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Ardl Panel Prediction of Monetary Policy Instrument and Economic Stability of Indonesia, India and Vietnam

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Abstract: *This paper aims to analyze the contribution of changes in macroeconomic instruments due to changes in the instrument of monetary policy with the expectation of inflation that can maintain the economic stability of Indonesia, Vietnam, and India. Data analysis using the ARDL Panel. The results of the ARDL Panel showed Leading indicators of state effectiveness in the stability control of the IVI countries, i.e., India is the exchange rate while Vietnam and Indonesia are exchange rates, JUB and GDP). Leading indicators of the effectiveness of variables in the state's stability control IVI are the exchange rates seen from long-term stability and panel stability, where variable exchange rate significantly affects the stability of inflation in IVI countries.*
Keywords: *exchange rate, ARDL panel, GDP, inflation*

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I. Introduction

Monetary policy has a problem of unsuitable transmission in the achievement of the final target (Bittencourt, 2016). One of the problems is the presence of inaction to fundamental economic stability... A delay effect can occur due to barriers from other macroeconomic variables (Natsir, 2011). Flowers can influence the occurrence of the delay effect (Wróbel,2013). Wimanda (2015) The exchange rate affects the success of monetary policy. Monetary transmission is crucial in maintaining economic stability (Rusiadi; Novalina, 2018). Onyeiwu (2012) concluded exports as a variable capable of affecting final target intercessions. Alfian (2011) The asset line affects economic growth and inflation. Natsir (2015) which demonstrates the workforce and exports of net affect economic growth. Silvia (2013) Exports and investments are capable of affecting economic stability... Indonesia rose to rank fifth because of rising chemical product growth, as well as manufacturing of industrial and financial services (Watson,2018). The increase in inflation as an indication of economic stability experienced that was experiencing interference. Therefore, in the case of price disorders, the Government should be able to control inflation fluctuations so as not to disrupt the economy. As the importance of inflation control, the government or the finance minister, in this case, needs to set a target for inflation. According to Warjiyo, (2003) inflation targeting is a framework for monetary policy characterized by announcements to the public about the inflation target number in a period. High inflation can lead to a worsening of revenue distribution which means it will also increase the poverty rate, reducing the deposit savings that are the emerging source of investment, causing the trade balance deficit, To inflate the magnitude of the foreign debt and can cause political instability (Sukirno, 2000). Given the ability to discuss inflation, it is no wonder that BI has set it as the final goal in implementing its monetary policy.

