is divided M2IS M1IS and again in their derivatives that were influenced by macroeconomic variables that is Real GDP. As a counterweight in the cost of holding money, the money demand is seen

from the level of return in the Islamic scheme. Then it will also show the influence of social values in the Islamic system, so it can be seen from each classification associated with viewing the number of Islamic money demand for monetary management in Islam.

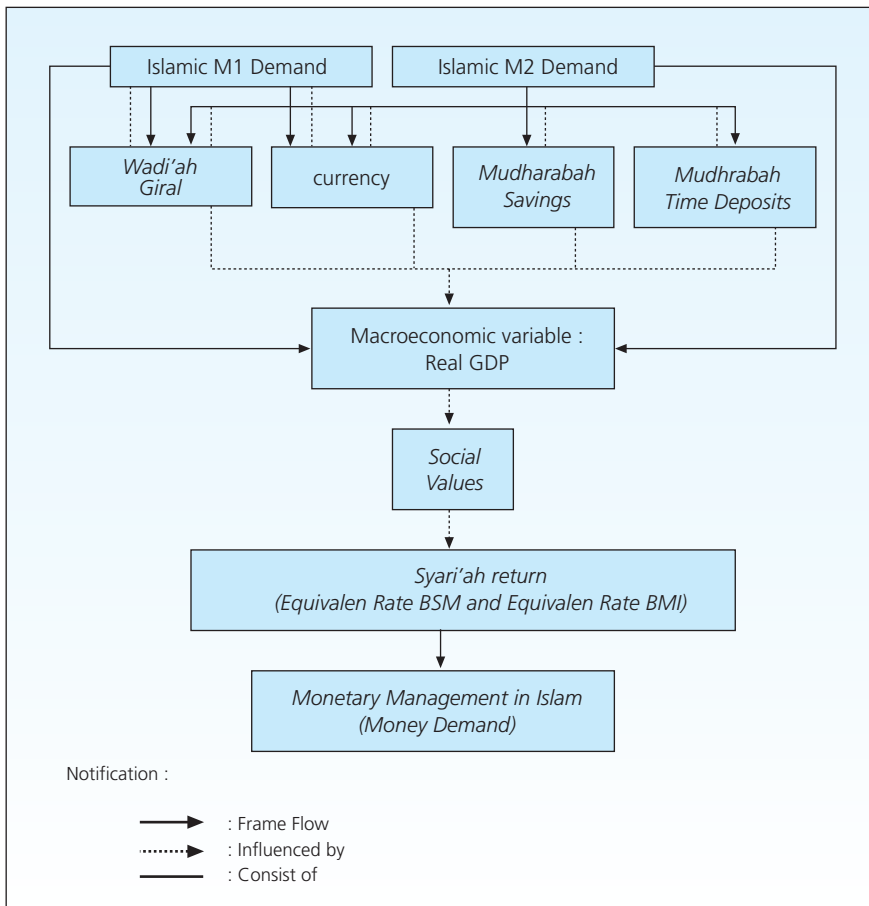


Diagram V.6.
Thinking Conceptual Framework

Based on the description above, there are two main hypotheses developed in this paper, first, Islamic money demand model that is divided in Kartal money element, *wadi'ah* clearing account, *mudharabah* and long-term investment, thus Real GDP positively impact on Islamic money demand and the return of Islamic sharia negatively affect it. Second, *social values* (zakat) negatively affect the demand for money for unproductive activities in the Islamic system on the side of muzakki and positive effect on demand for money on the side of *mustahik*.

III. METHODOLOGY

III.1. Types and Sources of Data

In this research, the data used are monthly secondary data of Indonesia which is obtained from *Statistik Ekonomi dan Keuangan Indonesia-Bank Indonesia* (SEKI-BI) Bank Indonesia Syari'ah Banking Statistics (SPS-BI); return syari'ah publication data in Bank Muamalat Indonesia and Bank Syariah Mandiri revenue distribution report; Annual Report of Religious Affairs Zakat Section and Financial Reports from several institutions (Agency of National Zakat; Postal Fairness Caring Ummah; Zakat House Indonesia; BAMUIS BNI; BSM Ummah; BAZDA DKI; BAZDA BOGOR; *Tabung Wakaf Indonesia* ; Paramadina Zakat Foundation; Forum Zakat and *Dompot Dhuafa*) and potential zakat data between January 2001 until December 2007 period.

