Monetary and Fiscal Policy on Handling Inflation in Indonesia

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Abstract — The steadiness of a country's economy can be seen from the expansion rate. The reason for this study is to analyze the impact of cash circulation on expansion and the foremost compelling arrangements for swelling issues in Indonesia, utilizing time arrangement information in 2010-2019 and utilizing the Vector Error Correction Model (VECM) show. The results found that the money supply and assess incomes impact swelling and there's a one-way causality relationship. For variable intrigued rates don't affect each other's expansion. The comes about of the causality test too appeared that intrigued rates don't affect each other on the variable sum of cash supply, as well as the variable charge receipts don't influence each other on the variable sum of cash supply. The clarification of the VECM show gauges for the most part demonstrates the presence of long-term connections and short-term connections of each variable.

Keywords — *Economics; Monetary; Fiscal; Inflation; Vector Error Correction Model.*

1. Introduction

Inflation is one of the problems that exist in Indonesia that can lead to a decrease in people's incomes that will affect macroeconomic aggregates. According to Susanti Hera, (1995) the impact of inflation, among others, first high domestic inflation causes the real rate of return of services to domestic financial assets to be lower (even often negative), So that it can interfere with the mobility of domestic funds and can even reduce domestic savings that are a source of investment funds. Second, inflation causes the competitiveness of export goods to decrease and can increase the deficit in current transactions and at the same time can increase foreign debt. Third, inflation can worsen the distribution of income by transferring resources from consumers and fixed income groups to consumers. Keempat, a high inflation rate can encourage capital flight abroad. Fifth, a high inflation rate can affect the level of investment needed to spur the rate of economic growth.

The inflation rate shows the poor economic problems faced. The first most critical problem in monetary policy is the difficulty of policy makers in controlling the rate of inflation (Brodjonegoro, 2008). Inflation that occurs in Indonesia is very vulnerable to external interference, although inflation is relatively low but always requires extra hard work.

According to Nopirin, (1987) monetary policy is directed at achieving inflation stability and the creation of a financial system that can carry out the function of intermediation in a balanced manner. The influence of monetary wisdom is first felt in the monetary sector of banking, which is then transferred to the real sector. There has been ample evidence that changes in monetary indicators (interest rates, inflation, credit and so on) will affect the real sector (e.g. consumption and investment). To overcome the problems faced by Indonesia requires a stable economic growth rate and a controlled inflation rate. The government can use monitor policy and fiscal policy. Samuelson, (2004) revealed that one of the important factors of inflation is due to the rapid growth in the volume of money supply. According to Sutawijaya, (2012) a high inflation rate will have a negative impact on the economy which can further disrupt social and political stability.

There have been many previous studies that have discussed the effects of monetary policy and fiscal. Research conducted by Mishkin, (2001) and (Havrilesky and Boorman, 1996) states that the demand for sensitive money affects inflation. Research conducted by Asmanto & Soebagyo, (2007) the results showed that first, fiscal decentralization and economic crisis affect price stability and economic growth significantly. Second, the combination of monetary and fiscal policy is significant to regional growth and price stability. This study shows that the effects of monetary policy are higher than fiscal policy. (Opriyanti, 2017) significant inflation is affected by the money supply and the BIRI interest rate on the first lag. Taxes and government spending are significant in the second lag. Nofiatin research, (2013) mentions that the relationship of coin integrity occur BI Rete between inflation, interest rates and exchange rates. As well as causality between inflation to interest rates, the money supply to interest rates. Based on this background can be drawn the formulation of the problems in this study is (1) analyze how the influence of money circulation on inflation that occurs in Indonesia, and (2) know the most effective policies that can be done in tackling the problem of inflation in Indonesia. This is what underlies the researcher to raise the research with the title effect of monetary and fiscal aspects on Indonesian inflation.

2. Research Methodology

The type of data in this study is secondary in the form of time series of monthly data with a period of 2010 quartal

I to 2019 quartal IV obtained from Bank Indonesia, the Central Statistics Agency, the Directorate General of Taxes and the Indonesian research object. The variables used in the study were inflation, the money supply, bank interest rates, and tax receipts. Use the VECM analysis tool.

Vector Error Correction Model (VECM) is a method for analyzing time-guided data on a stationary Vector Autoregression (VAR) model at the first differencing and meets the cointegrated test.

