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Simultaneous Effect of Monetary Policy on Macroeconomic Changes in IVI Countries

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Abstract:- The short-term goal of this study is to analyze the contribution of changes in macroeconomic instruments due to changes in monetary policy instruments with inflation expectations that can maintain economic stability, including (Exchange Rate, Money Supply, Inflation Expectations, GDP and Inflation). The specific target in this study is to find the simultaneity and Leading indicator of the effectiveness of controlling economic stability in each country of Indonesia, Vietnam, and India. The material used in this study is quantitative material with simultaneous data, secondary data sources in time series that is from the first quarter of 2000 to the first quarter of 2017. The data analysis model in this study is the Simultaneous analysis model. The results showed that there was a simultaneous effect of the exchange rate, the money supply, and inflation expectations on changes in the macroeconomic and macroeconomic stability of the IVI countries. The results showed that macroeconomic variables have a simultaneous effect on economic stability. The exchange rate, money supply, and inflation expectations have no significant effect on the macroeconomic stability of IVI countries.

Keywords:- *Exchange Rate, JUB, Inflation Expectations, GDP, Inflation.*

I. INTRODUCTION

Monetary policy in achieving intermediate and final targets can be predicted in the short and long term. The intermediate target is macroeconomic stability, while the final target is price stability. The monetary transmission has problems with a time lag (Alani, 2016). The delay effect can occur due to obstacles from other macroeconomic variables (Natsir, 2011). Interest can influence the delay effect (Wróbel, 2013). Zega (2015) exchange rates affect the success of the monetary policy. Monetary transmission is significant in maintaining economic stability (Rusiadi; Novalina, 2018). Onyeiwu (2012) concluded that exports as a variable that can affect the success of the final target.

Alfian (2011) states that asset paths affect economic growth and inflation. Natsir (2015) which shows that labor and net exports influence economic growth. Silvia (2013) economic stability is affected by consumption, net exports and investment. Indonesia rose to fifth place because of the increased growth of chemical products, as well as industrial manufacturing and financial services (Watson, 2018). The increase in inflation as an indication of economic stability is experiencing disruption. Therefore, when the price disruption occurs, the government must be able to control inflation fluctuations so that it does not disturb the economy too much. So important is the control of inflation, the government or the finance minister, in this case, need to set an inflation target. According to Warjiyo (2003), inflation targeting is a framework for monetary policy that is marked by announcements to the public about the inflation target figures for a period. High inflation can lead to a worsening income distribution which means it will also increase poverty, reduce savings deposits which are a source of investment in developing countries, cause a trade balance deficit, inflate the amount of foreign debt and can lead to political instability (Vymyatnina, 2005). Considering how crucial this discussion of inflation is, it is no wonder that BI has set it as the ultimate goal in implementing its monetary policy. The phenomenon of the problem in this study is seen from the various responses of macroeconomic variables to the ability of monetary policy transmission in controlling the economy in Indonesia, Vietnam, and India, as follows:

No	Year	Country		
		Indonesia	Vietnam	India
1	2000	3,72	-1,71	4,01
2	2001	11,50	-0,43	3,68
3	2002	11,88	3,83	4,39
4	2003	6,59	3,21	3,81
5	2004	6,24	7,75	3,77
6	2005	10,45	8,28	4,25
7	2006	13,11	7,38	6,15
8	2007	6,41	8,3	6,37
9	2008	9,78	23,11	8,35
10	2009	4,81	7,05	10,88
11	2010	5,13	8,86	11,99
12	2011	5,36	18,67	8,86
13	2012	4,28	9,09	9,31
14	2013	6,41	6,59	10,91
15	2014	6,39	4,08	6,65
16	2015	6,36	0,87	4,91
17	2016	3,53	3,24	4,94
18	2017	3,44	2,65	5,03

Table 1:- Inflation in IVI countries (in percent)
Source: *Worldbank*

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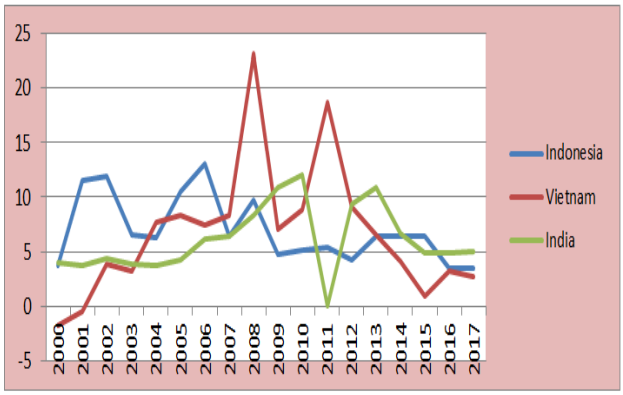

