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THE IMPACT OF FISCAL POLICY ON THE OUTPUT AND INFLATION

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Abstract

This study examines the impact of fiscal policy on output and inflation, along with a look at discretionary fiscal policy and how it impacts the volatility of output and inflation. Model Vector Error Correction Model (VECM) was applied over quarterly data, covering the period 1990 to 2009. Empirical results showed that there is a cointegration relationship between government spending and taxes with respect to output in the long-run.Unlike government spending, in the long-term, taxation has a positive effect on economic growth. Short-term adjustment suggests that anincrease in government spending has a positive effect on output, while a tax increase has a negative effect. There is a greater influence of government spending on output in the short term compared to taxation policies. Therefore, government spending is more effective to stimulate economic growth especially in times of recession, compared to taxation policies. While the increase in government spending causes a decrease in inflation, tax increases lead to higher inflation. This study also indicates the absence of discretionary fiscal policy made by the government of Indonesia.

Keywords : Inflation, output, fiscal policy, tax, discretionary, VECM.
JEL Classification: E31, E62

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I. INTRODUCTION

1.1. Background

Fiscal policy is one policy for controlling the balance of macroeconomic. It is aimed at influencing the aggregate demand side of the economy in the short term. In addition, fiscal policy may also affect the supply side that is more long-term, through increased economic capacity. In the macroeconomic stability management, fiscal policy will interact with monetary policy.

Keynes stated that there is a significant influence of fiscal policy on the economy. Prior toKeynes, a government's financial operations were considerednot to have a significant influence on the level of employment and aggregate demand. The role of government at that time was limited to reallocate its financial resources from the private sector to the government. This view supported by Say's Law that under conditions of full employment, each increase in government spending will cause a decrease in private spending (crowding out) in the same amount of spending, resulting the same amount of aggregate income.

This view was later altered by Keynes, and sincethen economists gave emphasis on the macroeconomics effects of government spending and taxes. Keynes highlighted that the increases in government spending did not merely move resources from the private sector to the government, but also stressed on the multiplier effect of these expenditures.

Research on the multiplier effects, both in developed and developing countries generally have been carried out using simulation methods on macroeconomic models and reduced form equation method. The use of both methods for the case of Japan concluded that the multiplier resulting from the reduced form equation methods tend to be smaller than the results of macroeconomic model simulations.

As stated by Hemming, R., et.al (2002)[2], the simulation results of some of the macroeconomic models and the reduced form equation approach in developed countries, showed positive short-term multipliers of fiscal policy.Multiplier value is within a fairly wide range, from 0.1 to 3.1. From the various macro models, it was also concluded that the multiplier is much smaller, which likely reflects a change in the structure of the model.In the early decades of the 70's and 80's most structured Keynesian macro models were backward-looking expectations.In a further development, the structure of the model began to include intertemporal budget constraints, and used forward-looking expectations variables, such as exchange rates.

Meanwhile, Hemming, R., et.al also summarized researches on the same issues in developing countries, and concluded that the direction and magnitude of fiscal multipliers in

2 "The Effectiveness of Fiskal Policy in Stimulating Economic Activity—A Review of the Literature", Hemming, Richard, et. al. , IMF Working Paper WP/02/208.

the secountries are inconclusive. The study by Haque and Montiel (1991), for example, concluded that the impact of increased government spending in the short to medium-term is contractive. These results are attributed to the existence of crowding out, namely an increase in government spending would increase the real interest rate resulting in a contractionary impact on output. While a study by Haque, Montiel, and Symansky (1991) showed that although increases in government spending initially led to lower output, it will raise output and inflation in subsequent periods. Meanwhile, Khan and Knight (1981) concluded that the nominal income elasticity of government spending and taxes is positive and close to 1. These conclusions are drawn from a sample of 29 developing countries by applying a modified monetary model assuming endogeneity of inflation and output.

Given the research in several developed and developing countries did not rely only on one method of use, thereforein the case of Indonesia it is necessary to examine the effects of government spending by using other methods, such as reduced form equations. This alternative method is seen to complement the simulation of macroeconomic models that already exist, and can provide an alternative assessment of the effects of government spending.

In addition to the effects of government spending on output, another important aspect is the problem of fiscal policy synchronization with the business cycle economy. Ideally, fiscal policy acts as an *automatic stabilizer* for the economy. When the economy is undergoing an expansion, then government spending should be reduced or tax revenue increased. Conversely, if the economy is contracting, fiscal policy should be expansionary through increased spending or reduce tax revenue. Thus, the automatic stabilizers of fiscal policy require the function of a countercyclical fiscal policy.

For the case of Indonesia, a study conducted by Akitoby, et.al. (2004) and Baldacci (2009) had not found any counter-cyclicality in fiscal policy. The Indonesian fiscal policy tends to be more acyclical or even procyclical. This conclusion is also confirmed by research of Hidayah Dhini Ari and Myrnawati Savitri (2009)[3] that found Indonesian fiscal policy tends to be acyclical in aggregate or even procyclical if expenditures are grouped. The cyclical properties have the potential of putting pressures of instability in the economy[4], such as rising inflation. By putting the ratio of government expenditure, excluding interest payments, and the economic growth in a graph showed a same directionof these two variables after the 1998 crisis. Prior to 1998 economic crisis, the relationship between these two variables was in the opposite direction.

In general, the reason why developing countries have not adopted countercyclical fiscal policy is mostly related to financial resource constraints and institutional weaknesses. Institutional weaknesses were related to the presence of influential groups in society who seek their interests to be accommodated by the government. This weakness can lead to discretionary fiscal policy

3 "Siklikalitas Kebijakan Fiskal di Indonesia", Research Note No.11/15/DKM/BRE/CR, Bank Indonesia.
4 Alesina dan Tabellini (2005), "Why is Fiscal Policy Often Procyclical?", NBER WP 11600, hal. 2.

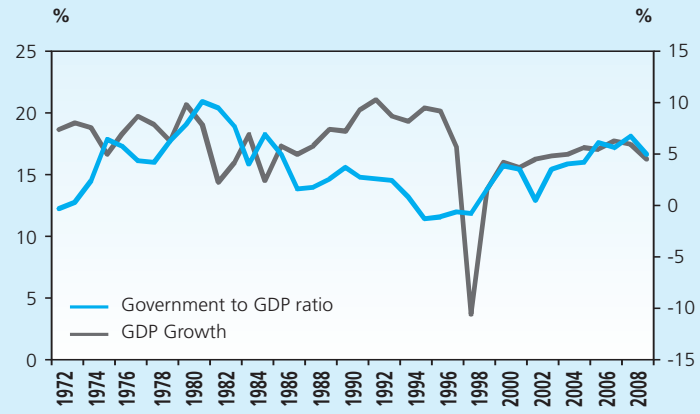

Figure 1.
Government Expenditure to GDP Ratio and the GDP Growth

that influences higher inflation volatility. The transmission of fiscal policy to inflation can be through aggregate demand, spillovers of public wages to private sector, as well as the effect of taxes on private sector marginal costs and consumption. In addition, fiscal policy can create inflation through public expectations concerning the government's ability to re-pay its debt. As the cyclicality of Indonesian fiscal policy has not led to counter-cyclicality, Indonesian discretionary fiscal policy needs to be studied to see how it effects inflation.

More explicitly, the main objective of this paper is to examine the effects of fiscal policy on output and prices. Fiscal policy here includes the effects of government spending and government tax revenue on output and prices. Secondly, the paper examines whether there is a discretionary fiscal policy in Indonesia and if so, how does it impact output and inflation volatility.

The second part of the paper reviews the theoretical basis. The third section discusses the methodology and data used, while the fourth section is a review of the results and analysis. Conclusions and implications of the study will be the concluding section.

II. THEORY

2.1. Effects of Fiscal Policy on Output and Inflation

The existing literature on the effects of fiscal policy can be classified into two groups: the demand side and the supply side effect. The effect of fiscal policy on the supply side has long-term implications. Fiscal policy oriented to increase the *supply side* can overcome the problem of limited production capacity and therefore have a more long-term effect.

The effect of fiscal policy on the economy through the aggregate demand approach is described by Keynes' approach. The Keynesian approach assumes the existence of price rigidity and excess capacity so that outputs are determined by aggregate demand (*demand driven*). Keynes said that in a recession, the market-based economy will not be able to recover without intervention from the government. Monetary policy is powerless to restore the economy because it depends only on interest rate cuts policy while in recession interest rates are already low and can even be close to zero.