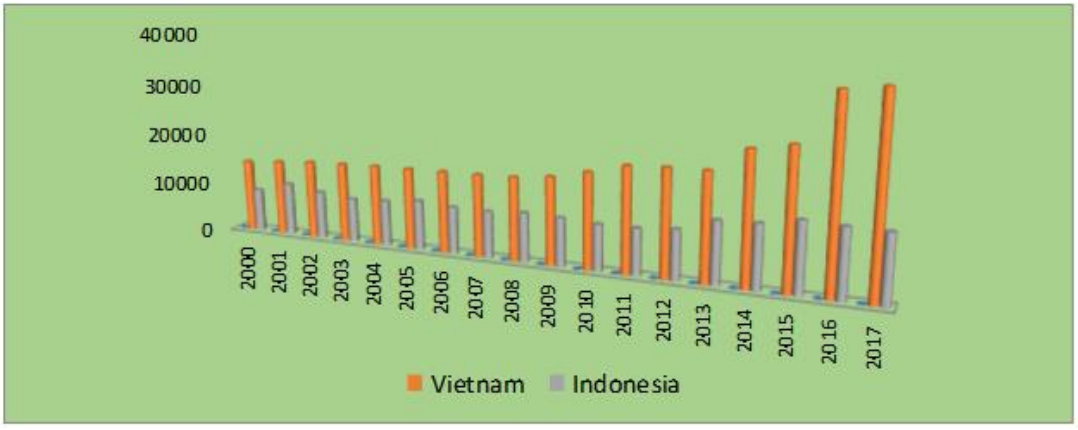

Figure 1: The development of the exchange rate

According to table 4.3 and chart 4.3 above the rate value in Indonesia increased by 1869 rupiah in 2001, the rate of the year is 10265 Rupiah/US $ where the previous year or the year 2000 is 8396 Rupiah/USD, this Indicates that the rupiah exchange rate is appreciated against the US Dollar. The increase in the rate was due to increased inflation in the same year; this increase resulted from the president's policy of 2 times the premium price increase. Starting from the year 2003, the exchange rate of the Indonesian currency has always increased or appreciated by US $. With the value of increasing the rupiah rate which is high enough 3011 Rupiah/USD in 2013, the rate of the year is 12189 Rupiah/USD where the previous year or the year 2012 amounted to 9178 rupiah/USD, this is the increase in the most rupiah From the year before. As with Indonesia, the value of currency exchange in Vietnam or Dong against US $ is also increased or appreciated from year to year. Where an increase in Dong exchange rate against the highest US dollar occurred in 2011, with an increase of 1898 Dong/USD, Dong's rate of 20510 Dong/USD in the previous year or 210 amounted to 18613 Dong/USD. In India in 2001 the value of the currency was appreciated to 68.23 rupees/US $, where the previous year was 63.53 rupees/US $. In 2003 to 2017 the value of the Indian currency or rupees has always been depreciation.

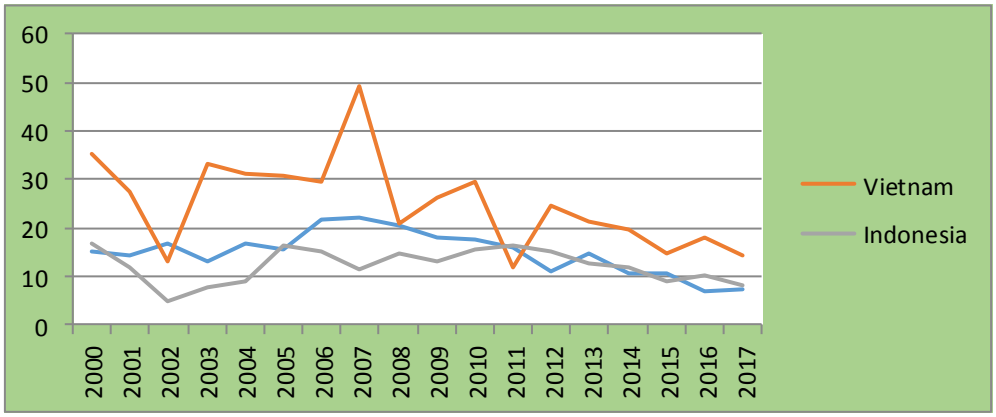

Figure 2. Growth in the amount of money supply

Based on the data, it is known that the graphs emerging from each country form a diverse fluctuation. In India's country, the money supply in 2000 to 2007 tends to increase, from the range of 15.17% to 22.27%, but in 2007 to 2011 the decline was decreased by the amount of 22.27% declining to 11.05%. For the country of Vietnam the amount of money is circulating is high enough where the highest increase occurred in the year 2007 IE at 49.106%. In Indonesia the amount of money supply is not too high, but in the year 2002 there is a decrease in the amount of money supply is very drastic that is 4.74%. The previous year was 11.87%. And in the following year or year 2003 the amount of money supply began to increase. But the increase is not too high. Hülsewig (2010) The rising impact of the Bungan tribe will increase prices and economy in general. Natsir (2011) Interest rates functioned effectively operational objectives. Sitaresmi (2005) The reliability of the use of interest rate lanes in the pursuit of inflation policy targets. The tightening to the interest rate can also protect the price volatility of Hussain (2014), Hsing (2015) and Wróbel (2016). Monetary policy should facilitate profitable investment climate through appropriate interest rates, exchange rate management mechanisms and liquidity and money market. (Onyeiwu,2012). Interest rates are largely linked to price increases. The existence of functional interest rates in the Zambia economy (Sheefeni,2013).