Fig 1:- Development of Inflation in IVI Countries

The data above shows that inflation in Indonesia, Vietnam, and India (IVI) tends to fluctuate during the period 2000 to 2017. The movements are almost the same in Indonesia, Vietnam, and India, which is a significant increase in inflation in 2008. It caused by the impact of global problems, namely the increase in global food prices. In general, people want the cost of living needs that are stable from time to time and want income to increase continuously or at a macro level of economic growth accompanied by excellent economic stability. Economic stability is needed to keep people's income from being eroded by price increases (inflation). That way, the community will also become more prosperous (Boediono, 2013).

If someone is reluctant to save, the business and investment world will be challenging to develop. Inflation is also able to widen the income gap between the rich and the poor. Creditors or lenders will also be affected by inflation because the return value is lower than when borrowing money. Inflation also causes production costs to rise so that it can hamper productive investment by producers, so producers are reluctant to continue production. Producers can stop their production for a while; even if they are unable to keep up with the rate of inflation, production can go out of business. It can be seen that the economic growth of Indonesia, Vietnam, and India has seen a slowdown. According to Hussain (2015), to maintain an adequate growth rate, it is necessary to intervene from the government to reduce the primary sector and increase the role of the non-primary sector. The non-primary sector, in this case, needs to be improved, such as the industrial sector that can contribute a GDP of 9.3% in 1972 to 28.34% in 2008. In 1972 to 1996 there was a transformation of the economic structure in Indonesia that was able to cause an increase in the growth rate in Indonesia with an average growth of 7% per year so that Indonesia can enter the HPAES (High Performing Asian Economies) group of countries. Some inconsistencies of research gaps regarding Inflation and Monetary Policy Analysts at home and abroad, as well as the author's motivation to re-raise this study with the Simultaneous model and ARDL panel.

The results of this analysis are expected to become input for policymakers such as Bank Indonesia and the Minister of Finance to predict economic stability. Hülsewig (2010), the impact of rising interest rates will increase prices and the economy in general. Natsir (2011) interest rates function effectively as operational targets. Sitaresmi (2005) the reliability of using the interest rate channel in pursuing policy targets in the form of inflation. Tightening of the interest rate can also protect Hussain's price fluctuations (2014), Hsing (2015) and Wróbel (2016). Monetary policy must facilitate a favorable investment climate through appropriate interest rates, exchange rate, and liquidity management mechanisms and money markets. (Onyeiwu, 2012). Interest rates are primarily related to price increases — the existence of functional interest rates in the Zambian economy (Sheefeni, 2013).

II. THEORIES

- *Mechanism of Monetary Policy Transmission of Interest Rate Pathways*

The interest rate is the critical monetary transmission mechanism in the IS model, the LM model, the AD model, and the US model. An increase in the stock of money will reduce the real interest rate and the cost of capital and increase business investment. Increasing investment will increase aggregate demand. A decrease in the real interest rate will also increase spending on home purchases and durable goods. Therefore a decrease in the interest rate due to monetary expansion will increase spending or consumption and aggregate demand. At a shallow nominal interest rate, monetary expansion will increase expectations of the price level and inflation. Consequently, the real interest rate falls. A decrease in the real interest rate will reduce the cost of capital and the cost of holding money, then stimulate business and consumer spending. Increasing business and consumer spending will ultimately increase aggregate demand. The flow rate transmission mechanism is formulated in two forms, such as:

$$m\uparrow \rightarrow r\downarrow \rightarrow \pi\uparrow \rightarrow y\uparrow$$

$$m\uparrow \rightarrow p\uparrow \rightarrow r\downarrow \rightarrow \pi\uparrow \rightarrow y\uparrow$$

where:
m = nominal money stock,
r = real interest rate,
p = rice level expectation,
π = real investment, and
y = aggregate real output

