

IMPACTS OF FISCAL AND MONETARY POLICIES ON INFLATION: THEORETICAL AND PRACTICAL MODEL FOR THE CASE OF VIETNAM

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The origin of inflation is often pondered in light of monetary policies. Yet in recent years, economists have started studying its origin via fiscal policies, especially budget deficit. This paper is to sum up theoretical paradigms and the application of VAR model with a view to testing the relationship between the fiscal policy, the monetary policy, and inflation in Vietnam. Quantitative analyses indicate that inflation in Vietnam, besides effects of monetary policy, is also impinged by the fiscal policy (i.e. the national budget overspend) within recent years.

Keywords: fiscal policy, monetary policy, budget overspend, inflation, Vietnam

1. Introduction

When the fiscal policy has been employed as an effective apparatus to stimulate the economic growth of a country, it is inevitable that its government has to cope with a budget deficit. Vietnam is not an exception. The model of evolving the economy by means of increasing investments, especially the public one, has been criticized due to the fact that it results in the higher and higher budget deficit, causing volatility in the macroeconomic indicators such as high inflation rate. This model also makes Vietnam's budget scale higher than a reasonable budget one in recent years (Vũ S. Cường, 2009).

The question of whether Vietnam's inflation is influenced by the fiscal policy or the monetary policy alone has been taken into contemplation so far. To work out an answer to this issue is very crucial for defining measures to maintain a sustainable economic development by coordinating the fiscal and monetary policies. For former socialist countries, quantitative researches have pointed out that the high inflation rate in the first

stage of transition resulted from the loose monetary policy (Ross, 1998; Cottarelli & Doyle, 1999). In Vietnam, its high inflation rate in the first stage of economic reform resulted from excessive increases in the money supply in previous years (Lê Q.L., 2005; Lê V. Đức et al., 2009). However, there has not been any research on the quantitative rapport between inflation and fiscal and monetary policies in Vietnam since 1986.

By means of the Vector Autoregression (VAR) model, the relationship between inflation, budget income and expenditure, money supply, and economic growth in the period 1986-2010 will be taken into account. The paper is divided into three parts: (1) a summation of theoretical models about the relationship between inflation and fiscal and monetary policies; (2) application of VAR model into testing results of theoretical models for the case of Vietnam and discussion of findings; and (3) some suggestions for the sake of national economic growth.

2. Relationship between inflation, fiscal policy, and monetary policy: Theoretical model

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Monetarists argue that inflation is always and everywhere a monetary phenomenon. Thus, cause of all price rises is the increase in the money supply. The fiscal policy and the monetary one have a close rapport with each other in determining the budgetary restraints. Fluctuations in price level can impact on governmental decision on budget expenditures and taxes. Vice versa, decisions on fiscal policy also influence the increase in money supply and inflation. In this part, the theoretical model about the relationship between inflation, fiscal policy (namely, the budget balance), and monetary policy from traditional approach will be presented; then fluctuations in price level will be explained with the support of the fiscal theory of price level (FTPL).

a. Relationship between inflation, money supply, and budget income and expenditure seen from traditional approach:

Theoretically, the requirement for a long-run balanced budget results in the fact that a government declaring itself insolvent at present must set up a budget surplus so as to cover debts in future. The point is that whether the budget overspend is going to result in a future increase in the money supply. Previous traditional researches merely concentrate on monetary policies which a government employs to secure a balanced budget. Fiscal policies (i.e. imbalance in the state budget) impact on inflation when central banks are obliged to print more money to balance the state budget. This is manifested in the following theoretical model.

To make a long story short, impacts of inflation on budget income and expenditure will be temporarily left out. The balanced budget formula can be written as below:

$$g_t + r_{t-1}b_{t-1} = t_t + (b_t - b_{t-1}) + s_t \quad (1)$$

Where,

- g_t : the government's expenditure in year t
- $r_{t-1} b_{t-1}$ the total interest for government's unpaid debts (the subscript index represents time while i_{t-1} represents the interest rate on public debt at the time $t-1$).
- t_t : budget incomes (i.e. taxes)
- $(b_t - b_{t-1})$ incomes earned from new debts
- s_t : seigniorage or inflation tax (generated from annual supply of money).