II. Heading

Integration Model uncertainty and credibility of monetary transmission instruments. Monetary policy credibility implies the effectiveness of monetary policy activism. Conversely, the uncertainty of monetary policy implies monetary policy conservatism. The integration of credibility and uncertainty models states that effective monetary policy is a partial monetary policy or discretion due to the influence of uncertainties the shock of money market turnover. The integration of the uncertainty model and the credibility of the monetary policy requires rational expectation inputs, the uncertainty of the transmission of monetary policy instruments, and partial monetary policy effectiveness or discretion. At Stage 3, monetary policymakers chose the optimal monetary policy [mP] before knowing the realization of the monetary policy instrument [C]. For equation (1.4) against uncertainty parameters [C] Air using operator expectation is

$$E_c(L) = E_c\left[[\beta(c\ m^P - v - E(\pi)) - \beta\ y_T]^2 + A\ [c\ m^P - v]^2\right]$$

$$\frac{\partial E_c(L)}{\partial c} = 2\beta^2 c\ [c\ m^P - v - E(\pi)] - 2\beta\ y_T + 2A\ c\ [c\ m^P - v] = 0$$

$$(\beta^2 c^2 + A\ c^2)\ m^P = (\beta^2\ c + A\ c)\ v + \beta^2\ c\ E(\pi) + \beta\ y_T$$

$$(\beta^2 + A\ )\ (1+\sigma_c^2)\ m^P = (\beta^2 + A)\ v + \beta^2\ E(\pi) + \beta\ y_T$$

$$m^P = \frac{\beta\ y_T + \beta^2 E(\pi) + (\beta^2 + A)\ v}{(\beta^2 + A)\ (1+\sigma_c^2)} \qquad (1.13)$$

At Stage 2, the inflation expectation balance is obtained from the equation (1.3) with the expectation operator E (v) = 0, namely:

$$E(\pi) = E_{c,v}(m^P)$$

$$E(\pi) = \frac{\beta\ y_T + \beta^2 E(\pi)}{(\beta^2 + A)\ (1+\sigma_c^2)}$$

$$E(\pi) = \frac{\beta\ y_T}{A\ (1+\sigma_c^2) + \beta^2\sigma_c^2} = IB \succ 0 \qquad (1.14)$$

Where IB is a bias inflationary. The substitution equation (1.14) returns to the equation (1.13) generates an optimal monetary policy, namely:

$$m^P = IB + \frac{v}{1+\sigma_c^2} \qquad (1.15)$$

He equation (1.15) explains that the optimal monetary policy consists of two parts. Firstly, the mP and IB values describe inflationary bias will reduce social welfare due to positive value. From the equation (1.14) It is shown that the higher degree of reluctance to inflation [A] the lower the bias inflationary [IB]. Inflationary also influenced by the precision of monetary policy instruments [q2c], the higher the precision of the monetary policy instrument, the higher the bias inflationary. If the precision of the monetary policy instrument is getting lower then the conservatism the use of monetary policy instruments is getting higher, otherwise, if the precision of the monetary policy instrument is getting higher then the activism of monetary policy instruments The higher. Thus the activism of monetary policy instruments is measured by the IB, where the IB depends on the degree of reluctance to inflation [A] and the uncertainty of the mechanism of the monetary policy transmission [q2c].

III. Indentations And Equations

This method of study uses quantitative material with simultaneous model approach and ARDL Panel. The quantitative material in this study is related to variable data observed by the exchange rate, money supply, expectations of inflation, GDP and inflation from several Emerging Market countries namely Indonesia, Vietnam and India (IVI) year 2000 S/d 2017. Then this conceptual research can be described as follows:

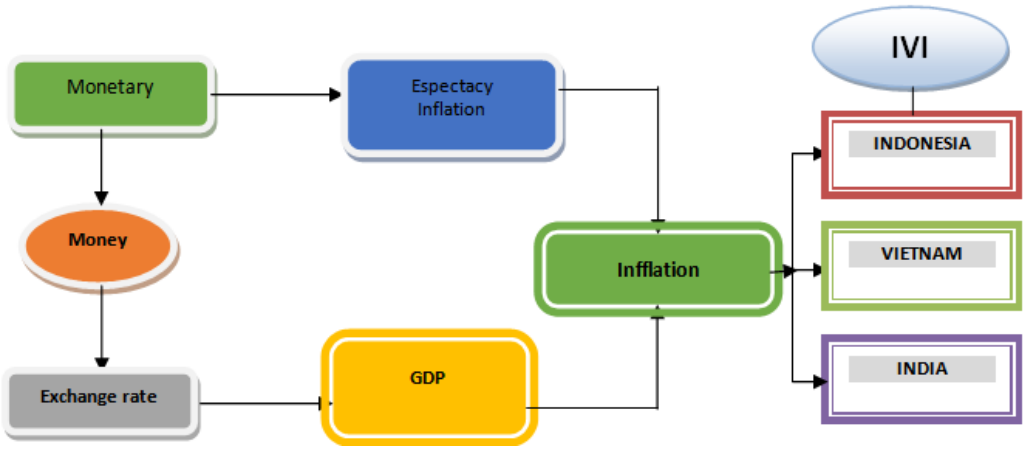

Figure 3. Thinking Framework: Monetary transmission

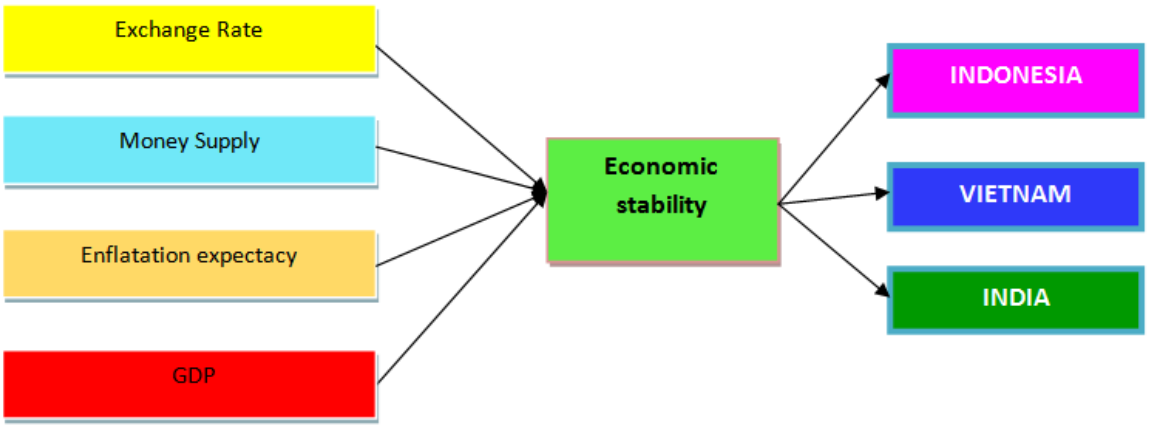

Figure 4. Conceptual Framework (panel): a Leading indicator of inflation in IVI country

Data Analysis Methods

The determination of the credibility of achieving the final target of Indonesia, India, and Vietnam's monetary transmission is used to approach the ARDL Panel. To obtain the estimated individual characteristics individually by assuming the presence of cointegration in the long-term lag of each variable. An autoreactivity Distributed Lag (ARDL) introduced by Pesaran et al. (2001). This technique examines each variable lag located on I (1) or I (0). In contrast, the ARDL regression is a test statistic comparing the two critical values of asymptotic.

Credibility Model = $E_{CE}(L) = y_T^2 + A\ [m^P]^2$

Uncertainty Model = $L_{UC} = \left[\frac{\beta^2}{(\beta^2 + A)\ (1+\sigma_c^2)} + 1\right] \left(\beta\ E(\pi) + y_T\right)^2$

The transformation of econometrics equations:

INFit = α + β1KURSit + β2JUBit + β3EINFit + β4PDBit + β5PDBit + E

Here's the formula based on country:

INFINDONESIA = α + β1KURSit + β2JUBit + β3EINFit + β4PDBit + β5PDBit + E

INFVIETNAM = α + β1KURSit + β2JUBit + β3EINFit + β4PDBit + β5PDBit + E

INFINDIA = α + β1KURSit + β2JUBit + β3EINFit + β4PDBit + β5PDBit + E

The ARDL Panel model received is a model that has a cointegrated lag, where the main assumption is the coefficient value of the Short Run Equation has negative slope with a significant rate of 5%. ARDL Panel Model Requirements: The value is negative (-0.597) and is significant (0.012 < 0.05) then the model is accepted. Test Stasioneritas. Test the station is done to see if the data time series contains the root unit. Test cointegration Lag. This approach is known as a boundary test co-integration procedure or a distributed lag (ARDL). The main advantage of this approach is to eliminate the need for variables into I (1) or I (0).