- *Exchange Rate Monetary Monetary Transmission Mechanisms*

The mechanism of transmission of asset price flows consists of the exchange rate effect, Tobin's q theory, and the wealth effect. Global economic growth and flexible exchange rates have increased the role of international monetary policy in determining a country's foreign exchange rates. The monetary expansion will initially reduce the domestic real interest rate and then cause foreign currency deposits to rise. An increase in the value of foreign currency deposits against domestic currency deposits will result in an appreciation of foreign currency exchange rates and depreciation of the domestic currency exchange rate. Depreciation of the domestic currency exchange rate results in the relative price of products or exports cheaper so that

net exports rise and ultimately increase aggregate demand. The mechanism of the exchange rate effect which flow transmission is formulated as follows:

$$m\uparrow \rightarrow r\downarrow \rightarrow e\downarrow \rightarrow x\uparrow \rightarrow y\uparrow$$

where:
e = currency exchange rates, and
x = net real exports.

Tobin has developed a theory of how monetary policy can influence stock valuations, called Tobin's q theory. Tobin defines q as the ratio of a company market price to the cost of replacing capital. If q is high, the ratio of the firm market price with high capital replacement costs, and vice versa if q is low, then the company market price ratio with capital replacement costs is low. The monetary expansion will increase the company stock price expectations, and consequently, the ratio of the company market price to the cost of replacing capital rises. This increase in q will increase spending on equipment and new plants or investment. An increase in corporate investment spending will increase aggregate demand. Tobin's q theory transmission mechanism is formulated as follows:

$$m\uparrow \rightarrow s\uparrow \rightarrow q\uparrow \rightarrow i\uparrow \rightarrow y\uparrow$$

where:
s = stock price expectations, and
q = the ratio of the stock market price to the cost of replacing capital.

The monetary transmission mechanism also influences people's wealth. Consumer spending decisions may affect the consumer's balance sheet. Modigliani uses life cycle hypotheses from the consumption of durable goods and services to explain the effects of wealth. The central premise of Modigliani is that consumption is not constant over a long-term period. It is mainly due to the financial wealth of consumers, such as stocks, bonds, and deposits that are not constant for life. The monetary expansion will increase the price of financial assets so that financial wealth rises. An increase in financial wealth will increase economic resources over the life of the consumer and will ultimately increase consumption and aggregate demand. The mechanism of transmission of the wealth effect flow is formulated as follows:

$$m\uparrow \rightarrow s\uparrow \rightarrow w\uparrow \rightarrow c\uparrow \rightarrow y\uparrow$$

where:
w = financial wealth or balance sheet of consumers, and
c = real household consumption.

III. METHODOLOGY

The material in this study uses quantitative material with the Simultaneous Model and ARDL Panel approach. Quantitative material in this study is related to observed variable data, namely the exchange rate, JUB, inflation expectations, GDP and inflation from several Emerging Market Countries, namely Indonesia, Vietnam, and India (IVI) from 2000 to 2017. Then the conceptual research can be described as follows:

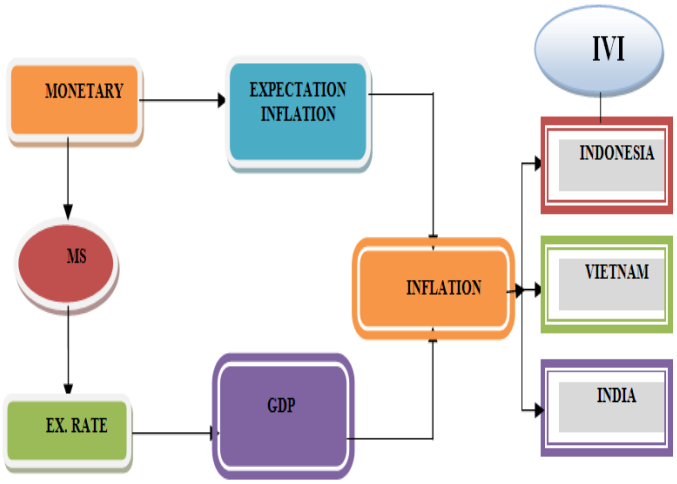

Fig 2:- Framework for Thinking: Monetary Transmission

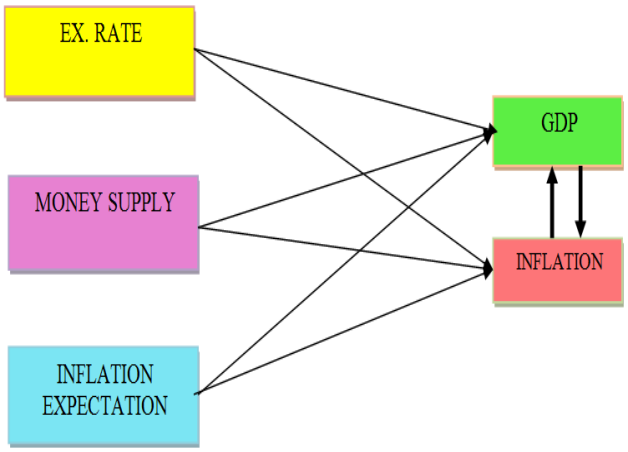

Fig 3:- Conceptual (simultaneous) framework: Monetary Transmission and Inflation Expectations of Economic Stability in IVI countries.

➢ *Observed Parameters*

The parameters observed were the exchange rate variable, the amount of money supply, inflation expectations, GDP, and inflation from several emerging market countries, such as Indonesia, Vietnam, and India from 2000 to 2017.

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NO.	VARIABLE	MEASUREMENT	SCALE
1	GDP	2010 Constant Prices	Ratio
2	INFLATION	consumer price index	Ratio
3	Exchange rate	Rupiah Exchange Rate Against US Dollar	Ratio
4	Total Money Supply	M1	Ratio
5	Inflation Expectations	Monetary Policy Inflation Targets	Ratio

Table 2:- Observation Variable Parameters

➢ *Data Analysis Method*

Simultaneous model equation as follows:

LOG(GDP)=C(11)*LOG(ER)+C(12)*LOG(MS)+C(13)*

LOG(EINF)+C(14)*LOG(INF)+ ε_1

LOG(INF)=C(21)*LOG(ER)+C(22)*LOG(MS)+C(23)*

LOG(EINF)+C(24)*LOG(GDP) + ε_2

where:

GDP = Gross Domestic Product (Billion US $)
ER = Exchange Rate (Country Currencies / US $)
MS = Amount of Money Supply (%)
EINF = Inflation Expectations (%)
INF = Inflation (%)
C(11), C(12), (13) = Constant
α = Regression Coefficient
ε_1 ε_2 = Term Error

Furthermore, simultaneous identification is carried out which aims to find out whether the equation is in one of the following conditions, namely under-identified, correctly identified or over-identified. Koutsoyiannis in Rusiadi (2016) states that for the 2SLS model to be applied to the equation system, the identification requirements must meet the exact criteria or over-identified. Based on the simultaneous conceptual framework and the above equation, the two equations are tested for identification as follows:

Persamaan	K-K	m-1	Hasil	Identifikasi
PDB	5-2	4-1	3=3	*exetly identification*
INF	5-2	4-1	3=3	*exetly identification*

Table 3:- Test equation identification

After knowing that simultaneous identification in the equation is in the exact identified condition, 2SLS simultaneous analysis can be done. The 2SLS simultaneous analysis must meet the classical assumptions where the classic assumptions are used:

- Test data normality
- Autocorrelation test

IV. RESULT AND DISCUSSION

The simultaneous model of the effect of variable two simultaneous equations is performed using the Two-Stage Least Squares model. The estimation results of the equation system with Two-Stage Least Squares are shown in the table below. From the table, it is known that 2 (two) simultaneous model equations:

LOG(GDP)=C(10)+C(11)*LOG(ER)+C(12)*LOG(MS)+

C(13)*LOG(EINF)+C(14)*LOG(INF)+ ε_1

LOG(INF)=C(20)+C(21)*LOG(ER)+C(22)*LOG(MS)+

C(23)*LOG(EINF)+C(24)*LOG(GDP)+ ε_2

System: YCM
Estimation Method: Two-Stage Least Squares
Date: 06/26/19 Time: 12:57
Sample: 1 54
Included observations: 54
Total system (balanced) observations 144