Referring to the framework (Figure 2.6), then the variables used in this study are:

- a. Demand for Islamic M1 (M1IS), the money supply in the narrow sense of Islam consists of currency and *demand deposits (wadi'ah clearing account)*. In this research, it can not be distinguished between Islamic and conventional money-based because there is a currency element in M1IS.
- b. Demand for Islamic M2 (M2IS), the money supply in Islam in a broader sense consists of M1IS plus *mudharabah* savings and deposits, as before on these variables, it can not be distinguished which more criterias that really fulfill the Islamic conditions because the existence of currency element in M2IS .
- c. Fiat money, either metal or paper money that is in the public (excluding banks) and ready to spend, is issued by the Central Bank at anytime. It still can not be distinguished in this currency elements which fulfill the Syari'ah or conventional conditions.
- d. *Wadi'ah* clearing account (GW), in which deposit contract is done where the receiver is responsible for money value.
- e. *Mudharabah* savings (TM) is the third party savings in Islamic bank in which the withdrawal can be done anytime based on the agreement.
- f. *Mudharabah* investment deposits (DIM) is the third party savings that requires time lag between deposit and withdrawal so the money can circulated
- g. Real *Gross Domestic Product* (GDP), is the GDP that experiences deflation with IHK rate in 2002, but in this GDP research, it still not out of *conspicuous consumption*.
- h. Social values (S), is a social allocation rate and resource distribution. In this research, the data used is zakat data which is estimation data of zakat income, *Badan Amil Zakat Nasional* (BAZNAS) formulation.
- i. *Return Syari'ah* (RS) consists of the Ekuivalen Rate of Mandiri Syari'ah Bank and Indonesia Muamalat Bank.

III.2. Methods Data Processing and Analysis

Vector Autoregression (VAR) will be used to analyze the influence of social values to the demand for money, if the data used is stationary and not co-integrated, or will be combined with error correction models to the *Vector Error Correction Model (VECM)* if the data used are stationary in first difference but there is cointegration. *Impulse response function* analysis was also conducted to see the response of the endogenous variables to shocks of other variables in the model. Decomposition variance analysis was also conducted to see the relative contribution of a variable in explaining the variability of its endogenous variables. All data in this study is transformed into the form of the natural logarithm (ln) except the rate of return. The software used in this study is *Microsoft Excel 2003* and the *Eviews 4.1* program.

Before estimating, the first step to do is stationary test for all variables in order to avoid any *spurious regression*. The test is done on the level and *first difference*.

In a VAR system, determining optimal lag is very important, because it is useful to eliminate any autocorrelation problem in a VAR system. Beside that, determining the optimal *lag* is useful to indicate how long the reaction of a variable against another. Testing the optimal *lag* in this study uses the minimum AIC criteria. Under this test, the lag one will be used for any equation of the next Islamic money demand.

After doing the determinant test of optimal lag, the next step is VAR *stability condition check* which is *roots of characteristics polynomial*. In *Eviews for Users Guide* (2002), Lutkepohl said that a VAR system is stable if all its roots have less than one modulus and is located within its *unit circle*. Linda (2007) also pointed out that unstable VAR system makes the analysis of IRF and FEVD invalid. VAR system test results can be seen in Appendix 1. If all the models in his unit circle or less than one, it indicates that the models are stable.

Cointegration test is conducted to obtain long-term relationship among variables that have met the prerequisites during the integration process in which all the variables have been stationary at the same level of degree one I (1). Cointegration relations in a system of equations in the system indicates that there is *error correction* model describing the consistent short-term dynamics with its long-term relationships as revealed by Verbeek (2000).

Cointegration test in this study uses the Johansen approach by comparing the *trace statistic* with *critical values* that are used, which is 5 per cent. If the trace statistic is greater than the critical value of 5%, then there is cointegration in the equations system. Cointegration test results can be seen in Appendix 2. Through the appendix, it can be seen that there is no cointegration among M1IS, M2IS, UK and GM equation. In TM and DM equation, each of them has minimally one cointegration rank in 5% real level. This information indicates the next

estimation result for TM and DM equation using VECM model. After passing the previous test on the cointegrating VAR system and it was seen that there are four equations that use VAR and two cointegrating equations have then further analysis combined with the VECM model. VECM estimation is carried out to see the long-term and short term analysis, whereas if only it were performed up to VAR, we can see the short-term analysis.

IV. RESULTS AND ANALYSIS

IV.1. VAR Estimation Results of Islamic Money Demand

VAR estimation results for the M1 money demand model of Islam can be seen in Appendix 3. In the short term, it shows that the output or GDP is significantly positively related to Islamic real M1 balance by 1.122078. This means that when GDP increases by one percent, the demand for real M1 balances Islam increased also by 1.122078 percent. So it is in line with the hypothesis whereby when the output increases the transaction costs will rise to be fulfilled, so the demand for money increases. It can be seen in the first period of the year 2001 in which when the GDP amounted to 1198.59 billion with Islamic M1 amounted to 59724.47 billion compared to the first period of 2002, it increased by 1251.53 billion for GDP and 69003.59 billion for Islamic M1.

