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The Influence of Exchange Rate and Foreign Capital on the Performance of Inflation Targeting Framework in Indonesia

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ABSTRACT

This study provides empirical evidence on the problem of the trilemma of monetary policy in an open economy, in the context of the effect of exchange rates and foreign capital flows on the performance of the ITF in Indonesia. The method used as an empirical estimate is the Structural Vector Autoregressive (SVAR) model. This model allows to include restrictions in the empirical estimation of parameters that measure the contemporaneous effect of one variable on another variable according to the structure of the macroeconomic model. Meanwhile, the lagged effects are estimated according to the VAR model. Therefore, the SVAR model is considered more appropriate than the ordinary VAR model because it can measure both the instantaneous effect and the intertemporal effect of the problem under study. The SVAR model uses restrictions that are consistent with the theoretical model in its estimation, regardless of the time-to-time effect of one variable on another. There are 9 variables in the SVAR model, namely: global risk, oil prices, federal funds rate, economic growth, inflation, interest rates, monetary policy, credit interest rates, foreign portfolio investment flows, and the rupiah exchange rate. All data used were obtained from several sources, including: Bank Indonesia, Central Statistics Agency, and IMF. Based on the estimation results, the exchange rate and foreign capital flows have a significant effect on inflation and economic growth, thus affecting the performance of the ITF in Indonesia. In particular, there is a relative influence between external factors, particularly global commodity prices, US monetary policy interest rates, and global risks, and domestic factors, particularly economic growth, monetary policy interest rates, and bank interest or credit rates. This study also concludes that in addition to inflation and economic growth considerations, Bank Indonesia also considers exchange rate movements in determining its interest rate policy response.

1. INTRODUCTION

The flexibility of the exchange rate (exchange rate flexibility) and the free flow of foreign capital (free capital mobility) underlying the implementation of an independent monetary policy to target inflation (Inflation Targeting Framework, ITF). The effect of the exchange rate on inflation, either directly through changes in nominal exchange rates and foreign prices or indirectly through changes in aggregate demand, is allowed to take place following economic dynamics and serves as a counterweight to external shocks (external shock absorber) [1]. Interest rate policy is consistently directed at achieving the inflation target, thereby mitigating the effects of the exchange rate in the medium and long term. The same rationale underlies the influence of foreign capital flows on inflation, both through changes in the supply of foreign currency against the nominal exchange rate and liquidity conditions on aggregate demand. The focus of monetary policy on the inflation target can free the central bank from the trilemma of monetary policy in an open economy [2], including: capital mobility, independent monetary policy and a flexible exchange rate.

Several empirical studies have been carried out regarding the relationship between exchange rates and the effectiveness of ITF-based monetary policy. In general, there are 3 categories of research related to this topic. First, research that observes changes in the exchange rate pass-through (ERPT) after the implementation of the ITF. This research in the first category was conducted to show whether the application of the ITF could reduce the effect of the exchange rate on inflation. Second, research that observes differences in exchange rate volatility before and after the implementation of the ITF. Since the ITF requires exchange rate flexibility, the countries that implement it will experience increased exchange rate volatility. Third, research that observes the response of monetary policy to changes in exchange rates in ITF countries. Based on Taylor's Rule, countries implementing the ITF should not include the exchange rate factor in determining interest rate policy [3]. Inflation has a positive relationship while interest rates and money supply have a negative relationship with exchange rate volatility [4]. There is a relationship between inflation and exchange rate volatility, both in the short and long term [5]. An increase in interest rates leads to an increase in output, investment and excess supply in the goods market, so that the price level increases. So the interest rate can be used as a signal for the inflation target. Another finding is that there

is an inverse relationship between money supply and exchange rate volatility [6].

