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by Wisnu Wibowo

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Transparency in the Central Bank and the Mechanism of Transmission of Interest Rates: Case Study of Asia-Pacific Countries

Wisnu Wibowo^a, Adilah Ayu Rosyidah^b, ^{a,b}Department of Economics, Faculty of Economics and Business, Universitas Airlangga Campus B Universitas Airlangga, Jln. Airlangga No.4 Surabaya – Indonesia,

This study aims to determine how the impact of transparency in the central bank in monetary policy transmission mechanism through interest rates can influence the ultimate goal in the form of price stability. The results of this study can also be used to determine whether monetary policy that uses interest rates affects the rate of inflation occurring in countries in the Asia-Pacific region, as well as to see whether the monetary policy transmission mechanism can be used in accordance with the theory of transmission mechanism through the interest rate. Panel data were collected yearly from 1998-2014 and estimated using PVAR (Panel Vector Auto Regression) analysis method. The results of this study indicate that the monetary policy transmission mechanism used in the Asia-Pacific region proves to be relevant to the theory of transmission mechanisms through the interest rate channel. The ultimate goal of price stability is also proven to be achieved. The result is shown by the result of estimation from PUAB interest rate and lending rate which proved to be a statistically significant negatively affect the inflation rate. Meanwhile, based on the results of impulse response, this study found that the existence of central bank transparency causes fluctuating inflation rate.

Key words: *Central bank transparency, PVAR, monetary policy transmission mechanism, PUAB interest rate channel, inflation rate.*

Background

Over the past two decades the Inflation Targeting Framework (ITF) has become a topic which often discussed by economists and monetary policy makers in almost all countries of the world (Papadamou, Sidiropoulos, & Spyromitros, 2015). In general, according to (Pohan, 2007), the



ITF policy framework has characteristics in which the central bank must be independent or in other words the central bank must be free from government intervention to regulate and formulate monetary policy. In addition, the ITF policy framework should also be forward looking as monetary policy focusing on inflation targets is a non-reactive, anticipatory policy of future inflationary pressure.

Furthermore, the achievement of ITF policy is also influenced by the high transparency of the central bank (Warjiyo, Juhro, Warjiyo, & Juhro, 2019). The central bank is required to publicly announce the direction and objectives of monetary policy as well as future macroeconomic targets to be achieved with a view to shaping public expectations and understandings to fit the central bank. (Van der Crujisen & Demertzis, 2007) argue that the increasing levels of transparency in formulating monetary policy will be consistent with the strengthening anchors of expectations of macroeconomic variables.

Up until now, the measure of central bank transparency remains a debate among policy makers and economists. The debate is increasingly complex because in reality transparency is a qualitative measure so it is difficult to measure and determine precisely the level of transparency of the central bank in monetary policy (Eijffinger & Geraats, 2006). (Papadamou et al., 2015) in his research defines transparency with two methods. The first method is to examine the period in which a country starts implementing the ITF policy framework because in principle the ITF demands high transparency from the central bank. The second method looks at the central bank transparency level of the transparency index developed by Eijffinger and Geraats.

According to (Eijffinger & Geraats, 2006) central bank transparency has several aspects that can be used as an indicator to determine the level of its openness to the public. Eijffinger and Geraats then divide that aspect into five categories. The five categories consist of: 1) political transparency: – openness about policy objectives; 2) economic transparency : – openness about data, model and forecasting forward; 3) transparency process: – openness about decision direction made and achieved throughout report and declarations; 4) policy transparency: – openness about policy implications and achieved through announcements and appropriate explanations of decisions made; and 5) operational transparency: – openness about the implementation of decisions made or in other words, controlling errors and macroeconomic disorder.

The same is also shown in a study conducted by (Cecchetti & Krause, 2002). In their research, Cecchetti and Krause found that central banks that have high levels of transparency have better performance to control macroeconomic variables. This occurs because everyone has clear information, so they can make better decisions and economies can run efficiently (Herianingrum et al., 2019).



However, not all economists agree with it. According to (Amato, Morris, & Shin, 2002) the existence of transparency in monetary policy in addition to providing benefits can also harm the economy of the country concerned. Morris and Shin found that when the information provided by the central bank to the public is too much (noisy information), it will cause confusion in the private sector. As a result, economic uncertainty will increase.