Social values variables (zakat) on the short term positively significantly affect the demand for Islamic real M1 equilibrium by 2.151359. This means that if *S* increases by one percent, the demand for real M1 balances Islam increases also by 2.151359 percent. So it could happen in the short term, although in the long term it could changed or in accordance with the theory in which with increasing *S*, the people will reduce the demand for money for over-consumption or speculative. Through comparison of the first period of data in 2001 and 2002, when *S* increased from 1685.22 billion to 1710.50 billion, the Islamic M1 also increased from 59724.47 billion up to 69003.59 billion

This variables is positive for Syari'ah return variable. Where if the Syari'ah return increased by one percent, the demand for real M1 balances of Islam would increase by 0.015241 percent. This could happen in the short term because when Syari'ah return is rising, the public can have a view to taking the money, for instance consumption. However, the demand for real Islamic M1. \hat{S} Syari'ah return does not influence significantly. In this case we compare the first periods in 2001 and 2002, in which at the time, Syari'ah return increased by 11.81 percent, the increase also occurred on the Islamic M1 in the same period.

Based on Appendix 4, for the M2 money demand, estimation results show that the output or GDP is significantly positively related to real M2 balance amounted to 1.032118

Islam. This means that when GDP increases by one percent, the demand for real Islamic M2 balances increased by 1.032118 per cent. This fits well with the previous hypothesis. It can be seen in the comparison of data in 2002 and 2003 in the first period, where GDP increased from 1251.53 billion to 1286.89 billion, Islamic M2 from 70575.74 billion to 79020.61 billion.

Social variables values (zakat) on this term is significant and influence the Islamic real M2 demand balance positively by 2.023231. This means that if *S* increases by one percent, the demand for Islamic real M2 balances increased by 2.023231 per cent. This can happen in the short term, because when one gives zakat, it does raise the aggregate demand for mustahik. Zakat's nature makes money owner more prosperous, then the assumption is they will think for investment. With this investment it will also move the aggregate supply, this causes the quantity of goods and services increases. When GDP increases, it makes the level of *muzakki* welfare increased as well.

Meanwhile for *Syari'ah* return variable, this variable is positive by 0.014216. Where if the *Syari'ah* return increased by one percent, the demand for Islamic real M2 balance increased by 0.014216 percent. This is normal in the short term, because when *Syari'ah* return increases, it indicates the profit-sharing increase as well thus in short-term withdrawal of funds can occur for other activities or re-investing the money. However, *Syari'ah* did not significantly influence the choice of someone to hold cash.

IV.3. VAR Estimation Result of Demand for Fiat Money (UK).

For GDP variables, the estimation result shows that these variables positively significantly relates to real UK equilibrium by 1.112937. It means when GDP increases by one percent, the demand for real UK balance will increase by 1.112937 percent. We can take one example occurring in 2001 and 2002, where GDP increased from 1198.59 billion to 1251.53 billion and at the same time, UK increased from 59540.00 billion to 68762.00 billion.

Social values variable (zakat) on short-term influences the demand for real UK equilibrium positively by 2.186456. It means if *S* increases by one percent, the demand for real UK equilibrium will increase by 2.186456 percent, but it doesn't significantly affect the currency. At the same previous period, *S* increased from 1685.22 billion to 1710.50 billion.

Meanwhile for *Syari'ah* return variable, It is significant and has positive value by 0.014752. Where if *Syari'ah* return increases by one percent, the demand for real UK equilibrium increases by 0.014752 percent as well, it can be seen in appendix 5. If we take an example occurring in the first period of 2005, when *Syari'ah* return is 9.59% the amount of UK is 59540 billion, then in the first period of 2006, when *Syari'ah* return 13.23 %, the amount of UK is.....?

IV.4. VAR Estimation Result of Wadi'ah Celaring Account (GW).

According to appendix 6, the output or GDP positively significantly relates to the real GW equilibrium in short-term by 0.198811. It means when GDP increases one percent, the demand for real GW equilibrium increases 0.198811. We can see in 2006 and 2007 where GW followed the GDP movement increasing from 1473.12 billion to 1625.39 billion and GW increased from 2056.76 billion to 3277.23 billion.