In the Keynesian approach, fiscal policy can drive the economy because increased government spending or tax cuts have a multiplier effect by stimulating additional demand for household consumer goods. Similarly, the government can make tax cuts as economic stimulus. Tax cuts will increase disposable income and in turn affect demand. The key for multiplier effect is higher marginal prospensity to consume (*mpc*) as disposable income increasing.

The government spending multiplier is expressed as 1/(1-mpc) and this formula shows that the greater the *mpc*, the greater the impact of government expenditure to the GDP. Meanwhile, the multiplier effect of tax cuts (tax cut multiplier) is expressed as (1/(1-mpc) - 1). The tax cut multiplier is reduced by the government spending multiplier. The tax cut multiplier is always less than the *s*pending multiplier, because tax cuts are considered to have a lower potential to spur economic growth in the recession than an increase in government spending.

The magnitude of the multiplier effect of increased government spending and tax cuts are largely influenced by the magnitude of the *mpc* which depends on whether the increase is transitory or permanent. In this case, the effects of the *mpc* on changes in transitory income are less compared to a permanent change in income.

Further development of the Keynesian model allows the addition of crowding out effects through changes in interest rates and exchange rates. Crowding out occurs when government provides goods and services that substitute goods and services produced by the private sector. The level of crowding out affects the magnitude of the fiscal multiplier, but does not affect the direction.

Within the framework of Keynesian theory, the increase in government spending shifts the IS curve to the right, (see Figure 2). This shift leads to a new economy in equilibrium (from point A to point B) where income levels and interest rates higher. Interest rates are higher due to the increase in income caused by an increase in demand for real money balances, while in the money market, the central bank does not increase the supply of real money balances. The increase in interest rates will in turn affect the market for goods, namely a review of business investment plans. Thus, the decline in investment spending would reduce the expansionary effect of government spending. If there is no crowding out, based on the Keynesian Cross, then the output will be Y_3. However, the crowding out causes output only to rise to become Y_2.

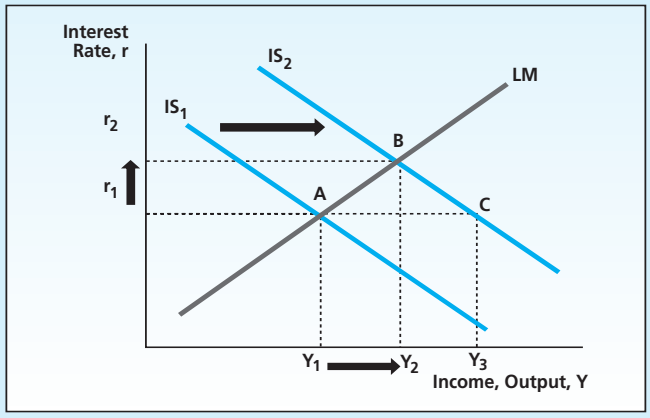

Figure 2.
Crowding Out

In the IS-LM model with an open economy (Mundell-Flemming), crowding out can occur via the exchange rate. High interest rates will attract capital inflow resulting in an appreciation of the exchange rate and lead to a decrease in the current account. In turn a decrease in the external current account would annul the first increase in domestic demand fuelled by fiscal expansion.

The magnitude of the effect of crowding out through interest rates and exchange rates are influenced by several factors in the IS-LM framework. Crowding out through interest rates will be greater when investments are sensitive to changes in interest rates. The more sensitive the demand for money to interest rate changes than to changes in income, the greater the effect of crowding out.

The level of crowding out is also influenced by price flexibility and the exchange rate regime of an economy. In the short-term, price flexibility has the potential to reduce the fiscal multiplierIn a closed economy, a fiscal expansion will push up the price so as to inhibit the increase in aggregate demand in the short term and ultimately strengthen the crowding out through interest rates.

In an open economy with a flexible exchange rate system, the level of crowding out depends on the response of domestic prices to changes in exchange rates. If the price changes are in line withappreciation of the exchange rate, the level of crowding out that occurs will be smaller than in conditions with price rigidity. This is because the exchange rate appreciation will reduce the price. On the other hand, in a system with fixed exchange rates, crowding out will be higher in price flexible conditions than in conditions with price rigidity.

Empirical studies on the relationship between fiscal policies with economic activity gave mixed results. Standard Real Business Cycle (RBC) model generally pointed out that consumption

will decline in response to increased government spending, while the IS-LM model (Keynesian) indicated otherwise. Therefore the debate about the relationship between fiscal policies to economic activity continues. Regardless of the debate, most studies still show that there is a relationship that is based on Keynesian theory.

Blanchard and Perotti (1999), Perotti (2002), Mountford and Uhlig (2002), Kruscek (2003), and Castro (2003), each of which used a sample of the U.S., the OECD countries, the European Union, Germany and Spain found that a positive *shock* on government spending (deficit increased by a flat tax) has a positive effect on output, although its effects tend to weak. Meanwhile, a positive*shock* on taxes by letting the government keep its spendingconstant has a negative effect on output. These results were also confirmed by Hemming (2002) who found that the Keynesian multiplier is positive but relatively small with a consumption effect on current income. Meanwhile, studies by Giavazzi and Pagano (1990, 1996) and Giavazzi et al (2000) stated that the Keynesian Effect does not apply.

Although empirical studies using a sample from developing countries are still very limited, one of them was performed by Schlarek (2005). Schlarek used panel data involving 40 countries and 19 of them from developing countries. Empirical results showed that the *shock* of government spending has the Keynesian effect on private consumption in both the industrial and developing countries. The *tax effect* only has the Keynesian effect in developing countries. Schlarek also found that the *shock* of government spending has a Keynesian *effect* on private consumption higher in developing countries than in developed countries.

There is no evidence of the Keynesian effect as proposed by Levine and Renelt (1992) according to Fu, et al (2003) due to the use of separate fiscal indicators. The use of one of the variables identified fiscal policy alone is not enough to be able to capture the *stance* of fiscal policy. For example an increase in government spending can be said to be expansive if it is financed by an increase in the deficit. However, government spending can be categorized as contractionary if it is financed by tax increases because the policy could have implications on the increasing role of the public sector. These results were confirmed by research of Martin and Fardmanesh (1990), Kocherlakota and Yi (1997) and Fu, et al (2003) that tax cuts can have a positive effect on economic growth only when public capital is kept constant.

In the case of Indonesia, the application of Keynesian theory in some macro-economic models has been developed by Bank Indonesia, including SOFIE and SEMAR, in line with the empirical findings[5]. However, the degree of influence on the output is different for each model. In SOFIE, the increase in government spending, either in consumption or investment, amounting to Rp10 trillion will increase GDP by 0.3%. While the addition of government spending for infrastructure programs of Rp10, 8 trillion GDP would increase by 0.0512% in the SEMAR model. Difference is probably caused by the influence of the nature of these two different models, namely the dynamic stochastic SOFIE, while SEMAR ismore static deterministic.

2.2. The Effect of Fiscal Policy on Inflation

In general economy setting, a function of the central bank is controlling the price level. This is related to the quantity theory of money by Milton Friedman who stated that "inflation is always and everywhere a monetary phenomenon". However, this traditional view was challenged by the *fiscal theory of the price level* (FTPL), developed by Leeper (1991), (Woodford (1994.1995), and Sims (1994), which states that fiscal policy plays an important role in price determination through the budget constraint associated with the debt policy, spending and taxation.

Fiscal theory of the price level (FTPL) can be explained by the two approaches, namely the weak form FTPL and strong form FTPL. Weak form FTPL reflects the dominance of fiscal policy (fiscal dominance) explained by the existence of a link between fiscal policy and monetary policy through *seigniorage*. Because *seigniorage* (revenue from printing money) is one source of government revenue, the long-term monetary and fiscal policies are determined at the same time by the *fiscal budget constraint*.

Weak form FTPL assumes that the fiscal authorities will move ahead with setting the primary budget surplus / deficit and then respond by creating seigniorage by monetary authorities to maintain the solvency of the Government. If the authorities refuse to create seignorage, the debt to GDP ratio can be increased in an unsustainable manner. This in turn will have an effect to increase real interest rates and government debt in line with increasing demand by the market premium. However, this process cannot continue. One of the policy authorities has to change. *Weak form FTPL* assumes that the central bank will respond by creating seignorage to avoid default. Therefore this theory also states that fiscal policy helps determine the future inflation through money growth. This theory simply states that the money supply is the main cause of the fiscal authority. In other words, fiscal policy is exogenous while the movement of money supply is endogenous.