Suppose that interest rates (r) are stable and

positive, (1) can be rewritten as follows:

$$(1+r)b_{t-1} + \sum_{i=0}^{\infty} \frac{g_{t+i}}{(1+r)^i} = \sum_{i=0}^{\infty} \frac{t_{t+i}}{(1+r)^i} + \sum_{i=0}^{\infty} \frac{s_{t+i}}{(1+r)^i} + \lim_{i \rightarrow \infty} \frac{b_{t+i}}{(1+r)^i} \quad (2)$$

The long-term budget plan of the government will reach a balance (i.e. without the occurrence of Ponzi scheme) when

$$\lim_{i \rightarrow \infty} \frac{b_{t+i}}{(1+r)^i} = 0$$

Accordingly, the right-hand side of (2) turns into the formula for calculating the net present value of budget future incomes, including taxes and seigniorage and is equal to the left-right side of (2) that represents the sum of present and future expenditures plus debts payable of the government (including interest and principal). Thus, the government must plan to boost receivables as per the present value so as to cover present debts and finance future expenditures. If ($\Delta = g-t-s$) is considered as the budget deficit, the equation (2) will result in:

$$(1+r)b_{t-1} = -\sum_{i=0}^{\infty} \frac{\Delta_{t+i}}{(1+r)^i} \quad (3)$$

Should the government's debts be larger than zero ($b_{t-1} > 0$), the present value of future budget deficit would be negative and the budget surplus would be positive. This is meant that the government must have a budget surplus if receivables are assumed to exist at present. Such the surplus can come from adjustments in spending, tax collection, or printing money.

Via (3), the equation of time-series budget balance is as follows:

$$b_{t-1} = -R^{-1} \sum_{i=0}^{\infty} R^{-i} (g_{t+i} - t_{t+i} - s_{t+i})$$

Where, R equals $(1+r)$ and represents the real total interest rate; $g_t - t_t - s_t$ is the budget deficit (not including repayment of debts), and s_t is the actual seigniorage. If we label $s_t^f = t_t - g_t$ the budget surplus (i.e. tax-take minus expenditures not including seigniorage and repayment of debts), the above equation can be rewritten as follows.

$$b_{t-1} = R^{-1} \sum_{i=0}^{\infty} R^{-i} s_{t+i}^f + R^{-1} \sum_{i=0}^{\infty} R^{-i} s_{t+i} \quad (4)$$

Present debts of the government are supported either by the budget surplus or seigniorage (turned into present value).

Aiyagary and Gerlert (1985) have proven that if a government pays debts by adjusting its budget incomes and expenditures, the increase in price level merely depends on the rise in money supply. In case the government happens to print more

money to cover debts, the increase in price level will depend on both the rise in money supply and the government's total liabilities. Traditional theories have their own limitation because they suppose that fiscal policies just produce inflation when the government supports the budget overspend by printing more money which changes the money supply.

b. Relationship between the fiscal policy and inflation explained by the fiscal theory of price level (FTPL):

Many of researchers, such as Leeper (1991), Sims (1994), Woodford (1995, 2001), Cocharane (1999), Christiano and Fitzgerald (2001), and Buiter (2002), have proposed some new research models to explain fluctuations in price level via fiscal policies instead of monetary ones. The school of FTPL has raised a lot of issues for both monetary policies and fiscal ones. FTPL sets forth two conditions to determine the price level of the economy, viz.:

$$M_t V = P_t Y \quad (5)$$

$$\frac{D_t}{P_t} = E_t \sum_{i=0}^{\infty} \beta^{t+i} (t_{t+i} + s_{t+i} - g_{t+i}) \quad (6)$$

Where M_t is the nominal volume of money used at the time t ; Y is the income (or yield); V_t represents the rotation of money (i.e. velocity of circulation); P is price level; β is the discount coefficient; D_t is the total nominal debts and $D_t = B_t + M_t$ (B_t is the total unpaid public debts); $(t_{t+i} + s_{t+i} - g_{t+i})$ is the total budget income generated from the surplus $(t_{t+i} - g_{t+i})$ and seigniorage (s_{t+i}) .

The equation (5) is the function of demand for money, and (6) the government budget restraints turned into present value. The government can define variables D_t (public debt), M_t (money supply) and the budget balance. The point is that (5) and (6) are two functions that contain one unknown variable, viz. P_t . FTPL supposes that any balance must satisfy both (5) and (6). Each country, based on its development strategy, will observe restraints by means of fiscal and monetary policies.

(i) If the government decides the fiscal policy independently from the monetary one and defines the levels of public debt and budget overspend (or excessive income), budget restraints will influence the price level as per the equation (6). Accordingly, even when the money printing is not employed to support the budget (s_{t+1} fixed), the price

level must also be adjusted so as to meet the equation (6). To make the equation (5) balanced, the monetary policy must be adjusted to the fiscal one. In this case, the fiscal policy seems overwhelming.