Social calues variable (zakat) in short-term negatively affect the demand for real GW equilibrium by -0.232958. It means that if S increases one percent, the demand for real GW equilibrium decrease by -0.232958 percent. Social values doesn't significantly affect the real GDP. It can be seen in 2001 where S increased from 1685.22 billion to 1687.32 billion, GW decreased from 184.7 billion to 171.63 billion.

Meanwhile for Syari'ah return variable, it is negative by -0.582130 and not significant. Where if Syari'ah return increases one percent, the demand for real GW equilibrium decrease by -0.582130 percent. It can be seen in 2004, where Syari'ah return decreased from 8.74 percent to 7.77 percent, GW increased from 664.62 billion to 667.7 billion. In this case, we can see that people still consider the opportunity cost in holding money, it could happen because the money owner can see the *nisbah* fluctuation.

IV.5. VECM Estimation Result of *Mudharabah* Savings

In the long-term, output or GDP has a negative impact on *Mudharabah* savings with coefficient of -1.908627 and is statistically significant. It means when GDP increases one percent, the demand for real *Mudharabah* savings balance decreases by 1.908627 percent. It can be seen from the first and the second period of 2001, where GDP decreased from 1198.59 billion to 1187.62 billion, *Mudharabah* savings increased from 367.55 billion to 403.58 billion.

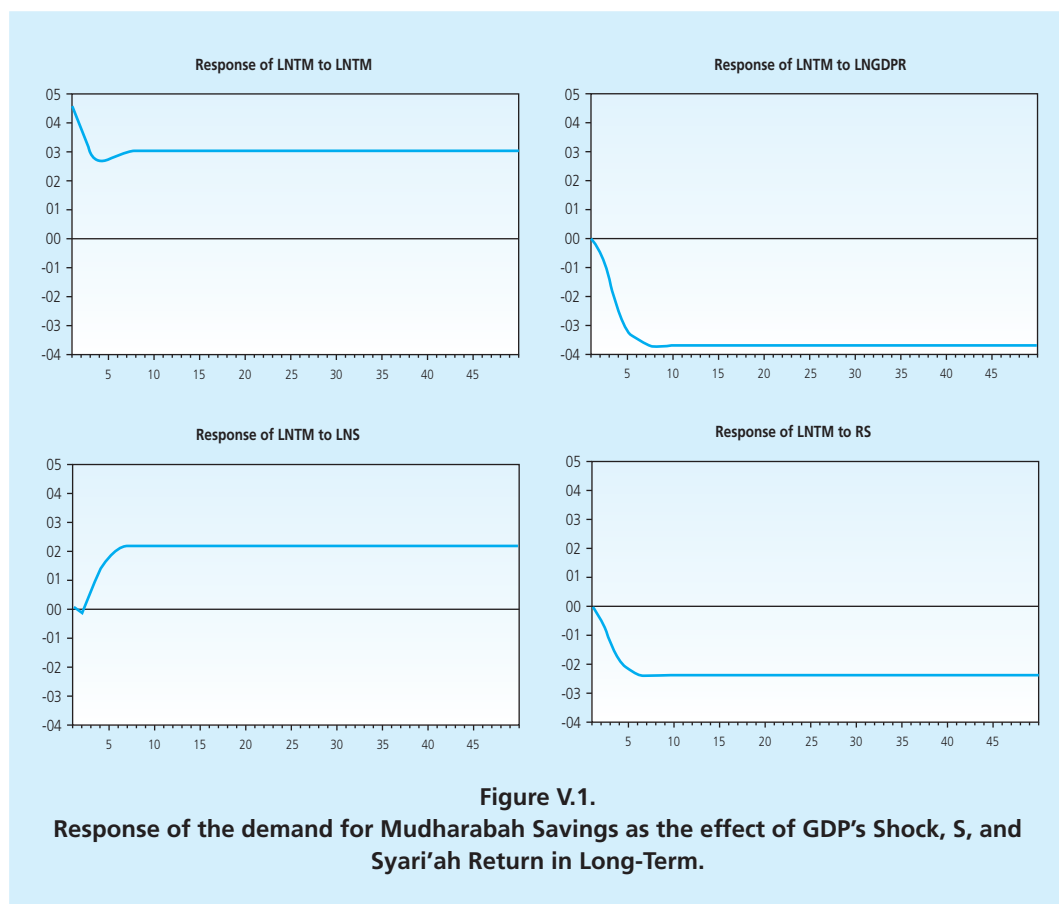
Social values variable (zakat) is significant and positively affect the demand for real *Mudharabah* savings by 2.198949 in the long-term. It means if S increases by one percent, the demand for real *Mudharabah* savings balance increases 2.198949 as well. At the same time, S increasing from 1685.22 billion to 1687.32 billion is followed by the increase of *Mudharabah* savings as mentioned above.

