SVAR MODEL TO EXAMINE THE SHORT AND LONG TERM MONETARY POLICY IN INDONESIA

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Abstract:

This research was conducted by the author to see the impact of monetary policy on the domestic macro-economic variables is important in Indonesia using a structural model of the short and long term, contained in a structural model of vectorAutoregressions (SVAR). The author uses the effects of macroeconomic policy is the key in this research, by applying the matrix model SVAR initiated by Bernanke & Mihov (1998) short term and Blancard & Quah (1989) long term. Research conducted using the 4 variables, consisting of two domestic variables, namely the interest rate of Bank Indonesia (SBI), the consumer price index (CPI) and two non-domestic variables, namely the interest rate the central bank United States(FFF), the rate of inflation in the United States (INF_USA). From the research that has been done can be inferred that the SVAR models used in this study can be used as a reference to the theoretical expectations in order to show that the rise in interest rates and the central bank of the United States could affect Indonesia's domestic variables.

Keywords:

SVAR, restricted short-term, restrictions long-term, IRF, FEVD, SBI, CPI, FFF, Inflation USA.

JEL Classification: C39, C01, B49

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1 Introduction

Some of the results of empirical research on the impact of monetary policy could be erratic. On the one hand Parado (2001) says, in the form of a large closed economy context, the effect of this policy is largely consistent with conventional theories. For example, in the United States (US), an increase in domestic interest rates, may tighten monetary policy, is if it is linked to the appreciation of the currency in host Kim and Roubini (2000). On the other hand Cushman & Zha (1997) says that in the setting of a small open economy, the impact of monetary shocks do not seem consistent with existing economic theory. Another example as found by Sims (1992), the monetary contraction failed to reduce the level of house prices (a problem known as puzzle price). In addition, rising interest rates is often associated with the depreciation of the home currency (which is defined as a problem puzzle exchange rate).

This research will look at the impact of domestic monetary policy on key macroeconomic variables due to the influence of foreign variables Indonesia using SVAR approach. In addition, this study also will examine whether the response of short-term and long-term key macroeconomic variables Indonesian domestic monetary shocks are consistent with existing theory. In particular theory of monetary policy will reduce the absorption of the monetary aggregates of domestic variables Indonesia?

In building a model SVAR to model the Indonesian economy, there are two important things that need to be seen. First, Indonesia should be considered in the form of a small open economy, very sensitive to foreign shocks were exogenous. Therefore, to analyze the monetary policy in a small open economy setting, Cushman & Zha (1997), Zha (1999), as well as Dungey & Pagan (2000) suggest foreign exogeneity assumptions used blocks. In the context of the Indonesian economy models, this assumption see that there is an influence either directly or indirectly, the effect of dropping the Indonesian economy to foreign economies. Impose this restriction is not only interesting from an economic standpoint but also econometrically as to prevent any decisive as it existed on the model Zha, (1999).

2. PREVIOUS RESEARCH

Previous research identified the effects of a standard approach to monetary policy has been used Autoregressions vector (VAR). This approach does not have a strong theory in identifying monetary shocks initiated by recursive models of Kim and Roubini, (2000). Because of this, the results of studies using standard VAR may be biased as well as being contrary to the theory that there is monetary. Suppose the simultaneous reaction between monetary policy and exchange rate. In the standard VAR model, the exchange rate will mean react to all the other variables. Meanwhile, other variables (eg policy level) is placed before the exchange. This means that the interest rate used for that policy will only respond with a lag of the exchange rate. As a result, the relationship between interest rates and exchange rates, or interdependence simultaneously ruled out. But it does not apply,

because the central bank may respond very rapidly exchange rate, this indicates that monetary policy has been identified as mentioned in Zaidi, (2011).

SVAR expansion model made by Sims & Zha (1995a), Cushman & Zha (1997), Kim & Roubini (2000), which identifies the demand for money and the money supply in the context of a small open economy. Researchers impose the equation of money supply as the central bank reaction function. The difference between the two models of existing research Cushman & Zha (1997) are more stringent in applying restrictions on foreign exogeneity block model of Kim & Roubini (2000). The policy conducted by the Fed directly in research at Cushman & Cushman and Zha justify it, while Kim & Roubini (2000) did not. The existence of other differences in the study conducted by Cushman and Zha (1997) and Kim and Roubini assumed that domestic output and domestic price levels do not respond to extraneous variables, while Kim & Roubini (2000) noted the importance of the impact of world price used variables.