However, in reality, many Emerging Market Economies (EMEs) that adopt the ITF are still implementing intervention policies to maintain exchange rate stability [7]. This phenomenon is known as fear of floating [8]. The phenomenon of fear of floating can be seen from the accumulation of large amounts of foreign exchange reserves, which are actually unnecessary if the country adopts a free-floating exchange rate system [9]. There are several reasons for this phenomenon. First, the inability of EMEs countries to borrow domestic currencies due to underdeveloped financial markets. Second, EMEs avoid the impact of depreciation on the size of their foreign currency liabilities in the economy. Third, EMEs countries face a large effect (exchange rate exchange rate pass through) tall one. Fourth, there is high exchange rate volatility due to speculation. Fifth, the low credibility of policy makers has resulted in excessive public expectations. Sixth, access to global markets is obtained by currency stability.

These various considerations explain why the exchange rate is still one of the main focuses of macroeconomic policies in EMEs countries. Some empirical evidence supports the importance of exchange rate stability in developing countries. Research related to exchange rate volatility states that EMEs are small open economies that are very vulnerable to shocks in both the goods market and the money market [7]. Changes in exchange rates have an impact on trading and investment activities [10]. This condition can disrupt the stability of aggregate demand abroad which ultimately has an impact on the nominal exchange rate [11]. The central bank must be able to influence exchange rate changes by intervening in the foreign exchange market to stabilize exchange rates. A number of developing countries, including South American countries, prevent currency appreciation that is too high so that export goods can compete in international markets [12]. This problem is then used as a justification for exchange rate stabilization policies in conjunction with the implementation of the ITF in many EMEs.

The problem of the trilemma of monetary policy in an open economy for EMEs has increasingly emerged in the last decade, particularly since the 2007/2008 global financial crisis. Exchange rate volatility and foreign capital flows increasingly pose a challenge to the effectiveness of ITF implementation in many EMEs. Exchange rates in many EMEs strengthened with a high level of appreciation in the aftermath of the global financial crisis which resulted in the collapse of the financial sector and economic recession in the United States and other developed countries. This has resulted in a very large inflow of foreign capital into EMEs. Meanwhile, the Greek crisis in 2011 and the announcement of the plan to normalize monetary policy in the US (Fed taper tantrum) in 2013 led to a weakening of exchange rates in many EMEs countries. The Fed effect has been taper tantrum felt by EMEs in the form of reversal of foreign capital outflows since 2011 and high volatility since 2013.

The implementation of ITF policies that have been carried out by Bank Indonesia in the context of the monetary policy trilemma requires a study of the effect of the exchange rate and foreign capital flows on the rate of inflation (exchange rate pass through). Two main problems will be tested empirically. First, how and how much influence the exchange rate and the flow of foreign capital on the effectiveness of ITF performance. This study specifically examines the relative influence of external factors (global commodity prices, US monetary policy interest rates, and global risks) on domestic factors (economic growth, monetary policy interest rates, and bank credit interest rates). Second, how is the response of Bank Indonesia's monetary policy in facing the trilemma of open economic monetary policy after the implementation of the ITF. This problem is tested by analysing the effect of exchange rate movements and foreign capital flows in determining the response to Bank Indonesia's interest rate policy.

The method used as an empirical estimate is the Structural Vector Autoregressive (SVAR) model. The SVAR model has been widely used for cases in other countries but has not been widely used to research similar problems in Indonesia. The SVAR model uses restrictions that are consistent with the theoretical model in its estimation, regardless of the time-to-time effect of one variable on another. The dynamics of contemporaneous and lagged effects using this methodology can enrich the analysis of the problems under study.

2. METHOD

This study uses the Structural Vector Auto Regression (SVAR) method to empirically estimate the effects of exchange rate shocks and foreign capital flows on monetary policy responses. This model allows to include restrictions in the empirical estimation of parameters that measure the effect of contemporaneous one variable on another in accordance with the structure of the macroeconomic model. Meanwhile, the lagged effects are estimated according to the VAR model. Therefore, the SVAR model is considered more appropriate than the ordinary VAR model because it can measure both the momentary effect and the time-to-time effect of the problems under study.