(ii) Nonetheless, if the central bank proactively decides the monetary policy [i.e. M_t in equation (5)] before the government makes decision on the fiscal policy, the government is obliged to adjust the fiscal policy to meet the price level (P_t) identified by equation (5). In this case, the monetary policy is stronger.

The model of FTPL also expresses a noteworthy point that when D_t is determined in advance and M_t and B_t are constant, P_t is still changeable if budget balance (i.e. t_{t+1} and g_{t+1}) alters.

Theoretical analyses have shown that both fiscal and monetary policies have impacts on inflation yet at different levels depending on which one is overwhelming. In next part, numerical data collected in Vietnam will be taken into account in order to test the relationship among fiscal policy, monetary policy, and inflation.

3. Testing the actual relationship among fiscal policy, monetary policy, and inflation in Vietnam as of 1986

This part is to test the relationship between inflation, budget deficit and money supply in Vietnam as of 1986. Results will answer whether the fiscal policy or the monetary policy is overwhelming and has a close relationship with inflation in Vietnam.

a. Analysis methodology and numerical data:

Theoretical models used for analyzing effects of fiscal and monetary policies on inflation via assumed expectations of future budget income and expenditure. Yet in fact, economists can only test hypotheses by means of past numerical data. Logically speaking, because expectations are usually founded on known numerical data, the employment of such past numerical data is very significant to policies adopted by Vietnam in time to come. Hence, in this paper, the VAR model will be employed with numerical data of the period 1986-2010 so as to test the above-mentioned theoretical models. Many researchers, such as Griger and Niman (1987), Ross (1998), and Brada and Kutun (1999), have employed the VAR model to

test the rapport between inflation and monetary policy or between budget deficit and monetary policy.

The equation utilized in the VAR model can be written as follows:

$$Y_t = \varepsilon_t + A_1 Y_{t-1} + A_2 Y_{t-2} + \dots + A_p Y_{t-p} + BZ_t$$

Where, Y_t represents the k vector of endogenous variables, Z_t represents exogenous variables (if any), A_p and B are the coefficients matrix, ε_t is the error vector.

First of all, the unstructural VAR method will be used to test the Model 1 whose endogenous variables are inflation (measured by fluctuations in CPI), budget deficit and money supply M2. Then, the variable “economic growth rate” is added to the model in order to determine whether results are affected by presence of a variable that reflects upheavals in output - (Model 2). Besides, output is also a factor that theoretically relates to other variables. Estimating the models produces the following results: firstly, impulses allow us to identify impacts of changes in fiscal and monetary policies on inflation; and secondly, we can evaluate the role of the changes in fluctuations in variables by means of forecast error variance decomposition (FEVD).

Numerical data are collated from many different sources such as IMF, World Bank, and Vietnam’s GSO in the period 1986-2010 when Vietnam has developed the market economy. It is also worth noting that way of calculating Vietnam’s budget balance is kind of different from ways employed by other countries. In Vietnam, overspend is perceived as difference that exists when budget expenditure (including payment of interest and principal; not including loans for re-lending) are larger than budget income. Yet, according to IMF, the budget overspend only includes payment of interest and loans used for re-lending, and not including payment of principal. In this paper, data of WB and IMF will be employed to calculate budget overspend /surplus. To simplify the calculation, the ratio of budget overspend/surplus to GDP will be transferred into the 100-point scale, that is, an overspend of 10% of GDP will equal 100 points and a surplus of 10% of GDP will be one point. In other words, the more points there are, the larger the budget overspend is. In models utilizing time-series data, if the time series is non-stop, the regression results may hap-

pen to be phony. Therefore, it is needed to test the stationarity of variables via the ADF test.

Table 1: Testing the stationarity of variables

Variables	ADF test	
	Level	1st difference
INF	-7.957*	
M2GR	-4.263*	
Bal_GDP	-2.296	- 5.522*
GDPGR	-2.296**	

NB: * & ** denote the statistical significance at 1% and 5% respectively

Testing results show that initial time-series data [$\log(\text{CPI})$, $\log(\text{M2})$, the ratio of budget balance to GDP, and $\log(\text{GDP})$] are non-stationary, therefore we calculate first differences of variables. This means that vector Y_t will include inflation (INF), money supply growth rate (M2GR), changes in the ratio of budget balance to GDP (DBAL_GDP), and GDP growth rate (GDPGR). The results of ADF test are presented in Table 1.