The latter is a study conducted by Pirovano (2012), as amended by the model SVAR Neri (2004) and Li et al. (2010). In a study conducted by Pirovano (2012), he developed four models svar using seven variables to identify the impact of monetary policy on stock prices for the Czech Republic, Hungary, Poland and Slovenia. He found that the response of stock prices in countries that are more sensitive to changes in interest rates (Euro Area) foreigners than to shocks in one household. Moreover, changes in stock prices in these countries are also due to shocks in the exchange rate and monetary policy Eurozone. This implies that the domestic stock market is more sensitive to external shocks than domestic ones.

From the study of related theories and empirical research on the above, it can be concluded that a change in interest rates is a better indicator of innovation in monetary aggregates in identifying monetary policy shocks in Sims, (1992). It can also be concluded and it is expected that there will be appreciation of the exchange rate, the increase in imports in response to the tightening of monetary (interest rate increase). On the other hand, there will be a drop in stock price, the stock of money, export, the output and the price level in response to the policy of Facilities.

3. RESEARCH METHODOLOGY

3.1 Time Research

This research was conducted at the time of the month November 2014-March 2015.

3.2 Model Approach In Research

The approach in this research model based on the specifications of the structural model approach vector Autoregressions (SVAR) initiated by Bernanke & Mihov (1998) to model the short term, as well as Blancard & Quah (1989) for the long-term model, the authors did not use and discuss in detail SVAR models Zha (1997), Kim Cushman & Roubini (2000), which many researchers make reference to the model SVAR.

3.3 Research Data

This study uses monthly data from December 1984 to December 2012. Data derived international financial statistics (IFS) and the website of Bank Indonesia (BI), but the data is processed in advance by the author. This study divides the variables in the two blocks. The first block consists of domestic variables : a. Interest Rate of Bank Indonesia (SBI / BI_RATE), b. Indonesian Consumer Price Index (CPI), Then the second block consisting of non domestic variables: c. The interest rates on the American central bank (FFF), d. Inflation in the United States (INF_USA).

4. RESEARCH RESULT

The first part of this research begins with a discussion of the various diagnostic tests SVAR models short term and long term. Then, the second part is about the benchmark model. The focus of this second part is to discuss the impact of the domestic monetary policy on key macroeconomic variables inndonesia, to check whether the results of the research conducted is consistent with economic theory that is used, then the method of impulse response function (IRF) and variance decomposition error Fector (FEVD) in use. Furthermore, the last part is about the use of the model of Bernanke and Mihov and Blancard & Quah which can be used as a handle for SVAR models in use.

4.1 Diagnostic tests Model SVAR Short Run With 4 variables

Short-term models in the idea Bernanke & Mihov (1998). They examined the controversy about the effects of liquidity (LE) and LR neutrality M (LRN), simultaneously using SVAR. Here we see the results display SVAR models with models of short-term restrictions B & M.

Table 1 : SVAR model short run restriction with four variables

Structural VAR Estimates

Log likelihood	-290.5183		

Estimated A matrix:

1.000000	0.000000	0.000000	0.000000
1.766064	1.000000	0.000000	0.000000
0.005930	-0.008594	1.000000	0.000000
0.005736	0.000885	0.075392	1.000000

Estimated B matrix:

3.093596	0.000000	0.000000	0.000000
0.000000	55.04453	0.000000	0.000000
0.000000	0.000000	1.293683	0.000000
0.000000	0.000000	0.000000	0.732869

Sources : Process by author

In general literature to assume that structural innovation has a diagonal covariance matrix that is by comparing the results of the literature, dividing each column B with the elements on the diagonal. For example:

$$B = \begin{pmatrix} 1 & b_{12} / b_{22} \\ b_{21} / b_{11} & 1 \end{pmatrix}$$

B is a diagonal matrix, which results in the estimation matrix A matrix multiplication as table 1: where in the model overidentified but passed the restrictions identified. Look at the results of model estimation matrix A, the result of multiplying domestic and non domestic variables, showed significant levels greater, so that we can be sure the models used svar short-term domestic and non domestic variables Indonesia in the economy there is interplay and there were affected.

4.2 Diagnostic tests Model SVAR Long Run With 4 variables

Long-term model identification results by: Blanchard & Quah (1989) decomposition. B & Q shows how macroeconomic variables and the recovery of pure shock (identify VARs) by assuming that long-term demand shocks could have an impact on the output of zero. As mentioned in section 3 (methodology), this study did not use diagnostic the information

criterion FPE, AIC, SIC and HQIC to determine the optimal length, as a result, if there is value remaining two (m = 2) for all models. Restriction tests needed to confirm the identity over the validity of the identification in the model. Here the authors show for the results of the model svar Blancard & Quah who took 4 of 8 models matrix.