This is motivated by two factors, that is the effectiveness of the news delivered and the level of credibility of the central bank (Amato et al., 2002) when the news is delivered effectively or the news contains positive things, such as inflation in the future tends to be stable, then the news will shape positive public behaviour as well, so that future inflationary developments will be also stable. In addition, the effectiveness of news is also supported by the level of credibility of the central bank against established policies. When the central bank is not credible about the information it submits, it will trigger the public to distrust the information provided. As a result, the public will react negatively.

This study focuses on countries in the ASEAN and Asia-Pacific region by including Japan and South Korea. The selection of these two countries is due to the main focus of this study being to analyse the impact of the transparency of the central bank in monetary policy, so that this study chooses a country with a consistent transparency level that remains high. The high level of transparency is reflected of the transparency index value published by (Born, Ehrmann, & Fratzscher, 2014). The following Table 1 shows the development of the transparency index that occurs in the countries of the Asia Pacific region.

**Level of Transparency of Central Banks in Asia-Pacific Region Countries Period 1998-2014****Table 1:** Development of the transparency index that occurs in the countries of the Asia Pacific region.

	Indonesia *	Malaysia *	Thailand *	Philippines *	Singapore *	Cambodia	Laos	Korea Selatan *	Japan *	China	Macau
1998	3	4.5	2	3.5	2.5	2	0	6.5	8	1	3
1999	4.5	4.5	2	5	4	2	0	6.5	8	1	3
2000	4.5	6	6	5	4	2	1.5	8	8.5	1	3
2001	4.5	6	6.5	6	4	2	1	8.5	8	1	3
2002	4.5	6	8	10	3	2	1.5	8.5	8	1.5	3
2003	7	6	8	10	4.5	2	1.5	8.5	8	3.5	4.5
2004	8	6	8	10	4.5	2.5	1.5	8.5	9.5	3.5	4.5
2005	8	6	8	10	5.5	2.5	1.5	8.5	9.5	3.5	4.5
2006	8.5	6	8	10	5.5	2.5	1.5	8.5	9	3.5	4.5
2007	8.5	6	8	9	5.5	2.5	1.5	8.5	9	3	4.5
2008	8.5	6	8.5	9	5.5	2.5	1.5	8.5	10.5	3	4.5
2009	8.5	6	8.5	9	5.5	2.5	1.5	8.5	10.5	3	4.5
2010	9	6	8.5	10	5.5	2.5	1.5	9.5	10.5	3	4.5
2011	9	6	10	10	5.5	2.5	1.5	9.5	10.5	3	4.5
2012	9	6	10	10	5.5	2.5	1.5	9.5	10.5	3	4.5
2013	9	6	10	10	5.5	2.5	1.5	9.5	11.5	3	4.5
2014	9	6	10	10	5.5	2.5	1.5	9.5	11.5	3	4.5

In this research, exploration will be done by using VAR panel approach to central bank transparency level in monetary policy by using basic analysis of transmission mechanism on interest rate channel. The channel of the transmission mechanism through the interest rate channel can explain how monetary policy can affect the expectations of the behaviour of economic actors against future inflation through the interest rates announced by the central bank. The change in interest rates is expected to change the cost of lending or income from



savings that will subsequently affect investment, credit growth, consumption, and prices as a whole.

Literature Review

Theoretical Basics

Monetary policy

(Berner, Cecchetti, & Schoenholtz, 2019) in his book "Money, Banking, and Financial Markets" said that monetary policy is the ability of the central bank to control the development of money and credit in an economy by using monetary quantities to achieve economic development activities which are desired. In this case does monetary amount affect the actions that can affect interest rates, the amount of credit and the money supply. The actions of the central bank will ultimately impact not only on financial markets but also on aggregate output and price stability or inflation.

In some literature, generally monetary policy is divided into two types, expansionary monetary policy and contractionary monetary policy. According to (Warjiyo et al., 2019) expansive monetary policy is a monetary policy conducted by the central bank to encourage the economy, which is done by increasing the money supply or lowering interest rates. Expansionary policies are made when the economy is in a recession or depression or slump condition, with the aim that the economy can recover more rapidly. In contrast, (Warjiyo et al., 2019) contractionary monetary policy is a monetary policy aimed at slowing the economy, which is done by reducing the money supply or raising the interest rate. The contractive policy is applied when the economy is experiencing a boom (rapid economic development). This policy was taken with the aim of avoiding overheating (heating of economic activities).