Meanwhile for Syari'ah return, it is significant and negative by 0.057216. Where if Syari'ah return increases one percent, the demand for real *Mudharabah* savings balance decreases by -0.057216 percent. It can be seen from the forth and the fifth period of the same year, when Syari'ah return decreased from 12.11 percent to 10.83 percent, *Mudharabah* savings increased

from 430.43 billion to 475.12 billion. Thus it is in accordance with the previous hypothesis focusing on the opportunity cost. It can also be seen that there is an adjustment between short-term to long-term transition because the statistic estimation result is significant. It can be seen in the Appendix 7.

IV.5.1. Response Impuls of The Demand for *Mudharabah* savings

In figure V.1. below, it can be seen that the GDP shock make the demand for mudharabah savings response is negative. It decreased at the first until the fifth period, then at the tenth period, the demand for mudharabah saving started to be stable against the GDP shock influence by 0.39 percent until the end of observation. While for social value variable which is in this case is zakat, S shock makes the *mudharabah* savings positive, even in first period until the level of giving negative respons by 0.02 percent. At the fourth period, *Mudharabah* savings increased until the seventh period, it started showing the stability by 0.2 %.

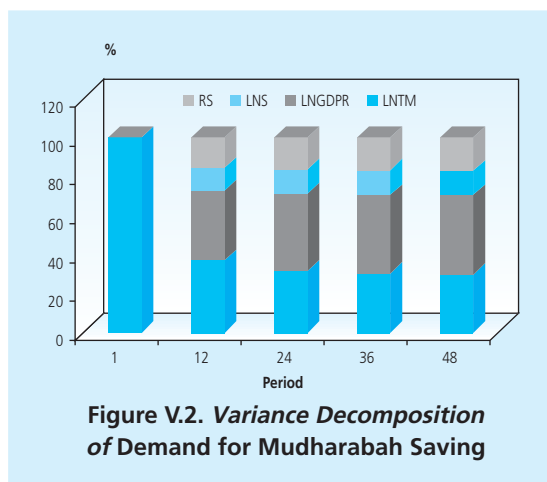


Meanwhile, for the shock given by Syari'ah return variable, Mudharabah savings had negatively responded it since the first period. It decreased from the first until the seventh period and was stable again at the tenth period by 0.25%.

The result of response impuls on *Mudharabah* savings can explain in detail from the previous reseacrh result (Hasanah, 2007) concerning to demand for Islamic M2, where in the research based on IRF demand for Islamic M2 is stable in responding other variable innovation and the result from ECT is statically significant as seen from the adjustment mechanism from the short-term to the long term.

IV.5.2 Decomposition Variance of the Demand for Mudharabah Savings

FEVD result of the demand for mudharabah savings can be seen from figure 4.2. Through the figure, we can see that at the first period, the fluctuation of the demang variable for mudharabah savings is influenced by the shock of Syari'ah savings itself by 100 percent and other variables are not influential. On the next periods, the influence of Mudharabah savings decreased in influencing the fluctuation of Mudharabah savings demand. Started at the next period, GDPR variable started giving dominant variable on the fluctuation of demand for *mudharabah* savings.



At the 12th period, Mudharabah savings can be explain by GDPR variables by 36.08 percent even mudharabah savings itself influences by 36.96 percent. Then, at the 24th until 48th GDPR influence is more dominant by 39.29 percent, 40.22 percent, and 40.66 percent. Social values variable in each period gives influence on the fluctuation of the demand for

Mudharabah savings about 11.38 percent until 12.97%. Syari'ah return variable also gives contribution to mudharabah savings fluctuation started from the 1st until the 48th period about 15.57 percent until 16.74 percent. It can be concluded that in long-term, GDPR has an influence on the demand for mudharabah savings, while social values isn't so influential. It can also be seen from the research done by Chapra (1996) that S can't be explain its influence, because Md is not free from *conspicuous consumption* yet.

IV.6. VECM Estimation Result of Demand for Mudharabah Deposits.

Social values variable (zakat) is significant in long-term and positively influence the demand of real Mudharabah deposits balance by 2.462457. It means that if S increases by one percent, the demand for real Mudharabah savings balance increases by 2.462457 as well.

(L11) in long-term shows that output or GDP negatively significantly relates to the real Mudharabah deposits balance by -4.205416. It means when GDP increases by one percent, the demand for real Mudharabah deposits balance decreases by 4.205416 percent.