Common forms of VAR models that have non-stationary variables are as follows:

$$Y_t = \mu + \alpha_1 Y_{t-1} + \alpha_2 Y_{t-2} + \cdots + \alpha_p Y_{t-p} + \varepsilon_t \quad (1)$$

From the equation (1) can be formed the VECM equation as follows:

$$\Delta Y_t + \alpha e_{t-1} + \beta_1 \Delta y_{t-1} + \beta_2 \Delta y_{t-1} + \cdots + \beta_p \Delta y_{t-p} +_1 + \varepsilon_t$$

The model equations in this study are:

$$Inf_t = \beta_0 + \beta_1 Inf_t + \beta_2 MS_t + \beta_3 to_t + \beta_4 tax_t + ut$$

Description:
Inf: Inflation
MS: Money Supply
BIR: BI rate
Tax rate: tax revenue
In this study, variables were used:

The Inflation Variable (inf) in this study is inflation obtained based on the consumer price index. Inflation is measured by unit of percent (%). The variable amount of money supply (MS) in this study is the amount of money supply obtained from the money supply in the broadest sense (M2). The value of the money supply is measured by units of billions of rupiah. The variable interest rate (BIR) in this study is the interest rate of bank Indonesia as measured

by units of percent. The tax revenue variable in this study is tax revenue as measured by units of billions of rupiah.

3. Research and Discussions

Stationary test - The stationary test was the first test to be conducted in Vector Autoregression (VAR) and Vector Error Correction Model (VECM). It is found in table 1. In table 1 it is known that the roots test at the level of its probability value level is not stationary so it is necessary to test at the first difference level. In the first difference level conditions, the four variables show a probability value below 5% so that the next test can be done.

Table 1. Stationary test results

Data	Level		1st Difference	
	t-statistic	Prob.	t-statistic	Prob.
Inf	-721737	0.0000	-6694732	0.0000
MS	-254654	0.1145	-7755435	0.0000
BIR	-146749	0.5393	-6651635	0.0000
Tax	0.98953	0.7473	-3036433	0.0404

Optimal Lag Test - After the data is stationary then the optimal lag test is carried out using lag order selection criteria. The results can be seen in table 2. Table 2 shows that the optimal lag is at lag 1. Optimal lag conditions can be known by looking at the number of asterisk in each of the criteria contained in the table. In this lg selection it is necessary to see the relationship and behavior in each of the vang variables in the system. The optimal lag selection that is inserted too short will be feared that it cannot explain the overall dynamism of the model. While the lag is too long makes the measurement of the model inefficient.

Table 2. Optimal Lag Test Results

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-790.7588	NA	9.75e+15	48.16720	48.34859*	48.22823
1	-768.6593	37.50225*	6.80e+15*	47.79753	48.70451	48.10270*
2	-760.4907	11.88153	1.15e+16	48.27216	49.90472	48.82147
3	-740.1742	24.62608	9.98e+15	48.01056	50.36869	48.80400
4	-722.2542	17.37692	1.15e+16	47.89420	50.97791	48.93177
5	-706.3482	11.56800	1.88e+16	47.89989	51.70919	49.18160
6	-682.6135	11.50774	3.01e+16	47.43112*	51.96599	48.95697

Stability test - The next step is done with a stability test. This test serves to ensure that baha in the VECM model can be forecasted using Impulse Response Function (IRF) and VD (Variance Decomposition). Unstable use results in less valid estimation results. The results of the stability test can be seen in table 3. The results of the stability test with first difference lag level 1 are known that the VAR model is stable, this can be known by looking at the overall value of the modulus less than 1 and nothing

exceeding 1.

Table 3. Stability Test Results

Root	Modulus
0.651675	0.651675
-0.559612	0.559612
-0.239003	0.239003
-0.140812	0.140812

Kointegrity test -A kointegrity test is required to determine the use of the model, choosing the use of the VAR model or the VECM model. There is a long-term balance in the form of the same movement and a relationship between stable variables. The kointegrity test is conducted using Johansen's Cointegration Test method, the test results can be seen in table 4, with a probability value of less than 5%, in the presence of cointegration between variables and stationary at the first difference level then the next method can use VECM.