In contrast to the *weak form FTPL*, where money supply is endogenous to meet the government budget constraint, *strong form FTPL* assumes both fiscal policy and monetary policy are exogenous and that prices adjust to ensure government solvency.

FTPL departs from an understanding of equal velocity of money and the government budget constraint. Velocity of money in period t (V_t) is expressed as the ratio of nominal output (price level P_t multiplied by real output Y_t) of nominal *money balances*. In this equation the price level is proportional to the *money supply*.

$$V_t = P_t \,.\, Y_t / M_t \tag{1}$$

Furthermore the price level is determined M_t, Y_t and V_t by taking into account the entire balance in the trajectory of the economy. Balance is defined in two conditions, namely the balance

5 SOFIE and SEMAR are macro models developed internally at Bank Indonesia. These modelsdo not use tax variables in its modeling. SOFIE is a macroeconometric model, while SEMAR is a Computable General Equilibrium Model with Input-Output Tables 2005.

of the government financial balance and equilibrium in the money market. Equilibrium in the money market where the demand for real money equalsthe real money supply defined as:

$$M_0/P_0 = f(R) \quad (2)$$

Where the real money demand is a function of nominal interest rate $(R = r + \pi)$ and π is the inflation rate. Money demand is a function of inflation because real interest rates and output is assumed constant. M_0 is the nominal money stock at the beginning of the period of the model and P_0 is the prevailing price level.

The government financial balance sheet is expressed as:

$$D + S(\pi) = B_0/P_0 \quad (3)$$

where $S(\pi)$ $(S'(\pi) > 0)$ states *present value* of *seignorage*. D is the *present value* of future *primary budget surplus* (negative represent deficit). The *present discounted value* of *seigniorage* is $S = \pi f(\pi)/f$.

The accumulated value of the total real government debt maturing in the beginning of period denoted as (B_0/P_0) must be equal to the present value of the future primary budget surplus plus the revenue from seigniorage. Under conditions where the Ricardian Equivalence does not occur and with an independent central bank, the imbalances in *intertemporal budget constraint* must be adjusted to the movement of price levels. In other words if the perceived level of the *primary surplus* is not sufficient to ensure the fiscal *solvency* and the central bank does not create *seigniorage*, then the balance will be obtained through the price level. Adjustment will occur through a mechanism called *wealth effect*.

Empirical studies of the FTPL are still limited and the results are relatively diverse. The main constraints of these studies are that the behavior of price increases caused by fiscal policy can only be identified if the government's *intertemporal budget constraint*is not balance.

2.3. Discretionary Fiscal Policy on Output and Inflation Volatility

Discretionary policy, monetary and fiscal policies, is often the topic of public debate. In the monetary sector, the debate about the discretion has reached on the understanding that monetary policy should be free from government intervention, namely by establishing an independent central bank. However, for fiscal policy, no agreement has been reached on the mechanisms and institutions that can avoid the decisions maker to choose discretionary policy.

Discretionary fiscal policy is defined as a change or a reaction to fiscal policy that does not reflect a reaction to the current economic conditions (Fatas and Mihov, 2003). Fiscal policy can

be categorized into three groups: (1) *automatic stabilizers*; (2) discretionary fiscal policy as a response to economic conditions, and (3) discretionary policy conducted for reasons other than the current macroeconomic conditions. In essence, it serves as an *automatic fiscal stabilizer* in the economy, which requires the *countercyclical* nature of the policy. In addition, the application of discretionary fiscal policy can be both a response to economic developments as well as response that have no background to the macroeconomic conditions.

Academics have not reached agreement on the method of measurement of appropriate fiscal policy discretion (Fatas and Mihov, 2003). According to Blanchard (1990), to distinguish between fiscal policy and discretionary fiscal policy, any benchmark can be used. For example, changes in inflation, interest rates and economic growth within a certain time can be examined.

Measurement of discretionary fiscal policy by Fatas & Mihov focused on the three components above:

$$\Delta G_t = \alpha + \beta \Delta Y_t + \gamma \Delta G_{t-1} + \delta W_t + \epsilon_t \quad (4)$$

where G is the real government expenditure; Y is the real GDP, both in the value of the logarithm; W is a control variable, including time trends, inflation and *inflation squared;* while ϵ_t is a quantitative estimate of the discretionary policy *shock* in government spending (*discretionary spending policy shock*).

On the other hand, discretionary fiscal policy can jeopardize macroeconomic stability. Therefore, there is aview that fiscal policy needs restriction. On the other hands, there is also aview that fiscal policy should not be restrictive. The reasons underlying this view is that fiscal policy can smooth business cycle fluctuations through expansionary government spending, tax cuts in a recession, and a contractionary fiscal policy whenthe economy is in an expansionary phase A c*ross-section* study by Fatas and Mihov (2003) showed that countries aggressively implementing fiscal policy will have less desirable volatility and lead to lower economic growth.The study also concluded that political interest restrictions in fiscal policy implementation are supportive in reducing fiscal discretion.

Among other things, fiscal discretion may push inflation volatility. Studies on the effects of fiscal policy on inflation in general can be divided into two parts, the study focused on a longer period of time related to the impact of fiscal deficits on inflation and the study of fiscal discretion against inflation. Meanwhile, the effect of fiscal policy to inflation according to Rother (2004) may occur through the effect of fiscal policy in influencing aggregate demand, the *spillover* of wages of civil servants (public wages) to the private sector and through the impact of taxes on marginal costs and private consumption. In addition, fiscal policy can affect inflation through the public expectations of the Government's ability to pay its debts.

Rother (2004), using a data panel of 15 industrialized countries, concluded that the volatility of fiscal policy significantly affect the volatility of inflation[6], with a positive sign. This means that changes in the fiscal policy stance of the current period (t) and the previous period (t-1) increases the volatility of inflation in the current period (t). Volatility of discretionary fiscal rise by 1 standard deviation will cause an increase in *unconditional* [7] volatility of inflation on average by 10%, and 17% for the *conditional* [8] volatility of inflation. From a policy perspective, these results indicate that fiscal discretion affects de-stabilization rather than the stability of the macro economy.

Study of the effects of fiscal policy on inflation is usually done by studying the relationship between fiscal policy and monetary policy and its impact on inflation. It is understood, that within the framework, macroeconomic, monetary and fiscal policies will affect inflation through the impact of the policy to changes in aggregate demand and supply sides. The question is what condition a fiscal policy can affect monetary policy and inflation further. One logical explanation is through the dependent central bank. If the government can intervene monetary policy, there is a possibility the government will use force to support the measures taken. To finance its deficit, for example, the Government will ask the central bank to buttressit or ask to keep interest rates at low levels in order to lower its interest payments. Similarly, in case of conflict the Government will force central banks to support the policy (Sargent and Wallace, 1981).

However, an independent central bank also has an incentive to create *inflation surprise* in response to fiscal changes. Similar to the *time-inconsistency* problem, as applied in the Barro and Gordon (1983), an independent central bank will push inflation higher if the central bank considers that the Government fiscal consolidation could lead to higher costs for the economy. The conflict can be resolved if the central bank has independence (Rogoff, 1985) or applies certain *policy rules* such as an *inflation targeting* framework policy that uses inflation as a primary goal.

Empirical studies on the relationship between level of fiscal deficit and inflation through monetary policy are still inconclusive. Some studies conclude that the separation of the central bank from the government encourages low inflation. This supports the hypothesis that government intervention can improve the monetary policy of inflation. However, other studies (Fuhrer 1997, Campillo and Miron 1996) indicate that the influence of central bank independence decreases when considering other factors.

Allesina and Grill (1992) argued that delegating monetary policy to the parties that are more *inflationaverse* than the public preferences, is a form of commitment to support low

6 Volatility of inflation is calculated using the standard deviation of monthly inflation.
7 Standard deviation of monthly inflation (mtm) in a calendar year, which measures short-term fluctuations in inflation.
8 Standard deviation of forecast error in one period ahead is generated from time-series models. This implicitly assumes that fiscal discretion causes inflation projections to be more difficult, as reflected in the greater forecast error.

inflation. The argument constructed shows that the "median voter" community, will choose a central bank that is more *inflation averse* than themselves. However, the "median voter" wants to be "*time inconsistent*" and recall their support from a central bank that is very conservative about inflation.