The SVAR model used in this study comes from previous research, namely SEK (2009) which modified the model from Kim and Roubini [13]. The model identifies the function of external policy shocks and policy reactions, namely:

$$G(L)y\_t = e\_t \quad (1)$$

where represents a matrix with lag operator L, is a vector matrix (nx 1) and is a disturbance vector with variance var (et) = Λ (where Λ is a diagonal matrix. From these equations, an obtained, general reduced form is namely:

$$y_t = B(L)y_{t-1} + u_t \quad (2)$$

where is the matrix lag operator and var (ut)=Σ. The generalized method is used to return the parameters into the structural form equation from the reduced form equation, by specifying the constraints of contemporary structural parameters and allowing for a non-recursive structure as follows:

$$B(L) = -G_0^{-1}G^0(L) \quad (3)$$

where is the coefficient matrix without contemporary coefficients. In this regard, the restrictions on the contemporary coefficients are based on the macroeconomic structure model while the intertemporal coefficients are not restricted. Given that and S contains the parameter n(n+1)/2, this model requires at least n(n-1)/2 restriction for contemporary coefficients.

There are 9 variables in the SVAR model that are estimated

for the case of Indonesia, namely: Global Risk (RISK), Oil Price (POIL), Federal Funds Rate (FFR), Economic Growth (GDP), Inflation (INF), Monetary Policy Interest Rates (BIRATE), Credit Interest Rates (LRATE), Foreign Portfolio Investment Flows (CAPIN), and the Rupiah exchange rate (EXRATE). Two versions of the model will be estimated, namely transmission via the bank credit interest rate channel with LRATE and transmission via the foreign capital flow channel with CAPIN.

Foreign economic variables are assumed to be exogenous to domestic economic variables, because shocks to the economy in Indonesia do not have much impact on foreign countries. Therefore, the structure of the SVAR model can be grouped into two blocks, namely the foreign block and the domestic block as follows:

-Model structure: Y=[Y1, Y2];

-Overseas blocks: Y1=[RISK, POIL, FFR];

-Domestic block: Y2=[GDP, CPI, ID, LR, EX].

Following the model developed by Kim and Roubini [13], the restrictions for structural parameters contemporaneous for the first model with the transmission rate path are as follows Table 1. Meanwhile, the structural parameter restrictions contemporaneous for the second model with the transmission of foreign capital flows are as follows Table 2.

The foreign block consists of global risk (RISK), world oil price (POIL) and the Federal Fund Rate (FFR). Both global risk and world oil price variables are assumed to be exogenous to all variables in the model and only affected by the lag of the variables themselves. Meanwhile, the Federal fund rate is assumed to be influenced by world oil prices. The monetary policy specification for the federal fund rate is assumed to follow the Taylor's Rule where the main objective is to maintain output growth and price stability.

Domestic blocks are divided into 3 subsections. The first part is a non-policy block represented by domestic output and price levels. These two variables are assumed not to be influenced by variables in other domestic blocs. Both output and inflation are assumed to be affected by world oil prices and the exchange rate. The second part is the policy block which is represented by the Monetary Policy Interest Rate (ID) and the Credit Interest Rate (LR). The monetary policy reaction function is represented by the Monetary Policy Interest Rate equation. Both the BI Rate and credit interest rates are assumed to be affected by output and inflation. The BI Rate is also assumed to be influenced by exchange rates, and affects lending rates.

The last part of the domestic bloc is the exchange rate. The exchange rate equation represents market information variables that react quickly to all changes in other variables. Although the exchange rate contemporaneously is influenced by all variables in the model, it is also assumed that it does not have an immediate effect on these variables. Through the exchange rate equation, the variables in the foreign block can affect the variables in the domestic block.

All variables are logged (except the interest rate) to determine the percentage change in the variable. Sek (2009) then performed the Augmented Dicky Fuller (ADF) and Schmidt Phillips (SP) unit-root test and found that the variables were not stationary. Thus, the SVAR model is applied to a differenced form to obtain an efficient estimator.

The data used in this study are monthly data starting from July 2005 to December 2016. All data used were obtained from several sources, including: Bank Indonesia, BPS, and IMF. The selection of quarterly data is aimed at capturing fluctuations in monetary and exchange rate movements, as well as considering the lag in monetary policy response.