Meanwhile for Syaria'ah return variable, it is not significant and negative. Where if Syari'ah return increases by one percent, the demand for real Mudharabah deposits will decrease by 0.020466 percent. It can also be seen that there is an adjustment between short-term to long-term transition because its the t-statistic of estimation result is significant.

IV.6.1. Response Impiuls of Demand for Mudharabah Deposits

We can see from the table below that the influence of *social values* shock on mudharabah deposits still negatively responses from the first until the second period. We can also see that after that, it starts giving positive influence until the last observation period. *Mudharabah* deposits moves towards stable direction at the sixth period by 0,3 percent.

In GDPR variable, Mudharabah Deposits responding the GDPR's shock decreases until from the first until the fifth period. After decreasing, the signs towards stability comes up after the tenth by 0,6 percent.

When the shock of Syari'ah return variable occurs, the given response by Mudharabah deposits is about zero at the first until the second period and starts to be stable at the fifth period by 0.15 percent. It is the explanation that is more detail from the equation used by Hasanah (2007) showing that Islamic M2 can be stable enough.

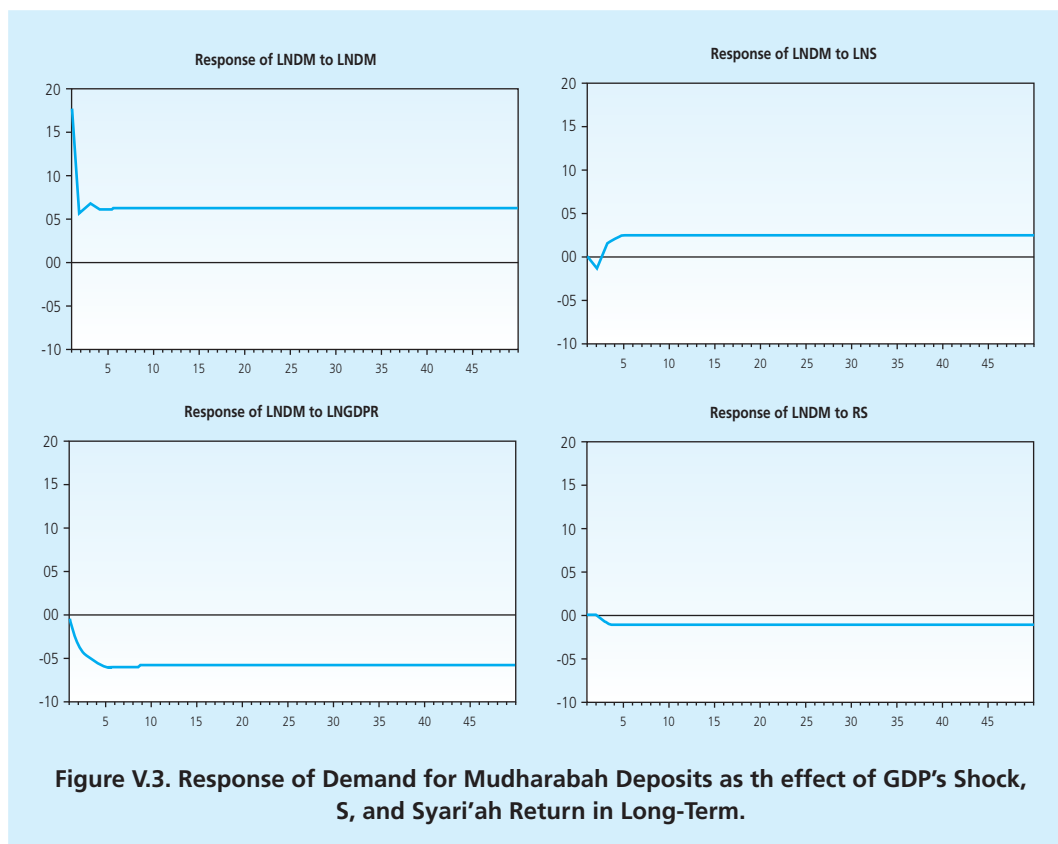
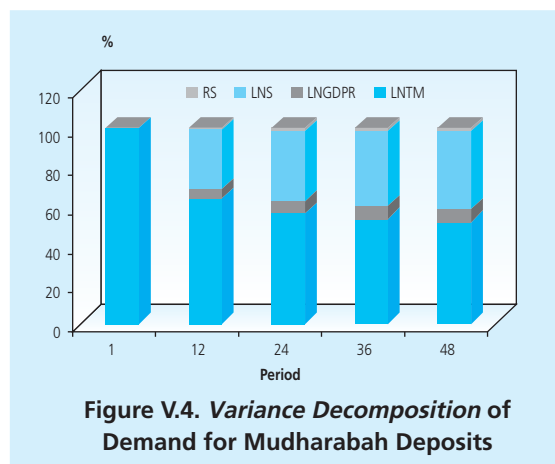


Figure V.3. Response of Demand for Mudharabah Deposits as th effect of GDP's Shock, S, and Syari'ah Return in Long-Term.