Allesina and Summers (1993) conducted a study to look at the relationship between the independent central bank and *macroeconomic performance*. The study generally concluded that an independent central bank will affect low inflation. Assuming that a low inflation level will provide low-inflation variability, an independent central bank will reduce the variability of inflation. However, an independent central bank has no correlation with other economic indicators such as economic growth, unemployment, and interest rates. Rogoff (1985) stated that *dynamic inconsistency theories of inflation* that was developed by Kydland and Prescott (1977) and Barro and Gordon (1983), allows a more independent central bank to lower the inflation rate. Kydland and Prescott Further (1977) stated that *discretionary policy,* where the decision-makers choose the best policy in accordance with the existing conditions, will not yield a maximum social welfare. However, with a *rules-based* policy, the economic performance can be improved.

Furthermore, there are some reasons why an independent central bank will have a positive impact on the economy. *Firstly,* the behavior of an independent central bank is predictable that will encourage economic stability, thus lower the interest rate *risk premium*. To that end, the central bank will seek to avoid any manipulation that is usually done before an election (as the model of Nordhaus, 1975, and Rogoff and Silbert, 1988) or reduce the shock after the election made by the party winning the election (as a model Hibbs (1987) and Allesina (1988, 1989). *Secondly*, given the high inflation would have a bad effect on the economy, the central bank will attempt to reduce inflationary pressures.

The importance of the inflation volatility has become an important aspect in the literature that discusses the relationship between inflation and growth. Fromthe academic point of view, there is a prevailing opinionthat inflation and high inflation volatility is harmfulfor growth. Judson and Orphanides (1999) found evidence that inflation volatility, calculated by the standard deviation of the rate of inflation (*intra-year*), contributes significantly in reducing economic growth. These findings support the theory of Friedman (1977) that the negative effect of inflation on the growth brought about by inflation volatility. In line with the findings of this theoryare Froyen and Waud (1987) who found that high inflation pushed the high inflation volatility and uncertainty in the USA, Germany, Canada, and UK, and ultimately had a negative effect on economic growth. Similar findings were obtained by Al-Marhubi (1998) who also found a negative relationship between economic growth and inflation volatility based on a study panel data from 78 countries. In contrast to the above study, Blanchard and Simon (2001) found a strong positive relationship between inflation volatility and the output volatility in major industrial countries.

III. METHODOLOGY

3.1. Data and Variables

There are essentially three fiscal policy variables that are commonly used, namely expenditure (*spending*), receipt (*tax revenue*) and the fiscal deficit. The latest is the difference between revenues and expenditures. The existing literature generally does not specify which variable is better to use for analysis. According to Fu et all (2003), who quoted the opinion of Levine and Renelt (1992), none of the three fiscal policy variables that affect economic growth proved robust when used separately. The use of only one variable is not expected to be fully adequate to capture the *stance* of fiscal policy. For example, an increase in government spending is categorized expansive when it is financed by an increase in the deficit. But the opposite can also be categorized contractive if it is financed by tax increases. Therefore the combined use of the fiscal policy variables is recommended in the equation.

This study uses the variables in the model used by Perotti (2002) as contained in Table 1 with quarterly data frequency from 1990: Q1 to 2009: Q4. All data are expressed in logarithms. Fatas and Mihov (2001) stated that the five variables below are the minimum macro variables needed to study the effect of fiscal policy.

Table 1.
Fiscal Policy Variables

No.	Variable	Description	Scope of Data	Source
1	LTSPNDRLSA[1)]	Total government expenditure in real terms (including central government expenditure, except interest payment and regional government expenditure). The real value is obtained by dividing the nominal value with the CPI.	Includes central and regional government expenditure. For central government expenditure, excluding interest payments on debt.	Bank Indonesia *
2	LTTAXRLSA[1)]	Total real tax revenue		Bank Indonesia *
3	LGDPRLSA[1)]	Real Gross Domestic Product		Central Bureau of Statistics
4	LCPI	Consumer Price Index		Central Bureau of Statistics
5	LDEP_3	3 month deposit rate		Bank Indonesia *

Note :
1) the cyclical effect has been eliminated using X11 method in E-Views.
* From Department of Economic & Monetary Statistics

Given the State Budget of Indonesia during 1970-2009 was relatively manageable at below 3% of GDP, in this study we use the definition of discretionary fiscal policy as the deviation of the actual government expenditure from its planned expenditure. This deviation will then be examined for its stationarity. If stationary, then the deviation is random and it can be concluded that there is no discretionary fiscal policy.

The term Government expenditure used in this study is total government expenditure excluding interest payments. Government spending plans are compiled from the Financial Memorandum prepared each fiscal year. The realization of government spendings are from the audited State Budget by the Audit Board of the Republic of Indonesia for period 1990 to 2009. If the measurements indicate the presence of discretionary fiscal policy, the research will continue to see the effects of discretionary fiscal policy on output and inflation volatility.

In summary, the data required to test the impact of fiscal discretionary policy on output and inflation volatility is shown in the following table.

Table 2.
Effects of Fiscal Policy Variables on Output Volatility

Variable	Description	Source
VOL_Y	Output volatility of GDP: moving average - standard deviations 4 quarters	Processed from Statistics Indonesia data
DISK	Discretionary fiscal volatility: mean of standard deviation - 4 quarters	Processed from the error equation of fiscal discretion
VOL_INFL	Inflation volatility of IHK: two moving averages standard deviation 4 quarters (as a control variable)	Processed from Statistics Indonesia data
VOL_WTV	Volatility in world trade volume: Average 4 – mean of standard deviations of quarterly (as a control variable)	Data are compiled from IFS, IMF

Table 3.
Data Used in Inflation Volatility Equations

Variable	Description	Source
VOL_INFL	Inflation volatility: moving average of standard deviations 4 quarters	Processed from Statistics Indonesia data
DISK	Discretionary Fiscal volatility: mean of standard deviation - 4 quarters	Processed from the error Discretionary Fiscal equation
VOL_KURS	Volatility of the Rupiah / USD: two moving average standard deviation of 4 quarters (control variable)	Diolah dari data IFS, IMF
OUTGAP	Output gap	Estimation from the SOFIE model 2004-Bank Indonesia
INFL	Inflation	Statistics Indonesia

3.2. Estimation techniques

This study used two estimation techniques: (i) Vector Error Correction Model (VECM) and (ii) linear regression model. The first approach, VECM, was used to analyze the effects of fiscal policy on output and inflation, while the second approach was used to analyze the effects of discretionary fiscal policy on output and inflation volatility.

VECM is a VAR model; designed for use in the non-stationary data series andthe series have a cointegration relationship. The VEC has cointegration relations built into the specification so that it restricts the long-runbehavior of the endogenous variables to converge to their cointegrating relationships while allowing for short-run adjustment dynamics. Thecointegration term is known as theerror correction term since the deviation from long-run equilibrium is corrected graduallythrough a series of partial short-run adjustments. VECM equations developed from the unrestricted VAR equationsand can be written as:

$$Y_t = A_0 + \sum_{i=1}^{k} A_1 Y_{t-1} + e_t \tag{5}$$

where Y_t is the vector of endogenous variables (*ltspndrlsa, lttaxrlsa, lgdprlsa, lcpi and ldep_3*); A_0 is a vector of exogenous variables in the form of constants A_1; is the coefficient matrix for lag i^{th} with size (*k x k*) and e_t is a vector of error (residual).

By using the standard model of the VAR in equation (5), *structural innovation* will be calculated with:

$$\epsilon_t = Be_t \tag{6}$$

If Y_t is a vector of endogenous variables with k elements and $\sum \varepsilon = E(\epsilon_t \epsilon'_t)$, then the model SVAR can be estimated as follows:

$$A\epsilon_t = Be_t \tag{7}$$

where ϵ_t and e_t consecutively are vector k of *observed residual* and vector k of *unobserved structural innovation*. A and B is the matrix *(k x k)* to be estimated. *Structural innovation* e_t is assumed orthonormal so that the covariance matrix is the identity matrix $E[e_t e'_t)=1$. Assuming orthonormality, the number of necessary restriction is $k(k+1) / 2$ to complete as many $2k^2$ unknown parameters in the matrices A and B. So the matrix A is the lower triangular matrix, while B is the diagonal matrix.

$$A = \begin{bmatrix} 1 & 0 & 0 & 0 & 0 \\ a_{21} & 1 & 0 & 0 & 0 \\ a_{31} & a_{32} & 1 & 0 & 0 \\ \dots & \dots & \dots & 1 & 0 \\ a_{n1} & a_{n2} & \dots & \dots & 1 \end{bmatrix} \quad dan\ B = \begin{bmatrix} b_{11} & 0 & 0 & 0 & 0 \\ 0 & b_{22} & 0 & 0 & 0 \\ 0 & 0 & b_{33} & 0 & 0 \\ 0 & 0 & 0 & b_{\dots} & 0 \\ 0 & 0 & 0 & 0 & b_{nn} \end{bmatrix} \tag{8}$$

From the equation above, to obtain an equation model of long-term relationships, the VAR model should be added with lag, so the VECM equation will be as follows:

$$\Delta Y_t = \alpha\beta Y_{t-1} + \sum_{i=1}^{p-1} \Gamma_1 \Delta Y_{t-1} + C^* D_t + u_t \quad (9)$$

where Y_t is $(k\ x\ 1)$ vector of endogenous variables; α is the adjustment coefficient which measures the speed of adjustment of the endogenous variable *i* to the long term; β is the cointegration vector; D_t is a vector of *deterministic terms* ; Γ_1, ... Γ_p is $(k\ x\ k)$ coefficient matrix; C^* is the matrix associated with the *deterministic term* is used in the model as a constant, with a trend or *seasonal dummy*; and u_t *the reduced form disturbance*.