Monetary policy is applied with a view to achieving a specific final target. The final targets generally consist of several final objectives: economic growth and equity of income, high employment provision, price stability, financial market stability, interest rate stability, and stability in the foreign exchange market (Mishkin, 2008). However, almost all of the world's central banks cannot simultaneously reach the ultimate goal optimally. This is due to the contradiction between the achievement of one goal with another purpose. In recognition of the trade off in achieving the ultimate goal, the central bank faces two alternatives: choosing one of the final objectives to be achieved optimally by ignoring the other final goal, or the central bank may choose to keep all the final goals achievable but none of the final objectives is achieved optimally (Warjiyo et al., 2019).



Mechanism of Monetary Policy Transmission

The monetary policy transmission mechanism is a process of monetary policy to influence the economy at large. Specifically, (Warjiyo et al., 2019) divide the monetary policy transmission mechanism into two: the transmission mechanism through direct and indirect channel. Direct transmission mechanism is a monetary policy mechanism or process whereby money supply instruments are used to achieve the ultimate goal. Under this mechanism, in the short run the money supply will only affect the development of real output. Furthermore, in the medium run, the growth of the money supply will lead to an increase in price (inflation) which ultimately leads to a decrease in the development of real output to its original position. Meanwhile, in the long run, the growth of the money supply has no effect on the real output but will push the price increase proportionally (Warjiyo et al., 2019). Then for the mechanism of transmission of monetary policy through the indirect channel, (Pohan, 2007) divides it into four lanes. These four channels include: interest rate channel, asset price channel, credit line, and community expectations channel.

Transmission Mechanisms Through Line of Interest Rate

The transmission mechanism through the interest rate channel emphasizes that monetary policy can affect aggregate demand through interest rate changes. (Mishkin, 2008) says that expansionary monetary policy will lead to a decrease in real interest rates. The decline in real interest rates will then be transmitted to consumption and investment demand. The influence of interest rate on consumption is closely related to the role of interest rate as income of society from deposit (income effect) and interest of credit as source of consumer financing (substitution effect). Meanwhile, the effect on investment occurs because the interest on credit is a component of capital cost (cost of capital). Furthermore, the effect of changes on investment and consumption will have an impact on aggregate demand (AD) which will ultimately affect the real output. Systematically this is as follows:



Source: Mishkin (2008)



Mechanism of Transmission of Monetary Policy through Interest Rate Channel

According to (Mishkin, 2008) the most important feature of this mechanism is real (not nominal) interest rate as the interest rate that affects consumer and business decisions. In addition, long-term real interest rates (not real short-term interest rates) are also considered to have a major impact on spending. Assume prices are rigid, so expansive monetary policy that lowers short-term nominal interest rates also lowers short-term real interest rates. Based on the expectation hypothesis that long-term interest rates are the expected future short-term interest rates, this suggests that lower short-term interest rates lead to a decline in long-term real interest rates. As a result, it will encourage investment and consumption, which will eventually increase aggregate output.

Inflation Targeting Framework (ITF)

(Warjiyo et al., 2019) stated that the Inflation Targeting Framework (ITF) is a monetary policy framework which has the main characteristics of an official statement from the central bank that the ultimate goal of monetary policy is to achieve and maintain a low inflation rate, as well as a press release of the inflation target to public. The press release implies that the central bank gives commitment and assurance to the public that every policy which is taken always refers to the achievement of the final target. This policy framework is also believed to be able to help the central bank to achieve and maintain price stability by explicitly targeting monetary policy targets based on specific inflation projections and targets. In addition, through the ITF, public and business expectations can be controlled, thus reducing the risk of unwanted price increases. As a result, this will encourage increased business activities and the economy as a whole (Pohan, 2007).

(Mishkin, 2008) says that inflation targeting includes several elements. These elements are: public release of medium-run of numerical targets for inflation, institutional commitment to price stability as the primary and long-run goal of monetary policy and commitment to achieving inflation goals, information where many variables (not just monetary aggregates) are used in decision making on monetary policy, transparency of improved monetary policy strategies through public and market communication regarding the plans and objectives of monetary decision makers, and central bank accountability increased to achieve inflation goals.