Next, AIC and LM test will be run to work out the appropriate lag time for variables. Here, the most suitable lag time is 3. Other tests for the autocorrelation and the heteroskedasticity with estimated error also satisfy basic requirements of econometric theories. Testing the stability of the model also produces favorable results.

b. Testing results and discussion:

Table 2 provides VAR testing results with a regard to variables INF, DBAL_GDP and M2GR. It is apparent that the budget overspend and the rise in money supply have positive impacts on inflation even though no variables have statistical significance.

Table 2: VAR testing results

	INF	DBAL_GDP	M2GR
INF(-1)	0.159902	0.534325	-0.104269
	[0.72492]	[1.80875]	[-0.29009]
INF(-2)	0.016690	-0.115538	-0.202666
	[0.17169]	[-0.88745]	[-1.27938]
INF(-3)	0.229267	-0.021011	0.091525
	[2.46142]	[-0.16843]	[0.60301]
DBAL_GDP(-1)	0.211991	-0.15454	-0.202295
	[1.09013]	[-0.59339]	[-0.63839]
DBAL_GDP(-2)	0.295104	-0.154368	0.016311
	[1.58619]	[-0.61955]	[0.05380]
DBAL_GDP(-3)	0.265651	-0.266263	-0.206603
	[1.62198]	[-1.21389]	[-0.77412]
M2GR(-1)	0.295226	0.069402	0.276884
	[1.81429]	[0.31846]	[1.04421]
M2GR(-2)	-0.10868	0.211815	0.071351
	[-0.88225]	[1.28391]	[0.35545]
M2GR(-3)	-0.061008	-0.217749	0.019290
	[-0.66726]	[-1.77828]	[0.12947]
C	0.170403	-3.676014	19.41678
	[0.04186]	[-0.67420]	[2.92677]
R-squared	0.954553	0.657641	0.763850
Adj, R-squared	0.917369	0.377529	0.570636
Sum sq, resids	343.4440	616.0037	911.9683
S, E, equation	5.587682	7.483337	9.105284
F-statistic	25.67097	2.347778	3.953396

t-statistics in []

Source: Author's calculations

Response functions are also estimated to identify time-series effects of shocks of a certain endogenous variable to other variables. Figure 1 illustrates response of INF to shocks from changes in the fiscal policy shock (changes in budget balance) and monetary policy shock (changes in money supply) with the deviation of shocks being twice as much as the standard deviation of variables. Apparently, inflation is influenced by the increase in the price level of the previous period. This suits the theory on the price stickiness as set forth by the new Keynesian economics. Yet, inflation usually lasts from the previous year to the year after that. Response from rise in the price level to the budget overspend is positive and suits the above-mentioned theory. The price level also reacts positively to changes in the money supply. This is to say, the fiscal policy is overwhelming in Vietnam; and in many cases, the monetary policy often goes behind to deal with impacts of the fiscal policy on the price level with regardless of any direct influence.

FEVD allows estimating the relative significance over time of impacts of fluctuations in fiscal and monetary policies on changes in price level (inflation). FEVD results show that upheavals of inflation and money supply growth rate, in short run, are due to their own impacts. However, fluctuations in budget balance are partly derived from inflation. In other words, inflation, in short run, has impacts on budget balance. In long run, upheavals of the price level (i.e. inflation rate) are adversely influenced by the budget balance and money supply growth rate. After some five years, shocks of M2 can contribute 16% of fluctuations in inflation while DBAL_GDP contributes 18%. The longer it lasts, the greater the impacts of shocks of budget balance on changes in price level. This is to confirm that Vietnam's fiscal policy has profound impacts on the rise in price level. Yet, the price level also has great impacts on the budget balance (around 25%) after five years; and shocks of money supply also affect greatly fluctuations in budget balance (18.7%) after four years. Accordingly, testing VAR model with variables inflation, budget balance and money supply growth rate has proven that Vietnam's fiscal policies are stronger than monetary ones.