IV. Figures And Tables

Analysis panel with Auto-Regressive distribution Lag (ARDL) test pooled data that is combined data cross-section (country) with Data time series (yearly), the results of the ARDL panel is good more compared with ordinary panels, because it is capable of long-term integration and has the highest distribution of lag in accordance with the theory, using the Eviews 10 software, obtained the following results:

Tabel 1: *Output* Panel ARDL

Dependent Variable: D(INF)
Method: ARDL
Date: 06/27/19 Time: 20:19
Sample: 2001 2017
Included observations: 51
Dynamic regressors (1 lag, automatic): KURS JUB LNEINF LNPDB
Fixed regressors: C
Number of models evaluated: 1
Selected Model: ARDL(1, 1, 1, 1, 1)
Note: final equation sample is larger than selection sample

Variable	Coefficient	Std. Error	t-Statistic	Prob.*

	Long Run Equation			
KURS	-0.000521	0.000440	-1.184088	0.2451
JUB	-2.82E-05	0.000187	-0.150723	0.8811
LNEINF	10.48541	6.357869	1.649201	0.1089
LNPDB	-3.034102	1.051844	-2.884554	0.0070
	Short Run Equation			
COINTEQ01	-0.572076	0.260262	-2.198075	0.0353
D(KURS)	-0.023103	0.023840	-0.969117	0.3398
D(JUB)	0.042999	0.111250	0.386509	0.7017
D(LNEINF)	-16.02342	24.31330	-0.659039	0.5146
D(LNPDB)	21.24855	16.42400	1.293750	0.2050
C	-39.33820	18.73100	-2.100166	0.0437

Mean dependent var	0.100000	S.D. dependent var	4.467924
S.E. of regression	2.941831	Akaike info criterion	4.910159
Sum squared resid	276.9398	Schwarz criterion	5.720486

The ARDL Panel model received is a model that has a lag of integration, where the main assumption is the value of coefficient has a negative slope with a significant rate of 5%. ARDL Panel Model Requirements: The value is negative (-0.57) and is significant (0.03 < 0.05) then the model is accepted. Based on the model acceptance, the data analysis is done by the panel per country.

A. National Panel of India analysis

Table 2: Indian state ARDL Panel Output

Variable	Coefficient	Std. Error	t-Statistic	Prob. *
COINTEQ01	-0.074773	0.021203	-3.526494	0.0387
D(KURS)	-0.070764	0.075894	-0.932410	0.4199
D(JUB)	0.253662	0.017751	14.29040	0.0007
D(LNEINF)	-62.30469	4978.079	-0.012516	0.9908
D(LNPDB)	51.90411	4557.134	0.011390	0.9916
C	-2.900670	47.44627	-0.061136	0.9551

ARDL panel test results show:

1) The exchange rate does not significantly affect inflation, judging at the probability value sig 0.41 > 0.05.
2) JUB is significant in influencing inflation, seen in the value of the probability sig 0.00 < 0.05.3) Inflation expectations are not significant in influencing inflation, seen at a probability value sig 0.99 > 0.05.
4) GDP is not significant in influencing inflation. It can be seen at a sig probability value of 0.99 < 0.05.

B. Vietnam State Panel Analysis

Table 3: The Output of Vietnam's ARDL Panel

Variable	Coefficient	Std. Error	t-Statistic	Prob. *
COINTEQ01	-0.687585	0.044528	-15.44154	0.0006
D(KURS)	-0.000431	2.50E-07	-1725.770	0.0000
D(JUB)	-0.000319	1.25E-08	-25457.42	0.0000
D(LNEINF)	20.03785	84.82315	0.236231	0.8285
D(LNPDB)	-4.297872	3.508643	-1.224938	0.3080
C	-50.02167	1979.818	-0.025266	0.9814

ARDL panel test results show:

1) The exchange rate significantly affects inflation
2) JUB significantly in influencing inflation.
4) GDP does not significantly affect inflation