According to (Warjiyo et al., 2019) there are three assumptions underlying the ITF policy framework. First, the high inflation rate is a form of costs to be borne by the economy in the form of low economic growth and declining real value of national income. Second, monetary policy through the control of money supply cannot affect the growth of output in the long run. Third, inflation control is a monetary policy in order to stabilize and decrease the inflation rate in the long-run rather than in the short-run. In addition, for the achievement of ITF successfully



applied, there are several requirements that must be achieved: central bank independence in implementing monetary policy, implementation of floating exchange rate policy, the existence of price indicators relevant to good inflation methodology, and the absence of fiscal sector dominance.

Like most monetary policies, the ITF also has its advantages and disadvantages as a policy framework. (Mishkin, 2008) mentions there are four advantages possessed by ITF: ease and clarity of the target, does not depend on the relationship of money and stable inflation, central bank accountability increases, and the impact of inflationary shock is reduced. In contrast, the ITF also has three weaknesses: late signals on target achievement, may impose rigid rules (though not in practice), and large output fluctuations if only focus is on inflation.

Targeting Inflation through Interest Rate Channel

Because inflation is not directly under the control of the central bank, to reach the targeted inflation rate, suggests using the rule of interest rates to change aggregate demand. This is also in line with those suggested by (Islam & Hossain, 2015). According to Hossain the central bank can apply Taylor's rate rule to run monetary policy. The following systematic rules of interest rates:

$$i_T = i_T + \alpha (\pi_t - \pi_T) - \beta (u_t - u_n)$$

i_t = nominal interest rate

i_T = interest rate target

α and β = positive coefficient

π_t = inflation rate

π_T = inflation target

u_t = unemployment rate

u_n = natural unemployment rate

The interest rate rules as defined in the above equations can be interpreted as follows: If the inflation (π_t) = inflation target (π_T), and the actual unemployment rate (u_t) equals the natural unemployment rate (u_n) or $u_t = u_n$, then the central bank should set the nominal interest rate as the interest rate target. For example, assumed in the medium run, the real interest rate is the same as the real natural interest rate, so that the nominal interest rate can be driven to move in tandem with the inflation rate. If the real natural interest rate is 2% and the inflation target rate is 2%, then the target nominal interest rate is: $i_T = \pi_t + \pi_T = 2\% + 2\% = 4\%$. If the inflation target is 0%, then the target interest rate is: $i_T = \pi_t + \pi_T = 2\% + 0\% = 2\%$. If the actual inflation is higher than the target ($\pi_t > \pi_T$), then the central bank should raise the interest rate above i_T . Higher interest rates will increase the unemployment rate, which further lowers inflation. If the actual unemployment rate is higher than the natural level ($u_t > u_n$), then the central bank should



raise the nominal interest rate. This higher nominal interest rate will lead to increased unemployment, which further reduces inflation.

Central Bank Transparency

According to (Warjiyo et al., 2019) the central bank is said to be a good institution if its existence can be trusted by the public and can do its job well. Therefore, transparency of the central bank is essential so that all monetary policies can be publicly disclosed and they can exercise oversight of their performance. Transparency is a way for the central bank to communicate the intent of tactical selection or strategy for its monetary policy aimed at the market with a view to improving the effectiveness of monetary policy (Dincer & Eichengreen, 2013).

According to (Pohan, 2007) it will help the understanding of economic factors about how the central bank and how the economic conditions work, and how monetary policy affects output and prices. In practice, transparency of central bank policy is reflected in the form of regular publications such as inflation reports, press releases, minutes of meetings, speeches publications and other research results. Furthermore, the materials communicated must cover at least some aspects, including the objectives of the central bank, the goal achievement strategy, the tools used to make projections and the model used and the monetary policy response (Pohan, 2007).

Methodology

Research Approach

Based on research variables and models, this study uses two types of quantitative approaches: a descriptive quantitative approach and inferential quantitative approach. A descriptive quantitative approach is used to describe the condition of countries in the Asia-Pacific region in general, such as the form of applied monetary policy, the coordination of monetary policy, the figure of the financial system, the trend of inflation and the economic growth that occurs. The inferential quantitative approach is used to describe the estimation results of the regression results using the VAR panel data which will then be interpreted to produce a certain conclusion from the results of the research conducted. To support an inferential quantitative approach to obtain the best results, this study used the software stata.13 (Sukmana & Kassim, 2010).