Table 1. Restriction parameters model with the interest rate line transmission

Dependent Variables	Independent Variables							
	RISK	**POIL**	**FFR**	**GDP**	**CPI**	**ID**	**LR**	**EX**
Global Risk (RISK)	1	0	0	0	0	0	0	0
Oil Price (POIL)	0	1	0	0	0	0	0	0
Fed Fund Rate (FFR)	0	A32	1	0	0	0	0	0
Economic Growth (GDP)	0	A42	0	1	0	0	0	A48
Inflation(CPI)	0	A52	0	A54	1	0	0	A58
Central Bank Rate (ID)	0	0	0	A64	A65	1	0	A68
Loan Interest Rate (LR)	0	0	0	A74	A75	A76	1	0
Exchange Raet (EX)	A81	A82	A83	A84	A85	A86	0	1

Table 2. Restriction parameters model with foreign capital flow transmission

Dependent Variables	Independent Variables							
	RISK	**POIL**	**FFR**	**GDP**	**CPI**	**ID**	**CFA**	**EX**
Global Risk (RISK)	1	0	0	0	0	0	0	0
Oil Price (POIL)	0	1	0	0	0	0	0	0
Fed Fund Rate (FFR)	0	A32	1	0	0	0	0	0
Economic Growth (GDP)	0	A42	0	1	0	0	A47	A48
Inflation (CPI)	0	A52	0	A54	1	0	0	A58
Central Bank Rate (ID)	0	0	0	A64	A65	1	0	A68
Nett Capital Flow (CFA)	A71	A72	A73	A74	A75	A76	1	0
Exchange Rate (EX)	A81	A82	A83	A84	A85	A86	A87	1

3. RESULTS & DISCUSSION

Stationarity test is conducted to avoid spurious regression, which is a condition in which the regression describes the relationship between two or more variables whose results are statistically significant but are not. This study uses Augmented Dickey-Fuller (ADF) to determine whether there is aor not unit root. The test results are then compared with the table developed by MacKinnon. If the ADF test t-statistic is greater than the critical value of the table at a certain level of

significance, the series is stationary. The summary of the results of the data stationarity test is as follows Table 3.

Based on the Table 3, it can be concluded that 5 variables (BI interest rates, consumer price index, gross domestic product, capital flows, federal fund reserves) are stationary at the data level, while the variables of credit interest rates and exchange rates are not stationary at the data level. Thus, testing of the two variables was continued at the level 1st difference. As a result, the variable credit interest rate and exchange rate are stationary at the 1st difference. The stationarity test concludes that there is at least 1 stationary variable at the level, so that the equation analysis multivariate system can use SVAR with variable data at the level 1st difference.

The VAR and SVAR approaches are very sensitive to the amount of lag data used. If you specify lag too long a, it will reduce the degree of freedom, thus eliminating the required information. Meanwhile, the amount of lag that is too short will result in a misspecification model which is marked by a high number of standard errors. The determination of the length of the lag is done to determine the length of the period the influence of a variable is on its past variables and on other endogenous variables. Determination Lag can be used with several approaches, including Likelihood Ratio (LR), Final Prediction Error (FPE), Akaike Information Criterion (AIC), Schwarz Information Criterion (SC) and Hannan Quinn (HQ). The complete VAR lag Order Selection results can be seen in the following Table 4.

It can be seen from the Table 4, that according to the criteria LR, FPE, and the smallest AIC is lag the optimal according to the criteria LR, FPE, and the smallest AIC is lag 4. Furthermore, referring to the various smallest criteria, lag 4 will be used in estimate the next VAR equation model.

The VAR model stability test was carried out before the further analysis stage. The model stability test is performed using the VAR method, stability condition check namely the roots of characteristic polynomials, all variables used are multiplied by the amount of lag of each VAR. The VAR system is declared stable if the modulus of all AR-roots values is less than 1. This test is intended to ensure that the SVAR model being analysed is stable so that further analysis will produce an impulse response function (IRF) and forecast error variance decomposition (FEVD) valid. The results can be seen in the attachment Table 1.