Table 4. Cointegration Test Result

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistics	0.05 Critical Value	Prob.**
None *	0.697136	90.12999	47.85613	0.0000
At most 1 *	0.458013	45.93458	29.79707	0.0003
At most 2 *	0.338500	23.27159	15.49471	0.0028
At most 3 *	0.194036	7.981497	3.841466	0.0047

The causality test. By looking at the results of the integrity test in table 5, if the value of $prob. < 0.05$ can be concluded causality occurs, but if the value of $prob. > 0.05$ then it is concluded that there is no causality in the variable.

Table 5. Causality Test Results

Null Hypothesis:	Obs	F-Statistic	Prob.
MS does not Granger Cause INF	39	5.30331	0.0272
INF does not Granger Cause MS		0.43137	0.5155
BIR does not Granger Cause INF	39	1.63046	0.2098
INF does not Granger Cause BIR		2.32815	0.1358
TAX does not Granger Cause INF	39	8.55136	0.0059
INF does not Granger Cause TAX		0.06163	0.8053
BIR does not Granger Cause MS	39	0.70711	0.4060
MS does not Granger Cause BIR		1.32444	0.2574
TAX does not Granger Cause MS	39	0.53622	0.4687
MS does not Granger Cause TAX		2.11488	0.1545
TAX does not Granger Cause BIR	39	2.56515	0.1180
BIR does not Granger Cause TAX		0.00760	0.9310

Based on the results of the causality test above it is known that the money supply affects inflation, while inflation has no effect on the money supply (because the probability value >0.05), while the variable interest rate It has no effect on inflation, this is like the results of research (Mahendra, 2016), and inflation has no effect on interest rates. For tax variables affect inflation, while inflation has no effect on taxes. The results of the causality test also showed that interest rates had no effect on the money supply, and the money supply had no effect on interest rates. While tax variables have no effect on the money supply, the money supply has no effect on taxes. These results also show that tax variables have no effect on interest rates, and interest rates also have no effect on taxes.

3.1 Regression Model VECM

Table 6. Vector Error Correction Model

Long term

Variable	Coefficient	t-statistics
D_MS(-1)	-5.40E-07	[-0.61283]
D_BIR(-1)	0.055913	[0.87122]
D_TAX(-1)	4.64E-06	[1.45772]

Short Term

Variable	Coefficient	t-statistics
D(D_MS(-1))	7.08E-07	[0.74852]
D(D_BIR(-1))	0.197544	[2.44256]
D(D_TAX(-1))	9.87E-06	[1.06131]

Based on the regression results of the VECM model can be seen in table 6. The explanation of the VECM model estimates generally consists of two parts of the table, the top part shows a long-term relationship, and while at the bottom it shows a short-term relationship. At the top, it is known that variable amounts of money supply have an influence on inflation. While the variables of interest rates and taxes are insignificant, it means that there is no effect on inflation. This is indicated by the estimated results of each money supply of -0.61283, interest rate of 0.87122, while tax receipts amounted to 1.45772. Related to the explanation of the coefficient of each variable, the variable amount of money supply of -5.40 means that every 1% of the money supply will affect the decrease in inflation by 5.40%.

The next explanation is at the bottom of the table. At the bottom, it shows a short-term relationship. It is understood that the money supply and tax revenues have a short-term effect on inflation. While the variable interest rate has no short-term effect on inflation. From figure 6 can also be known the magnitude of the value of R-square in the g-individual variable. It is known that the largest value of R-square is in the variable money supply of 0.463707.

Table 7. Variance Decomposition of D (Inflation)

Period	S.E.	D_INF	D_MS	D_BIR	D_TAX
1	0.351658	100.0000	0.000000	0.000000	0.000000
2	0.463728	95.40002	3.673425	0.901771	0.024788
3	0.499648	87.95598	3.721244	7.367669	0.955111
4	0.511783	83.84533	6.062968	9.012247	1.079453
5	0.517458	82.43703	5.937775	10.46485	1.160340
6	0.521541	81.35917	6.649996	10.32889	1.661946
7	0.522435	81.09326	6.757112	10.36791	1.781720
8	0.525104	80.31429	7.144232	10.49460	2.046870
9	0.526819	79.87728	7.293264	10.54113	2.288327
10	0.528743	79.29997	7.634137	10.57678	2.489110