	Coefficient	Std. Error	t-Statistic	Prob.
C(10)	8.241571	0.971173	8.486199	0.0000
C(11)	-0.512230	0.037810	-13.54745	0.0000
C(12)	-1.201942	0.203302	-5.912091	0.0000
C(13)	0.541317	0.105667	5.122838	0.5450
C(14)	0.066611	0.125639	0.530179	0.5969
C(20)	-115.3435	215.6019	-0.534984	0.5935
C(21)	7.188246	12.88777	0.557757	0.5479
C(22)	16.83083	31.27752	0.538113	0.5914
C(23)	-7.598131	13.64415	-0.556878	0.5785
C(24)	14.01795	25.53443	0.548982	0.0039

Determinant residual covariance 0.000927

Equation: LOG(GDP)=C(10)+C(11)*LOG(ER)+C(12)*LOG(MS)+C(13)
*LOG(EINF)+C(14)*LOG(INF)
Instruments: C KURS MS EINF GDP INF
Observations: 54

R-squared	0.835257	Mean dependent var	6.523242
Adjusted R-squared	0.825422	S.D. dependent var	1.573042
S.E. of regression	0.657257	Sum squared resid	28.94314
Durbin-Watson stat	0.436543		

Equation: LOG(INF)=C(20)+C(21)*LOG(ER)+C(22)*LOG(MS)+C(23)
*LOG(EINF)+C(24)*LOG(GDP)
Instruments: C ER MS EINF GDP INF
Observations: 54

R-squared	0.802153	Mean dependent var	1.505714
Adjusted R-squared	0.829147	S.D. dependent var	0.801979
S.E. of regression	9.208071	Sum squared resid	5680.834
Durbin-Watson stat	0.438116		

Table 4:- Estimation Results of the Two-Stage Least Squares Equation

Based on the results of the structural equation output, it can be seen that there are two equations, following each description in 2 equations:

➢ *Equation 1 Test Result*

The first equation is the equation used to find out simultaneously on economic growth and inflation with the following equation as follows:

LOG(GDP)=C(10)+C(11)*LOG(ER)+C(12)*LOG(MS)+ C(13)*LOG(EINF)+C(14)*LOG(INF)+ ε_1

Based on the equation, the results of the eviews output with the Two-Stage Least Square model are as follows:

LOG (GDP) = 8,241 – 0,512*LOG(ER) - 1,201*LOG(MS) + 0,541 *LOG (EINF)+0,066*LOG(INF)+ ε_1

Based on the estimation results above can show that R^2 = 0.835257 which means that the ER, MS, Inflation and Inflation Expectations variables can explain GDP of 83.52% and the remaining 16.48% of GDP is influenced by other variables beyond the estimation in the model. Based on the estimation results obtained by the t-count value, there are 3 (three) variables which significantly affect the GDP variable, namely the Exchange and MS at alpha = 10 %, Exchange rates with prob value 0,000 < 0.10 and MS with prob value 0,000 < 0.10. So that the exchange rate and MS significantly influence the GDP variable.

- *Exchange coefficient*

Based on the regression results it is known that the regression coefficient for an adverse exchange rate of 0.512 means that for every increase of the exchange rate of 1%, the GDP will decrease by 0.512%.

- *JUB coefficient*

Based on the regression results, it is known that the regression coefficient for negative JUB 1.201 means that each increase of JUB by 1%, the GDP will decrease by 1.201%.

- *Inflation Expectation Coefficient*

Based on the regression results it is known that the regression coefficient for a positive Inflation Expectation of 0.541 implies that each increase of the Inflation Expectation of 1% then the GDP will experience an increase of 0.541%.

- *Inflation Coefficient*

Based on the regression results, it is known that the regression coefficient for positive inflation of 0.066 implies that for every increase of inflation of 1%, the GDP will experience an increase of 0.066%.

➢ *Equation 2 Test Result*

The second equation is the equation used to find out simultaneously on economic growth and inflation with the following equation:

LOG(INF)=C(20)+C(21)*LOG(ER)+C(22)*LOG(MS)+ C(23)*LOG(EINF)+C(24)*LOG(GDP)+ ε_2

Based on the equation, the results of the eviews output with the Two-Stage Least Square model are as follows:

LOG (INF) = -115,343 + 7,188*LOG(ER) +16,830*LOG(MS) – 7,598* LOG(EINF) + 14,017*LOG(GDP) + ε_2

Based on the results of data analysis, it is known that it turns out that GDP is significantly affected by the Exchange and the Amount of Money Supply. If the value of a country's currency exchange rate weakens against the US dollar, it will increase the value of a country's exports, because the price of goods will be lower so that it can increase a country's economic growth. It is following research conducted by Jan and Annaria (2015) which states that the exchange rate (exchange rate) partially has a positive but not significant relationship to economic growth.