Table 2 : SVAR model long run restriction with four variables

Structural VAR Estimates

Log likelihood	-543.4630		

Estimated A matrix:

1.000000	0.000000	0.000000	0.000000
0.000000	1.000000	0.000000	0.000000
0.000000	0.000000	1.000000	0.000000
0.000000	0.000000	0.000000	1.000000

Estimated B matrix:

| 1.879493	-2.143618	0.617889	-1.860501
-26.37196	28.79649	24.40726	-25.90662
5162.112	4173.264	2860.738	2899.652
-0.196626	-0.542116	1.002078	0.820893

Sources : Process by author

Similarly, the short-term models svar literature, in the long-term model assumes that structural innovation has covar diagonal matrix by comparing the results of the literature, as well as dividing each column B with the elements on the diagonal. If the short-term model is used as the handle is the result of multiplying that of the matrix A, but in the long run is the matrix B. We can see the result of the multiplication of domestic and non domestic variables Indonesia looks balanced, in the sense that there are domestic and non domestic variables in the long term affected and there were influences, but it is very obvious dependence in the long term, as a result of the estimation matrix B.

4.3 Impulse Response Function (IRF)

Model impulse response function is a practical way in analyzing visual data that represent the behavior of inflation and the unemployment rate in response to various shocks in an economy. Impulse response function is as a nuisance coefficients of the structural model. All functions of the impulse response in this study was calculated from the percent increase in disturbance and increased distractions can be understood to have a good effect for the economy. Here we see the impulse response of the data processing in this study.

Figure 1 : IRF SVAR four variables
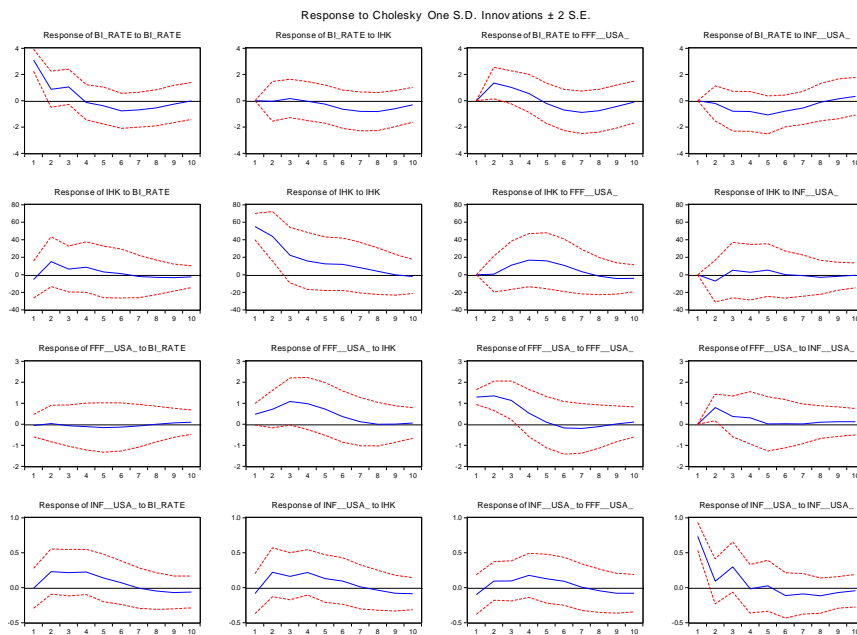
The IRF procedure is based the assumption that occurs contemporaneously independent between domestic variables with non domestic variables when shocks. To analyze at the beginning of shocks, with one variable and other variables, are also experiencing the same changes. If we see the impulse response graph shows the movement is getting closer to the point of balance or return to the previous equilibrium point. This indicates that the response of the variables due to the shocks the longer will disappear, so that the shocks did not leave a permanent effect on these variables.

From the image visible and shows the impact of the response received by CPI due to shocks and INF_USA FFF for 10 months is convergent, which is shown by the graph towards zero. A similar trend is also visible from shocks BI_Rate, FFF and INF_USA on the CPI.

4.4 Fector Error Variance Decomposition (FEVD)

Impulse response function analysis previously used to look at the impact of shocks from one variable to another variable, while the FEVD analysis is used to illustrate the relative importance of each variable in the system modeling using VAR base.