Explanation table 7. The Variance Decomposition of D (inflation) section shows the contribution that occurs in the inflation variable, where in the 1st period inflation contributes 100% to inflation itself, while variables in the amount of money, interest rates and tax revenues have not been contribute at all because it is worth zero. In the 2nd period, inflation in the previous period contributed 95.40% of current inflation variables, the money supply contributed 3.67%, interest rates contributed 0.90% and taxes by 0024%. Up to the 10th period inflation of the previous period contributed 79.29% to current inflation, while the money supply, interest rates and tax receipts each contributed 7.63%., 10.57%, and 2.48%.

Table 8. Variance Decomposition of D (MS)

Period	S.E.	D_INF	D_MS	D_BIR	D_TAX
1	57129.77	8.800482	91.19952	0.000000	0.000000
2	65020.71	12.29178	82.11481	4.993015	0.600395
3	77444.33	8.927991	86.96043	3.556019	0.555560
4	85107.54	11.76587	83.64845	4.062227	0.523462
5	93702.65	10.53614	85.28983	3.574902	0.599131
6	99896.20	10.74432	85.19029	3.473908	0.591480
7	106914.6	10.62431	85.50261	3.274331	0.598754
8	112767.6	10.54571	85.61925	3.224327	0.610714
9	118681.0	10.46410	85.83535	3.088096	0.612452
10	124174.2	10.45899	85.87759	3.046707	0.616713

The results of the VD analysis in Table 8, it can be known that in the 1st period inflation contributed 8.80% to the formation of the money supply, while the money supply itself contributed 91.19%, interest rates and Tax revenue does not contribute to the formation of the money supply. The increase occurred in the 2nd period where inflation contributed 12.29%, while the money supply itself contributed 82.11% of interest rates and tax revenues each contributed 82.11%. 4.99% and 0.60%. Contributions between variables continued to occur, until the 10th period where inflation contributed 10.45%, while the money supply itself contributed 85.87%, interest rates and tax revenues contributed 3.04% and 0.61% respectively.

Table 9. Variance Decomposition of D (BIR)

Period	S.E.	D_INF	D_MS	D_BIR	D_TAX
1	0.740897	1.236962	14.91348	83.84956	0.000000
2	0.804873	1.396031	15.86728	82.02657	0.710123
3	0.977306	1.230544	15.64119	82.62793	0.500328
4	1.062971	1.449656	16.16622	81.75753	0.626596
5	1.172801	1.345462	16.04975	82.03196	0.572826
6	1.255717	1.431071	16.36397	81.60843	0.596528
7	1.343291	1.407838	16.31217	81.69915	0.580846

8	1.419901	1.429230	16.47317	81.51023	0.587373
9	1.495488	1.427264	16.47711	81.51431	0.581317
10	1.566036	1.437567	16.55583	81.42378	0.582818

The results of the VD analysis in Table 9, it can be known that in the 1st period inflation contributed 1.23% to the formation of interest rates, while the money supply contributed 14.91%, interest rates contributed 83.84%, and tax revenues did not contribute to the formation of interest rates. . The difference occurred in the 2nd period where inflation contributed 1.39%, while the money supply contributed 15.86%, interest rates and tax revenues contributed 82.02% and 0.71% respectively. Until the 10th period where inflation contributed 1.56%, the money supply contributed 16.55%, interest rates and tax revenues contributed 81.42% and 0.58% respectively to the formation of interest rates.

Table 10. Variance Decomposition of D (tax)

Period	S.E.	D_INF	D_MS	D_BIR	D_TAX
1	6528.603	1.450554	1.682413	0.003767	96.86326
2	8442.367	0.903872	1.373085	0.516949	97.20609
3	10082.17	0.669590	1.210343	0.364512	97.75555
4	11508.76	0.525031	0.941134	0.322384	98.21145
5	12738.74	0.428614	0.801444	0.328943	98.44100
6	13876.13	0.366732	0.675721	0.289351	98.66820
7	14928.16	0.319207	0.595120	0.285608	98.80007
8	15902.83	0.282876	0.525924	0.272070	98.91913
9	16827.26	0.252655	0.475806	0.262502	99.00904
10	17700.77	0.228367	0.432309	0.255507	99.08382