The influence of the money supply on economic growth that is, if the amount of money held by the public increases, it will increase the purchasing power of the people so that the economic growth of a country will also increase. As research by Ashiddiiqi (2013) states that the money supply has a positive and significant influence on economic growth (GDP) either partially or simultaneously. Based on the results of data analysis, it is known that it turns out that Inflation is significantly affected by Economic Growth (GDP). The influence of inflation on economic growth is inversely proportional or opposite, i.e., if inflation increases, economic growth will decrease, and if Inflation decreases, economic growth will increase.

However, Endut's research (2013) showed that economic growth had a positive and significant effect on inflation. In a study conducted by Endut (2013) inflation that occurred was still at a mild level so that rising inflation still had a positive effect on economic growth. An increase in the level of inflation that is still at a mild level can provide stimulus to producers to increase production. By the law of supply, if the price level rises, the supply will rise, this is what makes producers increase their production. When goods produced in the community increase and prices are still affordable by consumers because the inflation rate is still at a low level, the purchasing power of consumers does not decrease so this can increase economic growth even though the inflation rate increases. The conventional monetary transmission has a continuity with inflation that starts from interest (Magdalena, 2014). The monetary policy transmission mechanism consists of interest, credit, exchange rates, asset prices, inflation expectations. This study uses the interest rate channel, asset prices, and the exchange rate channel (Rusiadi; Novalina, 2017a). Other studies have nothing in common using these three pathways. For example, those using a single channel such as Alani (2016) credit lines, Hussain (2014), Soares (2015), interest lines and using two channels such as Senbet (2016) lines of credit and exchange rates, Sekhposyan (2011), Abubakar (2013), Nijkamp (2011), (Rusiadi; Novalina, 2018). Rosoiu (2012), Tien (2013), Wollmershäuser (2005), interest and credit lines, Rusnák (2012), Vymyatnina (2005), Shenglin (2016), Togatorop (2014), Zega (2009), interest and exchange rates. Using three channels such as Ashiddiiqi (2013), interest, credit and exchange rates, Qurotulaina (2014), Odo (2016), interest, credit and asset prices, Qori'ah (2013) credit lines, asset prices and exchange rates (Rusiadi; Novalina, 2017c) and using four channels such as Oguanobi (2013) interest, credit, asset prices, exchange rates and expectations, Trang (2015), Nwaobi (2014), interest lines, credit, asset prices. Although using the three paths, but not the same path of interest, asset prices and exchange rates, and using the four paths of Trang (2015) and Oliner (2014), but only one country. The reason for using these three asset lines is by setting aside credit lines and expectations, where credit lines in some studies have perfect interactions with interest interactions so that the mechanisms are both equal and representative, Disyatat and Forhad (2017). The expectation pathway also has characteristics with asset prices and inflation itself. (Rusiadi; Novalina, 2017c), Disyatat and Forhad (2017), (Nuryakin and Warjiyo, 2006), Magdalena (2016) concluded that the interest rate channel was a productive path in realizing the ultimate goal of monetary policy. Rosoiu et al. (2015) state that the exchange rate other than interest is the main transmission line and effectively realizes the ultimate goal of monetary policy. Asset prices as one of the transmission can represent the demand and expectations, (Rusiadi; Novalina, 2017b). Minea (2004) chose to emphasize the concept of the mechanism of transmission of the continuation of the exchange rate policy. VAR models (Rusiadi, 2016), (2015),

Zhang (2015), Wollmershäuser (2005), Estrella (2015), Rooiu (2015), Yusuf (2016), Fauziyah (2015), (Rusiadi; Novalina, 2018), Daniar (2016).

V. CONCLUSION

The results showed that there was a simultaneous effect of the exchange rate, the money supply, and inflation expectations on changes in the macroeconomic and macroeconomic stability of the IVI countries. The results showed that macroeconomic variables significantly influence economic stability. The exchange rate, money supply, and inflation expectations have no significant effect on the macroeconomic stability of IVI countries.

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