Table 4: Output of the state ARDL Panel Indonesia

Variable	Coefficient	Std. Error	t-Statistic	Prob. *
COINTEQ01	-0.953869	0.081257	-11.73886	0.0013
D(KURS)	0.001885	1.85E-05	101.6807	0.0000
D(JUB)	-0.124345	0.024085	-5.162789	0.0141
D(LNEINF)	-5.803433	2434.240	-0.002384	0.9982
D(LNPDB)	16.13941	55.65045	0.290014	0.7907
C	-65.09227	2276.566	-0.028592	0.9790

ARDL panel test results show:
1) The exchange rate significantly affects inflation.
2) JUB significantly in influencing inflation.
4) GDP is not significant in influencing inflation.
Based on the overall results, it is known that a significant only in the long term affects the stability of country IVI inflation, i.e. GDP. While in the short term there is no impact on the stability of inflation. The leading indicator of the effectiveness of variables in IVI state stability control, i.e., the amount of money supply that is viewed in a panel, where the variable amount of money supply significantly panels in controlling the economic stability. Leading indicators of the country's effectiveness in the stability control of IVI countries, i.e. India (amount of money supply), Vietnam (exchange rate and amount of money supply) and Indonesia (exchange rate and amount of money supply). In panel the amount of money supply can be a leading indicator for the control of India, Vietnam, and Indonesia, but its position is unstable in the short run and long run.
Based on the overall results are known that the sign in the long term affects the inflation stability of IVI countries, i.e., exchange rate, amount of money supply, inflation expectations and GDP. Then in the short term only flowers are affecting the stability of inflation. Here's a summary of ARDL Panel results table:

Table 5. ARDL Panel Summary

	INDIA	VIETNAM	INDONESIA	Short Run	Long Run
Exchange rate	0	1	1	0	0
Money Supply	1	1	1	0	0
Inflation expectations	0	0	0	0	0
GDP	0	0	0	0	1

Figure 5. Control timeframe stability

Analysis of the ARDL panel proves:
1. The leading indicator of the country's effectiveness in the stability control of IVI countries, namely India (exchange rate) and Vietnam and Indonesia (the exchange rate and amount of money supply and GDP). Monetary policy with a monetary pricing approach can have an effective effect on controlling the inflation rate through the interest rate and exchange rate channels (Nguyen, 2015). The contractual monetary policy has a strong and negative effect on the output, indicating that it can rely on unexpected macroeconomic shocks even when the financial markets have not been well developed. We also demonstrate that such monetary policy shocks tend to stabilize inflation in India, albeit at a higher rate because of inflation driven by supply amid massive spikes in food and fuel prices while producing a very persistent negative effect on real equity prices. (Mallick, 2011).

2. In the panel the amount of money supply is also able to be a leading indicator for the control of India, Vietnam, and Indonesia but its position is unstable in the short run and long run. Interest rate relations with inflation can be seen from the Fisher effect theory stating that if there is a one percent increase then inflation will also increase by one percent (Putong, 2008). 3. The leading indicator of the effectiveness of the variable in the stability control of IVI country, i.e., the exchange rate seen from the panel, where the variable exchange rate significantly affects the stability of inflation in the country IVI. The determination of exchange rate as leading indicator country IVI also supported the opinion of Maryatul (2016) stating that in the agreement of the exchange rate variable began to affect the inflation movement entered the second period. Then in line with research Marlia (2014) stating that the rupiah exchange rate has a negative and significant relationship to inflation is depreciation of rupiah exchange rate against foreign currency especially the US dollar will cause Increase in the inflation rate, otherwise appreciation of the rupiah exchange rate against the American dollar caused a decline at the inflation rate. The results of this study were also reinforced with the purchasing power parity theory which expresses positive relations between exchange rates and inflation.

V. Conclusion

Based on the results of analysis and discussion that has been done using the ARDL panel method can be concluded: a Leading indicator of State effectiveness in the stability control of IVI countries, namely India (exchange rate) and Vietnam and Indonesia (And the amount of money supply and GDP). Leading indicators of the effectiveness of variables in the state's stability control IVI are the exchange rates seen from long-term stability and panel stability, where variable exchange rate significantly affects the stability of inflation in IVI countries.

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