The results of the VD analysis in table 10, it can be known that in the 1st period inflation contributed 1.45% to the formation of tax revenues, while the money supply contributed 1.68%, interest rates contributed. 0.003% and tax revenues alone contributed 99.08%. The change occurred in the 2nd period where inflation contributed 0.90%, while the money supply contributed 1.37%, interest rates contributed 0.51% and while tax revenues alone contributed 1.37%. It contributed 97.20%. Until the 10th period inflation contributed 0.22%, while the money supply contributed 0.43%, interest rates contributed 0.25% and tax revenues alone contributed 99.08%.

4. Conclusion

Research related to monetary and fiscal policy consisting of inflation, the amount of g outstanding, interest rates and tax revenues in the observation period 2010-2019 showed mixed results. Based on causality tests it was found that the money supply affects each other against inflation and there is a causality relationship indirection. Similarly, for variable tax revenues affect each other's inflation and there is a one-way causality relationship. Variable interest rates do not affect inflation. The results of the causality test also showed that interest rates do not affect the variable amount of money supply, as well as the variable tax receipts do not affect each other on the variable amount of money supply.

The explanation of the results of the VECM model estimates generally shows a long-term and short-term relationship of each variable. IRF analysis shows there is a response to shocks that occur in the variable itself and other variables. VD analysis shows that there is a large contribution role of the variable itself and some of the other contributions formed from the other three variables.

References

[1] Asmanto, P., & Soebagyo,S. (2007). Analysis of the Influence of Monetary Policy and Regional Fiscal Policy on Price Stability and Regional Economic Growth in East Java (Period 1995 - 2004). *Bulletin of Monetary Economics and Banking, 9*(4), 55-100. https://doi.org/10.21098/bemp.v9i4.214

[2] Havrilesky,Thomas M,&Amp Boorman, John T. (1976). Current issues in monetary theory and policy . USA: AHM Publishing Corporation.

[3] Mahendra. A. 2016. Analysis of THE Influence of MS, Interest Rates and Exchange Rates on Inflation in Indonesia. Journal of Accounting Research. Journal of Economics and Business of Indonesia. Vol. 5. No.204. Mishkin, F. S. (2001). *The Economics of Money Banking, and Financial Markets* (6th Edition). Pearson Education International, USA or Canada.

[4] Nofiatin, I. (2013). Money Supply, and Composite Stock Price Index (JCI) Period 2005 - 2011. *Journal of Management Applications, 11*(2), 1–8.

[5] Opriyanti, R. (2017). Analysis of the Effectiveness of Monetary Policy and Fiscal Policy in Addressing Inflation in Indonesia. *Media Trend*, *12*(2), 184. https://doi.org/10.21107/mediatrend.v12i2.2942.

[6] Samuelson, Paul A. William D. Nordhaus. (2004). Seventeenth Edition. Macroeconomics. Seventeenth Edition, Erlangga Publisher, Jakarta.

[7]   Sutawijaya,A. (2012). Effect of Economic Factors on Inflation in Indonesia. *Journal of Organization* and *Management, Volume 8,* Number 2.

[8]   Camerer, Colin F, Teck-Hua Ho, and Juin-Kuan Chong, "A cognitive hierarchy model of games,"*The Quarterly Journal of Economics,* 2004,119 (3), 861–898.

[9]   Coibion, Olivier, Dimitris Georgarakos, Yuriy Gorodnichenko, and Michael Weber, "Forward guidance and household expectations,"*NBER Working Paper* No. 26778, 2020.

[10]   Farhi, Emmanuel and Iván Werning, "Monetary policy, bounded rationality, and incomplete markets,"*American Economic Review*, 2019,109(11), 3887–3928.

[11]   Nagel, Rosemarie, "Unraveling in guessing games: An experimental study,"*The American Economic Review*, 1995,85(5), 1313–1326.

[12]   Sims, Christopher A, "Implications of rational inattention,"*Journal of Monetary Economics*, 2003,50(3),665–690.

[13]   Woodford, Michael, "Monetary Policy Analysis When Planning Horizons Are Finite," in "NBER Macroeconomics Annual 2018, Volume 33," University of Chicago Press, 2019.

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