The stability test of the estimation model at lag 4 shows that the model is stable because the modulus value of all the unit roots of the test results is less than 1. The graph produces the same stability test conclusion, that the model estimated at lag 4 is stable because all unit roots are in the circle of the Inverse Roots of AR Characteristic Polynomial image.

3.1 The effect of monetary policy shock, capital flows shock and exchange rate shock on inflation

The SVAR estimation results show that monetary policy shock has a negative effect on inflation shock by 11.72%, which means that an increase in interest rates will reduce inflation. When BI announced an increase in SBI, people tended to save because the interest earned was higher. This results in less disposable income, so inflation will fall.

Meanwhile, shock capital flows have a negative effect on inflation shock by 0.074%, which means that shock capital flows will move in the opposite direction to inflation shock. The effect is relatively small compared to the effect of monetary policy, but must still be considered in the long term. It can be explained that capital inflow causes real exchange rate appreciation due to an increase in foreign exchange supply. The decline in foreign exchange rates has a negative effect on real wages in the long run, thereby reducing cost-push inflation.

The exchange rate shock also had a negative effect on inflation shock by 0.69%, meaning that the exchange rate shock moved in the opposite direction to the inflation shock. This proves that there is still an influence from the exchange rate shock on the domestic market so that it can affect the effectiveness of the ITF policy.

3.2 The effect of inflation shock and exchange rate shock on monetary policy

Inflation shock has a positive effect on BI interest rates by 11.68%. The BI interest rate is a monetary policy instrument to achieve the inflation target. When there is an increase in inflation, BI will react by increasing interest rates to suppress the inflation rate. Thus, there is a positive relationship between inflation shock and monetary policy.

Table 3. Variable stationarity test

Variable	Tier	Coefficient Augmented Dickey Fuller (t-statistic)	Critical Value Mc. Kinon* (1%)	Probability	Inference
IR	Level	-4.509506	-3.584743	0.0007	Stationary
CRT	Level	-0.924403	-2.627238	0.3097	Non-Stationary
	1st Difference	-2.035362	-2.627238	0.0415	Stationary
CPI	Level	-4.529223	-4.180911	0.0039	Stationary
GDP	Level	-4.192337	-2.102976	0.0429	Stationary
CFA	Level	-6.830446	-3.581152	0.0000	Stationary
FFR	Level	-3.742258	-3.596616	0.0068	Stationary
EX	Level	-0.864611	-3.584743	0.7903	Non-Stationary
	1st Difference	-5.150971	-3.588509	0.0001	Stationary

Table 4. Lag optimum test

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-129.1828	NA	1.55e-06	6.484896	6.774508	6.591051
1	-56.73122	117.3026	5.23e-07	5.368153	7.685046	6.217386
2	17.99509	96.07667	1.87e-07	4.143091	8.487265	5.735403
3	83.29196	62.18750	1.54e-07	3.367050	9.738505	5.702440
4	248.8010	102.4579*	2.45e-09*	-2.180998*	6.217739*	0.897471*

Exchange rate shock has a positive effect on BI interest rates of 0.105%. This means that the movement of the exchange rate shock is in line with the monetary policy shock. Countries that implement the ITF should not intervene in the exchange rate, so they do not consider changes in exchange rates in setting monetary policy to achieve the inflation target. However, EME countries including Indonesia are still trying to maintain exchange rate stability. This has resulted in a positive relationship between exchange rate shocks and BI interest rates.

Apart from the inflation shock, the inflation expectation channel is also important to note. Empirical evidence shows that the behavior of inflation expectations is still largely influenced by past inflationary developments (inertia) [14]. Therefore, monetary policy is carried out not only by increasing commitment to the achievement of the inflation target that has been set, but also by increasing the explanation to the public regarding Bank Indonesia's monetary policy measures so that the public has more confidence in the commitment and inflation target set. On the other hand, exchange rate shock is also important to consider in the formulation of monetary policy [15]. On the one hand, the development of the exchange rate has a major impact on inflation, both because of its direct effect through changes in the prices of goods and services imported from abroad (direct pass-through effect) and indirect effect through the output gap (indirect pass-through effects) [16, 17]. Meanwhile, on the other hand, the ability of monetary instruments to influence the exchange rate faces obstacles due to the influence of the risk premium on the development of the exchange rate [7]. This empirical evidence shows the importance of monetary policy for stabilizing the exchange rate through foreign exchange intervention, not to achieve a specific exchange rate target, but to minimize its impact on inflation.