If there is a total rank $r \leq (k\text{-}1)$ cointegration vectors in matrix β, then this indicates that the number of columns $(k\text{-}r)$ of α is zero. Hence the determination of how many $r \leq (k\text{-}1)$ contained in the cointegration vector β is similar with determination of how many columns are zero in α.

The presence of zero column in α indicates that the cointegration vector in matrix β does not matter if it is not included in the model that determines the equation (6) above. Therefore, no information is lost by not modeling the equation and the corresponding variables are *weakly exogenous*.

The first step of the VECM method is to test the stationarity of all variables to determine the order of integration. The second step is to determine the optimal number of lag using *unrestricted* VARs. VECM equations will be estimated using Johansen's maximum likelihood procedure to determine the number of cointegrating vectors and distinguish between long term and short-term dynamics. Furthermore, testing of serial correlation and heteroscedasticity will be done using *serial correlation* with the LM Test and the White Test, respectively. To obtain the pattern of dynamic adjustment of the VECM model, we also analyze the impulse response function of the LGDPRLSA and LCPI to one standard deviation shock to other studied variables.

For Impulse Response Function analysis this study uses the Choleski Decomposition approach. The order selection (ordering) of fiscal policy between government spending (*spending*) and taxes in the equation SVAR and VECM are quite difficult (Perotti, 2002). One alternative is to see the *robustness* of two alternative sequences. In this study the selection of the order is determined by the Granger Causality test. From the results of Granger Test (Table 4), the sequence on the endogeneitylevel is started with government spending (*ltspndrlsa*), followed by taxes (*lttaxrlsa*) and output (*lgdprlsa*). Henceforth, the orderof thevariablesdoes not really matter if we only look at the impactof fiscal policy (Perotti, 2002).

As mentioned previously, the second approach the linear regression model, was used to see the effect of discretionary fiscal policy on output and inflation volatility. This is done by estimating the three variants of the equation, namely (i) the *cyclically adjusted balance* equation, (ii) the volatility of output equations, and (iii) volatility of the inflation equation.

Table 4.
Granger Casuality Test

Pairwise Granger Causality Tests
Sample: 1990Q1 - 2009Q4
Lags: 4

Null Hypothesis:	Obs	F-Statistic	Prob.
LTSPNDRSA does not Granger Cause LTTAXRL1SA	76	1.4480	0.2280
LTTAXRL1SA does not Granger Cause LTSPNDRSA		3.2748	0.0163
LGDPRLSA does not Granger Cause LTTAXRL1SA	76	3.3644	0.0143
LTTAXRL1SA does not Granger Cause LGDPRLSA		1.1158	0.3565
LGDPRLSA does not Granger Cause LTSPNDRSA	76	0.6179	0.6513
LTSPNDRSA does not Granger Cause LGDPRLSA		1.1515	0.3401

On output volatility, the regression equation was adopted from Fatas and Mihov (2003) as shown in equation (10). The volatility of inflation used for the regression equation was adopted from Rother (2004) shown in equation (11). The measurement of *inflation volatility* was done using the *unconditional variability* of inflation. This method is defined as the deviation of the monthly inflation rate from its average during the year. Inflation data used is the CPI inflation. The same definition of volatility is also applied to the Rupiah control variables.

$$Vol\_Y_t = \alpha + \beta Disk_t + \gamma VariabelKontrol_t + v_t \quad (10)$$

$$Vol\_Inf_t l = \alpha + \beta Disk_t + \gamma VariabelKontrol_t + v_t \quad (11)$$

IV. RESULTS AND ANALYSIS

VECM estimation begins with the stationarity test for each variable using Augmented Dickey Fuller (ADF) Test. The Stationarity test result in Table 5 shows that all variables are not stationary at its level. From this, it is concluded that all variables are integrated at order 1.

The optimal lag number for the VAR procedure is different for each of the criteria (Appendix-1). Schwarz criteria and Hannah Quin produces the optimal lag 2, while the Akaike criterion produces 4. In this model the optimal lag determination is based on the criteria of Akaike. VAR models also have met the criteria of stability in which all values have an *inverse roots* characteristics of AR polynomial smaller than one and are all in the *unit circle* (Appendix-2)

We test the number of *cointegrating vectors* using the Trace and Maximum Eigen Value Statistics (Appendix 3). The results of the tests are conducted on the assumption that the data

Table 5.
Unit Root Test (P Value)

No.	Variable	Level			First Difference		
		Trend	Trend + Intercept	None	Trend	Trend + Intercept	None
1	LTSPNDRLSA	0.8527	0.2710	0.9630	0.0000	0.0000	0.0001
2	LTTAXRLSA	0.8234	0.0122	0.9984	0.0000	0.0000	0.0000
4	LGDPRLSA	0.6542	0.5224	1.0000	0.0000	0.0000	0.0000
5	LCPI	0.7784	0.7445	0.9990	0.0002	0.0010	0.0037
6	LDEP3	0.0783	0.0089	0.3898	0.0014	0.0079	0.0001

has a linear trend by including the constant in the *cointegrating equation* and VAR. The results of Trace Test and Maximum Eigen Value indicate the presence of 1 (one) *cointegrating equation*. This study will estimate the effects of government spending and taxes on output and inflation.

Table 5 shows the *speed of adjustment* coefficient of these variables. Furthermore we conducted*weak exogeneity* test, which is equivalent with testing whether the speed of adjustment coefficients of the variables are equal to zero. In cointegration system, if the variable does not respond to long-term relationship discrepancy, then the variable is declared weakly exogenous. In other words, no information is lost if the variable is not modeled, so it means a variable can be inserted into the right side of the VECM equation.

Testing the speed of adjustment coefficient of the variables was done by linear restriction sonthe coefficients to the VECM long-term equation. The result of the test using the likelihood ratio test can be seen in Table 6. Government expenditure variable (*ltspndrlsa*), taxes (*lttaxrlsa*) and *lcpi* are exogenous variables as the p-value is greater than the 5% significance level. Nevertheless the *ldep3* variable can still be expressed as an exogenous variable at a 1% significance level. It may therefore be concluded that other variables except output (*lgdprlsa*) is weakly exogenous.

Table 6.
Speed of Adjustment and Test Weak Exogeneity

Variable	α	Standard Error	P-value	$?^2$ Stat
ltspndrlsa	-0.0363	-0.198240	0.8596	0.0313
lttaxrlsa	0.2297	-0.103990 ***	0.0652	3.3993
lgdprlsa	-0.0832	-0.025120 ***	0.0034	8.5986
lcpi	0.0177	-0.036310	0.6116	0.2578
ldep3	-0.2590	-0.095830 ***	0.0139	0.0139

***/**/* significant at 1%/5%/10%

The result of VECM testing indicate that variables tax, inflation and interest affecting output significantly in the long run (Table 7). Inflation and interest rate variables behave as expected where in the long term an increase in inflation and interest rates may slow output. Government spending variables have signs as expected but insignificant. On the other hand, tax has a positive effect on output in the long run. This could mean that the tax revenue is one of the most important aspects in source of government financing, especially for infrastructure development. The *error correction* coefficient for output (α of *lgdprlsa*) is negative and significant, indicating there are adjustments to instability in the short term.

Table 7.
The Result of VECM

lgdprlsa	ltspndrlsa	lttaxrlsa	lcpi	ldep3	error correction
1.0000	0.0073	1.0663	-0.6616	-0.4733	-0.0534
	[-0.02218]	[-2.18557]	[2.90109]	[3.24231]	[-4.23207]

value in [ ] Shows the T statistic

Residual tests of the VECM estimation results indicate that the VECM equation passes the residual test. LM Test results show a *p-value* 0.1074, while the White Test showed a *p-value* 0.2699.