IV.6.2. Variance Decomposition of Demand for Mudharabah Deposits.

To see the fluctuation of demand for *mudharabah* deposits, it can be explained through figure 4.4 below. At the first period, Mudharabah deposits variable itself is the most influential on the Mudharabah deposits fluctuation by 100 percent, and Mudharabah itself is still dominant until the last observation period. At the 12th period, Mudharabah deposits fluctuation can be explained by GDPR variable by 30.22 percent followed by *social values* variable by 4.85 percent. On the next period, the influence of GDPR shock increases as well as the social values variable with growth from 1% to 2%. While the Syari'ah return shock just gives contribution from 0.90 to 1.24 percent.

At the 48th period, Mudharabah deposits demand fluctuation is dominantly influenced by itself by 52.21 percent, GDPR by 39.9%. It shows that in the long-term, Mudharabah deposits variable keep dominantly influencing the Mudharabah deposits itself, while Syari'ah return is not very influential.



V. CONCLUSION

Based on the research regarding to the analysis of social values influence towards the money demand in Indonesia, the result is various. Some of them are in line with the first hypothesis, but the rest are not. It is because currency variables that can not be distinguished which is really in accordance with Islamic Syari'ah, money demand should have been free from *conspicuous consumption* and social values that is used is not wholly cover the measureable and the unmeasurable parts yet.

Nevertheless, the result gives the first outline concerning to the behaviour of Islamic money demand towards the influencing variable shock. The obstacles in this empirical test using Umer Chapra money demand model had been predicted before by Umer Chapra regarding to *social values* variables and *conspicuous consumption*.

In general, we can see the long-term relations only in *mudharabah* savings demand model and *mudharabah* deposits. GDP significantly influence each of money demand model (except *wadi'ah* clearing account) because either in syari'ah or conventional system, the money demand will increase if the people are prosperous.

For social values variable and syari'ah return in some models, their influence is opposite from the first hypothesis because the syari'ah system is stii dominated by conventional system. It is because of currency factor, *conspicuous consumption*, and *social values* itself. Syari'ah return that is not significant in some models can be explained by looking at the opportunity cost from holding the money. For this time because of some previous reasons, the influence of *social value* variable doesn't really appear towards the demand for money in Indonesia. The conclusion from general anlysis results is:

1. On the short-term Islamic M1 and M2 demand, GDP positively significantly influences. Social values variable (zakat) is positively significantly influential and syari'ah return is positive and not significantly influential.
2. On the short-term currency demand model, GDP positively significantly relates. While *social values* (zakat) influences the demand for currency balance positively but not significant. Syari'ah return variable is positive and significantly influences the currency.
3. For *Wadi'ah* clearing account, GDP variable has a positive influence, *social values* is negative as well as the *syari'ah* return. However all those variables are not significantly influential.
4. Model of mudharabah savings demand in long-term, GDP negatively significantly relates. While *social values* (zakat) is significant and positively influences the demand for *mudharabah* savings balance. Syari'ah return variable is significant and negative. Based on the result of IRF, the demand for mudharabah savings is stable enough in responding other variables' innovation. There is an adjustment mechanism from the short-term to the long-term and through FEVD result it can be seen that *social values* is not dominant in responding the demand for mudharabah saving.
5. On the model of the demand for mudharabah deposit in long-term, *social values* (zakat) is significant and positively influences the demand for mudharabah savings balance. While GDP negatively significantly relates, syari'ah return variable is negative and not significant. There is an adjustment mechanism from the short-term to the long-term. Based on IRF result, demand for mudharabah deposits is stable enough in responding other variables' innovation and through FEVD result, it can be seen that social values is not dominant in influencing the demand for *mudharabah* savings

Through the result of social values influence analysis towards demand for money in Indonesia, so suggestion that can be given is we need more researches regarding to *social values* especially variables belonging to it. We still need more data input regarding to *social values* to really prove it as the monetary instrument in Islamic monetary system. As the authority for the Islamic banking and economy system, Bank Indonesia is expected to re-consider *social values* variable to be more examined its influence in taking the monetary policy.