3.3 The effect of capital flow shock and inflation shock on the exchange rate

Capital flow shock has a negative effect on exchange rate shock by 0.105%. If the capital flow increases, the nominal exchange rate will decrease. On the other hand, if the shock capital flow falls, the nominal exchange rate will increase. Meanwhile, inflation shock has a negative effect on exchange rate shock by 0.005%. This is due to the implementation of monetary contraction policy by the central bank in the form of an increase in interest rates if inflation is expected to increase in the future. This policy will encourage the entry of capital flows into the country, so that the exchange rate will strengthen.

In another study by Caporalea et al. provides empirical findings on the effect of stock and bond portfolio flows on exchange rate volatility in EMEs (Emerging Market Economies) [18]. The study is based on monthly bilateral data between the US and EMEs and developing countries in Asia (India, Indonesia, South Korea, Pakistan, Hong Kong, Thailand, Philippines, and Taiwan) for the period 1993:01-2012:11. The results show that the portfolio flows increase the volatility of the exchange rate. Moreover, using the Markov-switching model, this study also shows that the net flow of stock portfolios (bonds) drives the exchange rate to high (low) volatility. Particularly, bond portfolio flows increase the probability of exchange rates at low volatility levels in Pakistan, Thailand and the Philippines while in Indonesia they tend to remain high volatility levels. Meanwhile, stock portfolio flows have been shown to increase the probability of exchange rates at high volatility levels in India, Indonesia, South Korea, Hong Kong, and Taiwan. Empirical evidence from this study strengthens the 'return-chasing' hypothesis of the behavior of international investors and therefore the management of foreign capital flows to investment portfolios can be an effective instrument for exchange rate stabilization.

Impulse Response Function (IRF) is used to see the effect of changes in the deviation standard of the variable on that variable or other variables. IRF will show the response of a variable within a certain period of time if an unexpected shock unit occurs from the variable itself or other variables. This study uses the Cholesky method to see the response of inflation to capital flow and exchange rate shocks that can affect the formulation of monetary policy. The IRF graph shows three lines, where the line in the middle represents the response of one variable to another, while the other two lines are the bands of two standard errors.

3.4 Inflation response to monetary policy and exchange rate shocks

Figure 1(a) and (b) show the response of inflation to shocks from monetary policy and exchange rates. When BI interest rate shocks occur, inflation only responds after the 2nd period with less drastic fluctuations. The effect will slowly disappear until it stabilizes again after the 25th period. On the other hand, volatile inflation is unstable when there is a currency shock. However, the effect disappeared soon in the 4th period and stabilized again. This means that the exchange rate volatility provides a significant shock to inflation and can affect the effectiveness of the ITF policies implemented even though the effects are short-term.

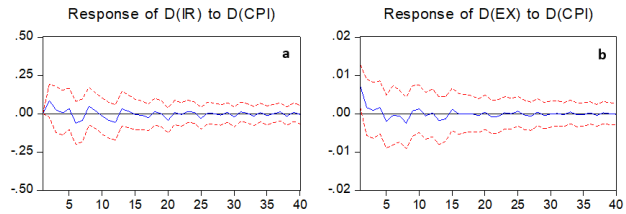

Figure 1. Inflation response to (a) interest rate shocks; (b) exchange rate shocks