The pattern of short-term adjustment of the output variable to one standar deviation shock of the other variables can be shown from the Impulse Response. The Impulse Response Function in VECM uses the Cholesky Ordering: *LTSPNDRLSA, LGDPRLSA, LTTAXRL1SA, LCPI, LDEP3*.

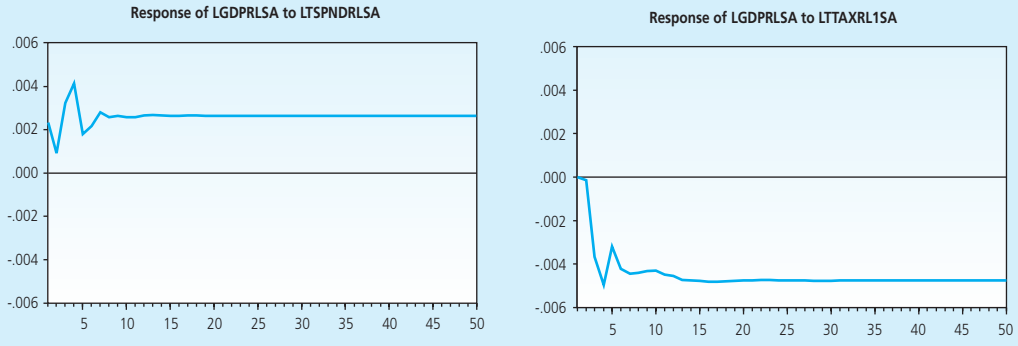

Figure 3.
Impulse Response Function of Output

Figure 3 shows that a positive shock in government spending have an impact on increasing output. Shock by 1 standard deviation has an immediate effect on the GDP by raising it 0.2% in Quarter 1 and later to 0.4% in quarter 4. This response then decreases until it reaches the stability at 0.26% in period 8. Government tax increase of one standard deviation lowered output by 0.5% in quarter 3. This response tends to weaken and to achieve stability at 0.32% in the period-13.

Variance decomposition analysis as contained in table 8 shows that government spending shock is greater in explaining the change of output than the tax. Fluctuations in output are explained more by changes in the output itself.

Table 8.
Variance Decomposition of Output

Period	LTSPNDRLSA	LTTAXRL1SA	LGDPRLSA	LCPI	LDEP3
1	1.122516	0.628023	98.24946	0	0
2	0.601045	0.502419	85.85251	13.04203	0.002001
3	1.083895	0.660221	80.46457	13.18265	4.608668
4	1.488406	0.919723	74.63147	11.76303	11.19737
5	1.259247	0.796259	71.57523	11.34711	15.02216
6	1.146604	0.822631	70.06114	10.68735	17.28227
7	1.141854	0.868725	68.91182	10.27887	18.79873
8	1.107807	0.891281	67.74219	9.99521	20.26351
9	1.082622	0.896481	66.64153	9.858749	21.52062
10	1.054638	0.892624	65.86026	9.732827	22.45965
11	1.027818	0.896237	65.23625	9.64874	23.19096
12	1.010235	0.900159	64.62339	9.609131	23.85709
13	0.99542	0.914057	64.06173	9.555639	24.47315
14	0.980393	0.926245	63.56744	9.510754	25.01517
15	0.967562	0.937003	63.1533	9.46629	25.47584

A positive relationship between government spending to output is in line with the theory and some empirical studies. Based on the Keynesian theory, fiscal policy can drive the economy because the increased government spending or tax cuts have the multiplier effect by stimulating additional household demand for consumer goods. These results are also consistent with research by Blanchard and Perotti (1999), Perotti (2002), Mountford and Uhlig (2002), Kruscek (2003), and Castro (2003), each of which used a sample of the U.S., OECD, European Union, Germany and Spain. They found that a positive shock in government spending has a positive impact on output. These results are also consistent with research by Schlarek (2005) who used a sample of developing countries as well as the application of macro models for Indonesia's economy (SOFIE and SEMAR) but with a different degree of influence on output.

In SOFIE, the increase in government spending, either in consumption or investment, amounting to Rp10 trillion will increase GDP by 0.3%. While the addition of government spending for infrastructure programs of Rp10, 8 trillion would increase GDP by 0.0512% in the

model SEMAR. The difference is probably caused by the influence of the nature of these two different models, namely SOFIE who is dynamic, while SEMAR more static. The dominant influence of government spending to GDP compared with the tax effects in the short-term suggests this policy is still effective enough to stimulate economic growth, especially in times of recession.

Related to these findings, efforts to increase the absorption of the budget are important. Throughout the 2002-2009 expenditure budget was generally always below the APBNP, with the exception of the years 2007-2008. Under conditions where actual revenues surpass the (plan) budget and the realization of expenditures is under budget, *over-taxation* is feared, and would interfere with the aim to encourage economic activity.

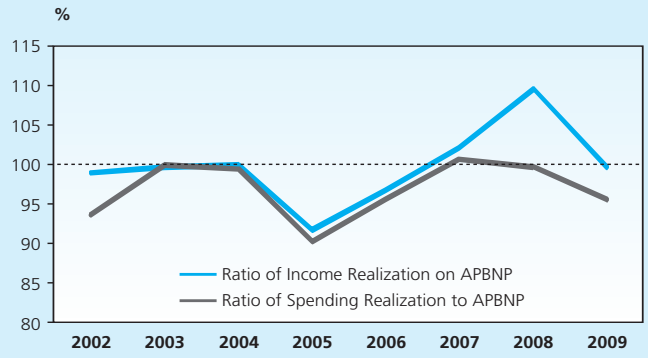

Figure 4. Realisation of Revenue and Spending (in percentage to the revised budget)

The test results with the same method to analyze the effect of government spending and taxation to inflation suggests that there is no cointegration relationship between inflation with the fiscal policy variables.The error correction coefficient of inflation is not significant despite having a negative value (Appendix 4). Therefore to test the effect on inflation, a SVAR approach was used with a restriction in the long-run equation as follows:

$$\begin{bmatrix} 1 & .. & .. & .. & .. \\ .. & 1 & .. & .. & .. \\ .. & .. & 1 & .. & .. \\ \gamma_{41} & \gamma_{42} & ... & 1 & .. \\ 0 & 0 & ... & ... & 1 \end{bmatrix} \begin{bmatrix} ltspndelsa \\ lttaxrlsa \\ lgdprsla \\ lcpi \\ ldep3 \end{bmatrix} \quad (11)$$

Each coefficient Y_{ij} shows a *structural* shock from variable *j* to variable *i* with a direct effect. The diagonal matrix elements are normalized to 1 and the empty cells are restricted to be zero. Structural factorization is used for further testing of the IRF.

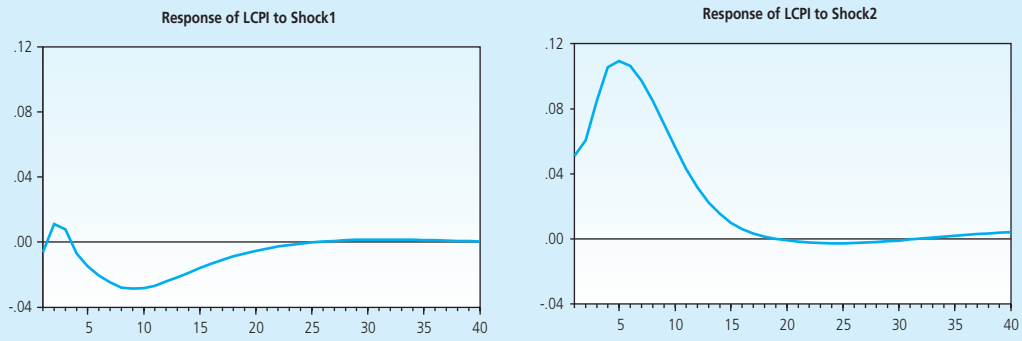

Figure 5.
Impulse Response Function: Inflation

In principle, the SVAR method requires stationary data.Nonetheless, considering the use of data in first difference produces highly oscilating pattern, we proceed with the data in level. The use of data in level is aimed to see the pattern of relationship between fiscal policy and not to see the magnitude impact of shock between the variables.