To test impacts of output on variables, the variable GDPGR (GDP growth rate) is added to the

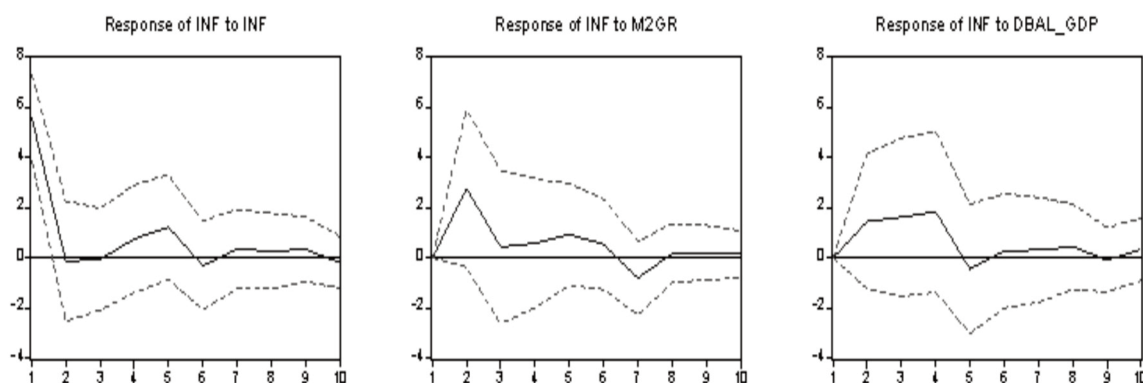


Figure 1: Response of inflation to changes in macroeconomic variables

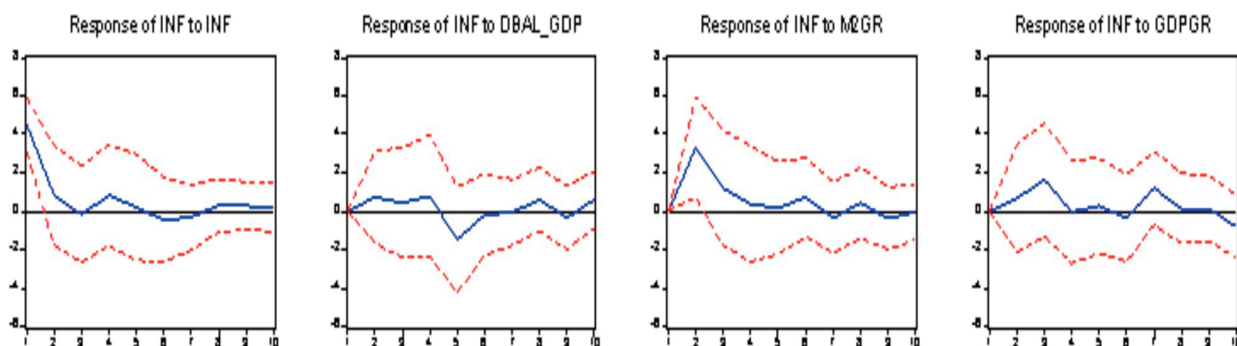


Figure 2: Response of inflation to macroeconomic shocks

VAR model. VAR testing results and response functions have reasserted the above-mentioned findings (see Figure 2). Furthermore, it is also proven that Vietnam's GDP growth rate has a close rapport with the price level growth rate. It is implied that if Vietnam tries to gain a high growth rate, it has to face difficulties in stabilizing the price level – a form of hot growth as pointed out by economic theories.

4. Conclusion

By running VAR test to investigate the rapport between fiscal policy, monetary policy and inflation, it is possible to conclude that Vietnam is in the group of countries where fiscal policy is overwhelming. The paper offers the following conclusions and suggestions.

Estimate of response functions has proven that profound impacts of fiscal policies (i.e. budget balance) on inflation are in line with predictions of theoretical models. Thus, to curb inflation, it is necessary to balance the budget. In other words, if Vietnam would like to pull inflation rate to the lowest level, the government must follow a stricter

fiscal policy so as to balance the budget in long run. Inflation, in the long run, will just go down when the government beef up its control over budget overspend.

FEVD show that the central bank alone and its monetary policy (i.e. money supply) are not sufficient to ensure a stable price level. Vietnam, to control inflation, needs to create a more rational coordination between fiscal policies and monetary ones.

However, the research model employed in the paper still contains certain limitations. Firstly, the time-series data of Vietnam are kind of short and insufficient for quantitative analyses. Secondly, Vietnam, in the period 1986-2010, has seen amendments to fiscal and monetary policies; yet, due to limitations in time-series data, it is impossible to split it into two separate phases for in-depth analyses. Thirdly, impacts of fiscal policies on inflation may be greater and sharper if there are sufficient and accurate data of budget expenditure concerning state-run enterprises. Anyway, the analyses also show that Vietnam's inflation,

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besides effects of monetary policies, partly derives from fiscal policies. This problem needs to be studied more carefully in future ■

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