The implementation of monetary policy through the ITF policy has succeeded in strengthening the transmission of monetary policy through expectations [19]. This is in contrast to conditions prior to the implementation of the ITF where the signal from Bank Indonesia's policy of using base money in general could not be accurately captured by the market, so that under certain conditions it tends not to change or even worsen inflation expectations. However, the credibility of monetary policy needs to be improved. Several structural shocks on the supply side that occurred in recent years caused inflation to exceed the set targets, namely in 2005, 2008, 2010, 2013, and 2014. In 2005, 2008, 2013, and 2014 inflation rose significantly above inflation target as a result of the government's policy to increase fuel prices. Inflation which tends to persist at a fairly high level with fluctuating movements is inseparable from the structural rigidity factor and the increasing role of global commodity prices in the inflation structure in Indonesia. Apart from structural problems on the supply side, the difficulty of achieving the

inflation target is also due to the complexity of the problems in the monetary sector faced by Bank Indonesia. As experienced in the last 5 years, to deal with heavy capital inflows so as not to put excessive appreciative pressure on the rupiah exchange rate, Bank Indonesia conducted foreign exchange interventions which resulted in increased liquidity in the domestic money market. This condition encourages excess liquidity which must then be reabsorbed by Bank Indonesia so as not to exert inflationary pressure in the future.

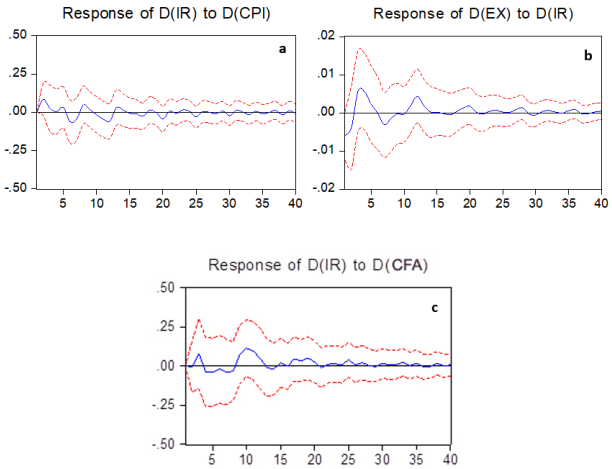

Figure 2. Monetary policy reactions to (a) inflationary shocks; (b) exchange rate shocks; (c) capital flow shocks

3.5 Monetary policy response to inflation shocks, capital flows, and exchange rates

Figure 2(a), (b), and (c) show the different reactions of monetary policy to shocks to inflation, capital flows and exchange rates. Indonesia, which has used the ITF framework, ideally designs monetary policy to achieve a predetermined inflation target. Bank Indonesia should not react to changes in exchange rates. However, the IRF image above shows that BI interest rates fluctuate unstable when there is a shock in the exchange rate. This condition continued until the 15th period where the value of interest rates stabilized.

Meanwhile, the results of the IRF on interest rates show that the response of interest rates to a shock of one standard deviation of capital flows tends to change throughout the observation period. The impact of capital flows on domestic interest rates occurred through the impact of an increase in the money supply from foreign capital which was converted to rupiah, which was then responded by a decrease in interest rates by the central bank in order to prevent excessive appreciation of the domestic currency which could disrupt export performance. On the other hand, if there is a net outflow, the central bank will respond by raising interest rates, in order to prevent excessive exchange rate depreciation. This change in the direction of the interest rate response to shock capital flows can be explained as a dynamic response of interest rates to shock capital flows, which can be inflows or outflows. The change in the direction of the interest rate response to capital flows also illustrates that the shock of capital flows is quite disturbing for the monetary authorities in determining the long-term direction of the SBI interest rate. It also shows that the monetary authority is quite responsive in directing the SBI interest rate in response to the volatility of capital flows in and out of the Indonesian economy.

FEVD is used to determine the relative role of each variable to other variables, so it is hoped that based on this analysis it can be seen which variable plays a more important role in explaining changes in a variable in the economy. In accordance to the research objectives in this study, FEVD is used to determine the effect of exchange rate volatility on monetary policy and the effectiveness of the ITF. The BI interest rate, which became an instrument for controlling inflation in the first period, all of its variances were influenced by itself.