From the impulse response function, positive shock of government spending will be responded with a decrease in inflation (left panel of Figure 5). The shock of onestandard deviation of government spending first will increase the inflation but then decrease in fourth quarter. The effect disappeared after 22nd quarter. The negative influence of a positive shock in government spending is in line with several studies, i.e. Fatas and Mihov [2003] and Mountford and Uhlig [2002], where government spending has a negative impact on inflation.

The negative impact of shock government spending to inflation might be due to the greater of multiplier effect of government investment expenditure (including infrastructure) compared to the routine expenditures. Government spending on infrastructure is expected to improve the distribution of goods and services thereby contributing to the decline in inflation. Meanwhile, a positive shock to the tax will increase inflation (right panel of Figure 5). The finding that the tax shock increases will affect inflation is less consistent with the goals of fiscal policy to influence aggregate demand. An increase in Value Added Tax, for example, will affect the consumption decisions of economic actors, so it will impact on the decline in inflationary pressures (Wren Lewis (2002) in Hermawan and Munro (2008)). One of the arguments for these findings sees tax increases as a way to increase production costs by the manufacturer, thus causing an increase in selling price of goods to consumers. To strengthen this argument, further study is needed to explore the impact of tax increase in producer prices. Another argument is that inflation is caused by factors beyond fiscal policy, such as *imported inflation*, output gap, monetary policy and structural policy of the government, so that no tax increases of itself won't affect inflation.

Table 9.
Variance Inflation of Inflation

Period	LTSPNDRLSA	LTTAXRL1SA	LGDPRLSA	LCPI	LDEP3
1	0.0086	0.1633	30.3594	69.4687	0.0000
2	0.0232	0.7683	44.5401	54.1220	0.5464
3	0.1209	1.1959	48.1340	49.4698	1.0795
4	0.3207	1.8523	47.3446	48.6620	1.8205
5	0.6261	2.3293	46.4992	47.9773	2.5681
6	0.8979	2.6025	45.4668	47.9937	3.0391
7	1.1390	2.7537	44.4498	48.3676	3.2899
8	1.3682	2.7958	43.5067	48.9493	3.3800
9	1.5294	2.7841	42.6642	49.6469	3.3754
10	1.6396	2.7450	41.9571	50.3287	3.3297
11	1.6986	2.7052	41.3920	50.9236	3.2807
12	1.7144	2.6795	40.9642	51.3889	3.2530
13	1.7083	2.6721	40.6506	51.7114	3.2576
14	1.6954	2.6799	40.4264	51.9024	3.2959
15	1.6899	2.6979	40.2640	51.9841	3.3641

The test results show that the *variance decomposition* of inflation (CPI) is explained more by changes in government spending than tax variables. Fluctuations in inflation are explained more by changes in this variable and the changes in output.

Meanwhile, in relation to discretionary fiscal policy, using government expenditure data ranging of from 1990 to 2009, there is a deviation between the initial plan and the realization. In the figure 6, we can see before the crisis of 1997/98 the deviation between the planned government expenditure and therealization expenditurebefore the crisis of 1997/98 was relatively small. In the post-crisis, the behavior of these deviations tends to enlarge. If the deviation is calculated as a percentage of the plan, then during the period of the sample the standard deviation is 19.4%.

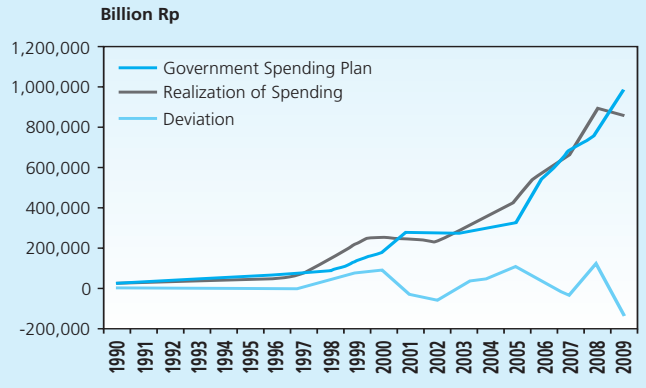

Figure 6. Realisation of Revenue and Spending (in percentage to the revised budget)

Stationarity test of the deviation of expenditure shows that it is stationary. Therefore, it can be concluded that the deviation has not demonstrated the existence of discretionary fiscal policy, hence testing for the effects on output and inflation volatility is not necessary.

The higher deviation of the post-crisis economy 1998 is partly due to Indonesia's economy becoming increasingly integrated with the global economy. Consequently, the shock that occurred in the global economy will affect the achievement of the macroeconomic assumptions used in budget planning. Oil price increases beyond the specified assumptionsoften force the government to review its spending plans. Review of expenditures is mainly related to the soaring fuel subsidies and transfers of funds to the regions. Adjustment of government spending since the 1998 economic crisis is not as easy to pre-crisis period as the government is committed to reduce its debt ratio gradually and control the fiscal deficit. In addition, the increasing role of parliament (DPR) in the budget process makes the government's budget adjustment process more complex.

V. CONCLUSION

An increase in government spending has a positive shock to GDP while tax increases have negative effects. The positive effects of government spending and the negative effect of the tax to GDP are in line with Keynes' theory about the role of government in stimulatingthe economy and in accordance with empirical studies in several countries. Thegreater effect of government expenditure shock on GDP compared to tax policy represents the effectiveness of government spending to stimulate economic growth, especially in times of recession. The negative effect of positive government spending shock to the inflation can be explained by the possibility of greater multiplier effects of government spending on investments (including infrastructure) than routine expenditures. Government spending on infrastructure is expected to improve the distribution of goods and services thereby contributing to the decline in inflation. *Meanwhile*, the effect of rising inflation due to a positive tax shock is likely triggered by increasing production costs as a response to increasing tax cost.

The deviation of government expenditure to itsplan was relatively smaller before the economic crisis in 1997/98than the post-crisis period. The deviation becomes larger after the crises due to the increasingly integration of domestic economy with the global economy. This condition affecting the realization of government spending. The deviation during the sample period (1990 - 2009) did not show any significant difference, so it can be concluded that discretionary fiscal policy was not present during this period.

The conclusions above have clear policy implications. Taking into account the positive effect of the increase in government expenditure to the GDP, it suggests that the absorption rate can be pursued in accordance with the budget spending plans in the APBNP. The absorption of the budget needs to be optimized considering actual revenues that exceed the plan could

raise fears of over-taxation on the economy. In academic terms, these studies suggest improvement of the model to examine the effect of fiscal policy on inflation. One way is to include the elasticity of expenditure and taxation to the inflation in the preparation of the model.

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Appendix 1. Optimal Lag

VAR Lag Order Selection Criteria
Endogenous variables: LTSPNDRLSA LGDPRLSA LTTAXRLSA LCPI LDEP3
Exogenous variables: C
Sample: 1990Q1 2009Q4
Included observations: 73

Lag	LogL	LR	FPE	AIC	SC	HQ
0	57.0542	NA	0.0000	-1.4261	-1.2693	-1.3636
1	434.4097	692.6800	0.0000	-11.0797	-10.1384	-10.7046
2	488.1510	91.2866	0.0000	-11.8672	-10.14146*	-11.1794
3	522.7159	53.9780	0.0000	-12.1292	-9.6191	-11.1289
4	562.4445	56.59970*	2.70e-12*	-12.53273*	-9.2382	-11.21981*
5	585.2919	29.4200	0.0000	-12.4738	-8.3949	-10.8482
6	612.2406	31.0095	0.0000	-12.5271	-7.6638	-10.5890
7	627.5594	15.5286	0.0000	-12.2619	-6.6142	-10.0112

* indicates lag order selected by the criterion

Appendix 2. Model Stability Test

Roots of Characteristic Polynomial
Endogenous variables: LTSPNDRLSA LGDPRLSA LTTAXRL1SA LCPI LDEP3
Exogenous variables: C
Lag specification: 1 4
Date: 04/03/12 Time: 17:12

Root	Modulus
0.994155	0.994155
0.917443 - 0.122319i	0.925561
0.917443 + 0.122319i	0.925561
0.742630 - 0.256660i	0.785732
0.742630 + 0.256660i	0.785732
-0.492782 + 0.589932i	0.768670
-0.492782 - 0.589932i	0.768670
-0.616799 + 0.352775i	0.710557
-0.616799 - 0.352775i	0.710557
0.558647 - 0.400280i	0.687249
0.558647 + 0.400280i	0.687249
0.156244 + 0.668743i	0.686753
0.156244 - 0.668743i	0.686753
-0.226525 + 0.603912i	0.644999
-0.226525 - 0.603912i	0.644999
0.450115 + 0.441664i	0.630611
0.450115 - 0.441664i	0.630611
-0.609034 - 0.095091i	0.616413
-0.609034 + 0.095091i	0.616413
0.206423	0.206423

No root lies outside the unit circle.
VAR satisfies the stability condition.