For the next research, we suggest to observe the money demand by prolonging the data series; re-decrease the *social values* variable for all social activities with the primary data, distinguish between Islamic and conventional currency and also consumption separate without *conspicuous consumption*. We believe that it will give a better analysis result.

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APPENDIX

Table 1
VAR System Stability Test Results

No.	Model	Modulus Range
1.	LNMI1S	0.417043 - 0.070260
2.	LNMI2IS	0.416193 - 0.082248
3.	LNUK	0.410916 - 0.067792
4.	LNGW	0.554353 - 0.130271
5.	LNTM	0.277161 - 0.068155
6.	LNDM	0.455528 - 0.137169

Table 2
Cointegration Test Results (Optimal Lag=1)

	Trace Statistic				
	H ₀	r = 0	r ≤ 1	r ≤ 2	r ≤ 3
	H ₁	r ≥ 1	r ≥ 2	r ≥ 3	r ≥ 4
LNMI1S		51.80194	24.36049	12.47034	2.669380
LNMI2IS		52.19621	24.46873	12.61307	2.587696
LNUK		51.66462	24.36053	12.49479	2.740090
LNGW		33.71517	15.75253	4.201820	0.402486
LNTM		63.62918	26.05854	14.25646	2.918710
LNDM		70.85890	27.69989	15.36594	4.228240
5% critical value		62.99	42.44	25.32	12.25

Note : bold indicator that trace statistic > 5% critical value and there is cointegration

Table 3
VAR Estimation Results of M1 Islamic Demand

SHORT TERM		
Variable	Coefficient	T-Statistic
D(LNMI1S(-1))	-0.445146	-4.24137
D(LNGDPR(-1))	1.122078	3.22959
D(LNS(-1))	2.151359	4.09567
D(RS(-1))	0.015241	1.94604
C	0.017000	2.65226

Note : bold indicators that the variable is significant at 5% significance level

Table 4 VAR Estimation Results of M2 Islamic Demand		
SHORT TERM		
Variable	Coefficient	T-Statistic
D(LNM2IS(-1))	-0.445903	-4.22948
D(LNGDPR(-1))	1.032118	3.09416
D(LNS(-1))	2.023231	4.01773
D(RS(-1))	0.014216	1.89670
C	0.018550	3.01926

Note : bold indicators that te variable is significant at 5% significance level

Table 5 VAR Estimation Results of Currency Demand		
SHORT TERM		
Variable	Coefficient	T-Statistic
D(LNUK(-1))	-0.434011	-4.11628
D(LNGDPR(-1))	1.112937	3.16769
D(LNS(-1))	2.186456	1.86620
D(RS(-1))	0.014752	4.12135
C	0.016904	2.61075

Note : bold indicators that te variable is significant at 5% significance level

Table 6 VAR Estimation Results of Wadi'ah Demand Deposit Demand		
SHORT TERM		
Variable	Coefficient	T-Statistic
D(LNGW(-1))	0.029453	-6.18646
D(LNGDPR(-1))	0.198811	0.16927
D(LNS(-1))	-0.232958	-0.11953
D(RS(-1))	-0.582130	1.04078
C	0.044192	1.84506

Note : bold indicators that te variable is significant at 5% significance level

Table 7
Estimation Result of *Mudharabah Savings Demand*

SHORT TERM		
Variable	Coefficient	T-Statistic
CointEq1	-0.333766	-5.23838
D(LNTM(-1))	0.113769	1.13528
D(LNGDPR(-1))	0.415462	1.28691
D(LNS(-1))	0.011711	-1.53806
D(RS(-1))	-0.827572	1.47837
SHORT TERM		
Variable	Coefficient	T-Statistic
LNGDPR(-1)	-1.908627	5.49247
LNS(-1)	2.198949	-3.17298
RS(-1)	-0.057216	4.51625
@TREND(01:01)	0.049968	-10.2711

Note : bold indicators that te variable is significant at 5% significance level

Table 8
Estimation Result of *Mudharabah Time Deposit Demand*

SHORT TERM		
Variable	Coefficient	T-Statistic
CointEq1	-0.589760	-4.26577
D(LNDM(-1))	-0.153518	-1.32523
D(LNS(-1))	-3.013017	-1.34550
D(LNGDPR(-1))	-0.169284	-0.13311
D(ERBMI(-1))	0.010978	0.36062
SHORT TERM		
Variable	Coefficient	T-Statistic
LNS (-1)	2.462457	-2.08780
LNGDPR(-1)	-4.205416	7.18548
RS(-1)	-0.020466	0.94958
@TREND(01:01)	0.067205	-8.11926

Note : bold indicators that te variable is significant at 5% significance level

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