In the 5th period, the influence of the BI interest rate variable on its changes decreased to 77.64%. The money market equilibrium, which is represented by credit interest rates, contributes 7.5% to changes in BI interest rates. Meanwhile, the influence of the domestic market, namely GDP and inflation, affected BI interest rates by 3.03% and 1.35%. The impact of external influences are capital flows and FFR of 4.35% and 3.2%, respectively. Meanwhile, the effect of exchange rate volatility on BI interest rate movements was 2.7% (Table 5). This figure continues to grow for each period in line with the reduced influence of the BI interest rate variable on itself.

The relevance of the need for Bank Indonesia's monetary policy response to systematically react to deviations in the real exchange rate from the equilibrium value is also supported by research by Juhro and Mochtar (2009) which simply analyzes the behavior of Bank Indonesia's monetary policy response for the period 2000-2009, without and by including dynamics [20]. the real exchange rate in the Taylor rule. Overall, these results conclude that the justification for taking into account the behavior of the exchange rate in the implementation of ITF-based monetary policy is supported by the data. In fact, at certain periods, the policy response in the enhanced rule design allows a more optimal countercyclical policy response than the simple rule.

Table 5. FEVD of interest rate variable

Variance Decomposition of D(IR):								
Period	**S.E.**	**D(IR)**	**D(CRT)**	**D(CPI)**	**D(GDP)**	**D(CFA)**	**D(FFR)**	**D(EX)**
1	0.325150	100.0000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
5	0.537063	77.64345	7.589762	3.031632	1.355787	4.353000	3.239144	2.787226
10	0.612994	63.34388	11.28641	4.620947	2.849477	6.557638	8.137584	3.204065
15	0.654032	59.34407	12.31986	5.573419	2.696031	6.589268	10.04762	3.429725
20	0.669718	57.21245	12.92688	5.967946	2.894926	6.551661	11.03875	3.407390
25	0.676741	56.54705	13.22556	6.131536	2.888319	6.560743	11.26811	3.378686
30	0.680688	56.16871	13.28718	6.208248	2.967492	6.682053	11.31491	3.371408
35	0.683605	55.93408	13.29763	6.281923	2.959399	6.719963	11.45171	3.355291
40	0.685243	55.77729	13.32436	6.363140	2.985963	6.725073	11.47689	3.347280

The flow of foreign capital has made monetary policy more complex in an open economy. The ability of monetary policy to achieve domestic economic objectives, such as inflation and economic growth, will be strongly influenced by exchange rate volatility and foreign capital flows from the influence of external factors. According to the impossible trinity theory, if you want monetary policy to be truly effective in achieving domestic economic goals, then the fixed exchange rate regime and the foreign exchange control regime are one option [21]. However, this choice is not in line with the flow of globalization which offers many benefits of international trade and investment for the domestic economy. Therefore, it is necessary to formulate an optimal alternative between monetary policy, exchange rate policy, and management of foreign capital flows so that the benefits of this economic openness can be obtained and the goals of the domestic economy can also be achieved.

4. CONCLUSIONS

This study provides empirical evidence on the problem of the monetary policy trilemma in an open economy, in the context of the influence of the exchange rates and the foreign capital flows on ITF performance in Indonesia. Two main empirical findings can be stated. First, the exchange rate and foreign capital flows have a significant effect on inflation and economic growth, thus affecting the performance of the ITF in Indonesia. In particular, there is a relative influence between external factors, particularly global commodity prices, US monetary policy interest rates, and global risks, with domestic factors, particularly economic growth, monetary policy interest rates, and bank interest rates or credit. Second, the response of Bank Indonesia's monetary policy within the ITF framework in dealing with the open economy monetary policy trilemma. This study concludes that apart from considering inflation and economic growth, Bank Indonesia also considers the exchange rate movements in determining its interest rate policy response.

Observing the results of the impulse response function (IRF) of interest rates on capital flows which tend to fluctuate throughout the observation period, this gives an illustration that shocks in capital flows are enough to interfere with monetary authorities in determining the long-term direction of central bank interest rates. Therefore, the central bank is expected to be more responsive to the volatility of capital flows that can affect exchange rate stability and price levels.

Further research can be developed to analyze the effect of macroprudential policies on the implementation of ITF policies in Indonesia. Macroprudential policies are needed to address systemic risks that could exacerbate the financial crisis.

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