Appendix 3. Cointegration Test

Date: 04/10/12 Time: 16:54
Sample (adjusted): 1991Q2 2009Q4
Included observations: 75 after adjustments
Trend assumption: Linear deterministic trend
Series: LTSPNDRLSA LTTAXRL1SA LGDPRLSA LCPI LDEP3
Lags interval (in first differences): 1 to 4

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.365944	72.79943	69.81889	0.0284
At most 1	0.206186	38.62804	47.85613	0.2753
At most 2	0.135779	21.31011	29.79707	0.3386
At most 3	0.09481	10.36561	15.49471	0.2536
At most 4	0.037862	2.894787	3.841466	0.0889

Trace test indicates 1 cointegrating eqn(s) at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.365944	34.17138	33.87687	0.0461
At most 1	0.206186	17.31793	27.58434	0.5527
At most 2	0.135779	10.9445	21.13162	0.6529
At most 3	0.09481	7.470822	14.2646	0.435
At most 4	0.037862	2.894787	3.841466	0.0889

Max-eigenvalue test indicates 1 cointegrating eqn(s) at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Appendix 4. Estimasi Result: VECM

Cointegrating Eq:	CointEq1		Cointegrating Eq:	CointEq1	
LTSPNDRLSA(-1)	0.350446		LCPI(-1)	1.000000	
	(0.33155)				
	[1.05698]		LDEP3(-1)	0.296498	
				(0.15357)	
LTTAXRLSA(-1)	-2.404.557			[1.93065]	
	(0.44469)				
	[-5.40730]		C	-1.649.441	
LGDPRLSA(-1)	1.814859				
	(0.55448)				
	[3.27308]				

Error Correction:	D(LTSPNDRLSA)	D(LTTAXRLSA)	D(LGDPRLSA)	D(LCPI)	D(LDEP3)
CointEq1	-0.016469	0.129543	-0.046010	0.009857	-0.141450
	(0.10942)	(0.05716)	(0.01387)	(0.02006)	(0.05288)
	[-0.15052]	[2.26644]	[-3.31696]	[0.49141]	[-2.67506]
D(LTSPNDRLSA(-1))	-1.094.965	-0.229310	0.002683	-0.001967	0.037956
	(0.12800)	(0.06687)	(0.01623)	(0.02347)	(0.06186)
	[-8.55411]	[-3.42938]	[0.16536]	[-0.08384]	[0.61358]
D(LTSPNDRLSA(-2))	-0.734586	-0.235978	0.013071	-0.004100	0.038420
	(0.16471)	(0.08604)	(0.02088)	(0.03019)	(0.07960)
	[-4.45979]	[-2.74260]	[0.62598]	[-0.13579]	[0.48267]
D(LTSPNDRLSA(-3))	-0.280343	-0.105123	0.018449	-0.010099	0.036076
	(0.12662)	(0.06614)	(0.01605)	(0.02321)	(0.06119)
	[-2.21404]	[-1.58931]	[1.14936]	[-0.43506]	[0.58956]
D(LTTAXRLSA(-1))	-0.249298	-0.558809	-0.086878	0.022489	-0.305089
	(0.29948)	(0.15644)	(0.03797)	(0.05490)	(0.14473)
	[-0.83244]	[-3.57202]	[-2.28833]	[0.40963]	[-2.10803]
D(LTTAXRLSA(-2))	0.147637	-0.147280	-0.081589	0.005455	-0.021043
	(0.30229)	(0.15791)	(0.03832)	(0.05542)	(0.14609)
	[0.48839]	[-0.93268]	[-2.12900]	[0.09843]	[-0.14404]
D(LTTAXRLSA(-3))	0.416239	0.085310	-0.065152	0.020237	0.017948
	(0.22839)	(0.11930)	(0.02895)	(0.04187)	(0.11037)
	[1.82250]	[0.71506]	[-2.25023]	[0.48335]	[0.16261]
D(LGDPRLSA(-1))	0.108064	1.461107	-0.263857	-0.421717	0.237213
	(1.09061)	(0.56971)	(0.13826)	(0.19993)	(0.52705)
	[0.09909]	[2.56465]	[-1.90842]	[-2.10935]	[0.45007]
D(LGDPRLSA(-2))	0.355318	0.957606	-0.207556	-0.275601	-0.489015
	(1.16903)	(0.61067)	(0.14820)	(0.21430)	(0.56495)
	[0.30394]	[1.56812]	[-1.40051]	[-1.28604]	[-0.86560]
D(LGDPRLSA(-3))	-0.200920	1.591497	0.061318	0.090706	0.101873
	(1.14284)	(0.59699)	(0.14488)	(0.20950)	(0.55229)
	[-0.17581]	[2.66587]	[0.42323]	[0.43297]	[0.18446]
D(LCPI(-1))	0.016755	0.529491	-0.363295	0.212835	1.667080
	(0.79316)	(0.41433)	(0.10055)	(0.14540)	(0.38331)
	[0.02112]	[1.27795]	[-3.61304]	[1.46379]	[4.34921]
D(LCPI(-2))	-0.180686	0.017076	0.132116	0.125574	-0.731970
	(0.94055)	(0.49132)	(0.11924)	(0.17242)	(0.45453)
	[-0.19211]	[0.03476]	[1.10803]	[0.72831]	[-1.61038]
D(LCPI(-3))	-0.312651	-0.242254	0.264951	-0.357680	0.104051
	(0.89440)	(0.46721)	(0.11338)	(0.16396)	(0.43223)
	[-0.34957]	[-0.51851]	[2.33675]	[-2.18154]	[0.24073]
D(LDEP3(-1))	0.023586	0.111538	0.016343	0.028199	0.678171
	(0.27414)	(0.14321)	(0.03475)	(0.05026)	(0.13248)
	[0.08604]	[0.77886]	[0.47026]	[0.56112]	[5.11890]

Appendix 4. Estimasi Result: VECM (continued)

Error Correction:	D(LTSPNDRLSA)	D(LTTAXRLSA)	D(LGDPRLSA)	D(LCPI)	D(LDEP3)
CointEq1	-0.016469	0.129543	-0.046010	0.009857	-0.141450
D(LDEP3(-2))	-0.251268	-0.286280	-0.082208	0.078772	-0.310979
	(0.31699)	(0.16559)	(0.04019)	(0.05811)	(0.15319)
	[-0.79267]	[-1.72888]	[-2.04572]	[1.35559]	[-2.03003]
D(LDEP3(-3))	0.354824	-0.081816	0.004288	-0.025682	0.022870
	(0.23332)	(0.12188)	(0.02958)	(0.04277)	(0.11276)
	[1.52076]	[-0.67128]	[0.14497]	[-0.60045]	[0.20283]
C	0.035649	-0.025044	0.020819	0.034647	-0.029616
	(0.07047)	(0.03681)	(0.00893)	(0.01292)	(0.03406)
	[0.50586]	[-0.68031]	[2.33035]	[2.68195]	[-0.86961]
R-squared	0.694138	0.644135	0.379310	0.418202	0.699933
Adj. R-squared	0.611192	0.547629	0.210987	0.260427	0.618560
Sum sq. resids	1.835392	0.500834	0.029497	0.061678	0.428642
S.E. equation	0.176376	0.092134	0.022360	0.032333	0.085236
F-statistic	8.368591	6.674573	2.253465	2.650614	8.601442
Log likelihood	33.65273	83.00481	190.6203	162.5899	88.91959
Akaike AIC	-0.438230	-1.736.969	-4.568.956	-3.831.314	-1.892.621
Schwarz SC	0.083119	-1.215.620	-4.047.608	-3.309.966	-1.371.273
Mean dependent	0.012482	0.018624	0.012903	0.026216	-0.012755
S.D. dependent	0.282860	0.136985	0.025172	0.037597	0.138009

Determinant resid covariance (dof adj.)	5.45E-13
Determinant resid covariance	1.54E-13
Log likelihood	581.9836
Akaike information criterion	-1.294.694
Schwarz criterion	-1.018.686

Included observations: 76 after adjustments, Standard errors in ( ) & t-statistics in [ ]. Sample (adjusted) covers 1991Q1 2009Q4 with Cointegration Restrictions: B(1,4)=1, Convergence achieved after 1 iterations. Restrictions identify all cointegrating vectors and are not binding (LR test not available)