Table 3 : Result FEVD with four variable in SVAR

Variance Decomposition
of BI_RATE:

Period	S.E.	BI_RATE	IHK	FFF__USA_	INF__USA_
1	3.093596	100.0000	0.000000	0.000000	0.000000
2	3.490092	84.83671	0.013601	14.79213	0.357558
3	3.871544	76.38536	0.204796	18.93715	4.472697
4	3.999464	71.67379	0.199584	19.67919	8.447429
5	4.173896	66.65257	0.560979	18.29892	14.48753
6	4.420330	62.46706	2.613934	18.89764	16.02137
7	4.666153	58.23817	5.379173	20.60323	15.77944
8	4.831229	55.57396	7.938992	21.71115	14.77589
9	4.897488	54.34628	9.248796	21.94390	14.46103
10	4.919644	53.85914	9.553667	21.78944	14.79775

Variance Decomposition
of IHK:

Period	S.E.	BI_RATE	IHK	FFF__USA_	INF__USA_
1	55.31501	0.975559	99.02444	0.000000	0.000000
2	72.46886	4.795948	94.22565	0.007936	0.970471
3	77.05315	4.953422	91.72473	2.000372	1.321472
4	80.91879	5.636762	86.98521	6.051749	1.326279
5	83.67239	5.422699	83.60798	9.311597	1.657724
6	85.19793	5.253258	82.58635	10.56144	1.598951
7	85.68385	5.247503	82.54082	10.61776	1.593917
8	85.89978	5.343163	82.34713	10.60043	1.709279
9	86.08458	5.465498	81.99394	10.79811	1.742454
10	86.23186	5.515027	81.76452	10.97821	1.742247

Variance Decomposition
of FFF__USA_:

Period	S.E.	BI_RATE	IHK	FFF__USA_	INF__USA_
1	1.378999	0.224213	11.76663	88.00916	0.000000
2	2.208201	0.109959	15.15041	71.64254	13.09709
3	2.735061	0.133274	25.54976	63.94964	10.36732
4	2.972294	0.252253	32.56328	57.34253	9.841942
5	3.065845	0.496306	36.25161	53.99848	9.253602
6	3.095232	0.671653	36.94769	53.29575	9.084904
7	3.104925	0.725001	36.87124	53.37226	9.031501
8	3.108518	0.723436	36.78614	53.37732	9.113100
9	3.111608	0.767471	36.71396	53.27538	9.243183
10	3.117920	0.864380	36.60016	53.18035	9.355101

Variance Decomposition
   of INF__USA_:

Period	S.E.	BI_RATE	IHK	FFF__USA_	INF__USA_
1	0.744171	0.011521	1.285279	1.717772	96.98543
2	0.820181	7.884609	8.270594	2.764545	81.08025
3	0.917884	11.72505	9.762102	3.302302	75.21054
4	0.985646	15.37166	13.34189	6.036142	65.25031
5	1.012561	16.44932	14.32898	7.326340	61.89537
6	1.029536	16.37897	14.70375	7.867463	61.04982
7	1.033397	16.26039	14.60714	7.815375	61.31710
8	1.042367	16.19976	14.47614	7.853986	61.47012
9	1.052975	16.30599	14.75426	8.277790	60.66196
10	1.062317	16.36628	15.17037	8.693533	59.76982

Cholesky Ordering:
BI_RATE IHK FFF__USA_
      INF__USA_

S.E : Standar error

Based on the table above shows that the source of the importance of variation BI_Rate is BI_Rate it self, while for the next period variation predicted value for BI_Rate variation

predictive value of 84.36% was contributed by the CPI by 0.01%, amounting to 14.79% of the FFF and by INF_USA by 0.35%. So forth at month 10 shocks to the variable in question. Seen that shocks and influence of non domestic factors (FFF and INF_USA) is immense (Against BI_Rate) when compared with the domestic factor itself (CPI).

5. CONCLUSION

Research is conducted to look at the impact of macroeconomic variables from abroad Indonesia in analyzing monetary policy approach, which uses short term and long term structural vector Autoregressions at (SVAR). Diagnostic tests for identity-based restrictions, model BM and BQ can be used as a tool of analysis in the SVAR models other than the model developed by the Sim known as Zha & KRBM and KRMM. From the research that has been done by the author can be inferred that the model used in this study supports the results of previous studies. Because of the limited number of observations to test this model is too complicated. But in this study provide an explanation of the restrictions that also serves as a policy analysis tool and the economic conditions in Indonesia.

However, the identification of schemes in all the models seem to be successful to identify the impact of monetary shocks on key macroeconomic variables for empirical puzzle solving the Indonesian economy. By looking at the impulse response function (IRF), the error variance decomposition fector (FEVD), Indonesian monetary policy seen contracting followed by appreciation of the variable factors of the domestic economy. So, when we see the results of the model SVAR short term and long term, it can be concluded that the domestic variables in Indonesia for monetary analysis influenced by larger factors from overseas. While domestic monetary variables that affect the Indonesia factor variable domestic monetary Indonesia itself was not great, as the output produced by the FEVD.

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