Identify Variables

Based on the model that has been formulated, this research uses five variables that are endogenous and then divided into three models. The first model consists of economic variables,



such: CPI (Consumer Price Index), Interbank Money Market rate (rPUAB), and lending rate (lending rate). Furthermore, for the second and third models, the variables used are economic variables (CPI and lending rate) as well as variables that explain the impact of transparency of the central bank on shocks that occur in the PUAB rates (Weber, 2019). In the second model, this study included a period in which the central bank's transparency level is still low (LT_rPUAB) to the shocks that occur in the interbank rates. In contrast, the third model includes the period in which the central bank's transparency level has been said to be high (HT_rPUAB) to the shocks that occur in the PUAB rates (Montes & de Oliveira, 2019).

Types and Data Sources

This study uses secondary data using panel data regression, so the secondary data is divided into two, the time series data with the period from 1998-2014, and cross section data consisting of 7 Asia-Pacific countries such Indonesia, Malaysia, Thailand, Philippines, Singapore, South Korea and Japan (Rai, Seth, & White, 2019). This research obtained data from various sources, including International Financial Statistics (IFS) published by International Monetary Fund (IMF), World Development Indicators (WDI) published by World Bank, and central bank transparency index published by (Eijffinger & Geraats, 2006) and (Dincer & Eichengreen, 2013).

Results and Discussion

Development of the Central Bank's Transparency Level in Each Country in the Asia-Pacific Region

According to (Pohan, 2007) within the framework of inflation targeting policy (ITP) central bank transparency is one of the most important aspects in the system. The existence of central bank transparency is intended to reduce the risk that occurs due to the lag effect of monetary policy in affecting the economy, especially the achievement of the inflation target. The delay effect allows the central bank to use unforeseen or previously unknown events as an explanatory factor for unachieved targets. Therefore, in order to reduce these risks, the central bank must explain publicly the difference between the actual and the target (Pohan, 2007).

**Description of the Central Bank Transparency Level Indicator Indicators in the Country Asia-Pacific Region Period 1998-2014****Table 2:** Range of values of the level of openness

Variable	Obs	Mean	Std. Dev.	Min	Max
Transparency Central Bank	119	7.445378	2.216836	2	11.5

Source: (Dincer & Eichengreen, 2013)

The transparency variable is used to determine the level of information disclosure of the current economy from the central bank to the public. In Table 2 it appears that the range of values of the level of openness is in the range of 2 to 11.5. This indicates that the greater the value of the transparency index, where the number is close to 11.5 (the maximum value shown in Table 2), the higher is the level of information disclosure from the central bank to the public in the country.

Description of Research Results**Assumption Testing Results****Stationary Test**

Stationary test is the first step that must be done before the data in estimation. In this research the stationary test is conducted using Fisher-type test, where the root behaviour of the units of each panel data will be tested individually. Furthermore, this test will combine the results of the p-values of each individual, so that the results of the test will be obtained as a whole. In addition, Fisher-type tests also include Augmented Dickey-Fuller (ADF) test and Phillips-Perron (PP) methods. The p-value results of the ADF and PP methods will then be compared with the critical value of 1%, 5%, and 10%. Based on the provisions of the criteria and by examining the results of stationary test in Tables 1.3 and 1.4, it can be concluded that variables used in this research are assumed to be at first difference level.

Table 3: Test Results of ADF Statistical Tests at Level

ADF Statistical Tests	The p-value value of each variable				
	rPUAB	INF	rLENDING	HT_rPUAB	LT_rPUAB
Inverse chi-squared(10)	0.0004	0.9292	0.0000	0.5351	0.0000
Inverse normal	0.0001	0.9778	0.0010	0.1564	0.0000
Inverse logit t(29)	0.0002	0.9829	0.0000	0.1814	0.0000
Modified inv. chi-squared	0.0000	0.9026	0.0000	0.6730	0.0000

Source: Processed on Stata 13



Table 4: ADF Statistical Test Results At First-Difference Level

Test Statistic ADF	Nilai p-value of each variable				
	rPUAB	INF	rLENDING	HT_rPUAB	LT_rPUAB
Inverse chi-squared(10)	0.0000	0.0000	0.0000	0.0000	0.0000
Inverse normal	0.0000	0.0000	0.0000	0.0000	0.0000
Inverse logit t(29)	0.0000	0.0000	0.0000	0.0000	0.0000
Modified inv. chi-squared	0.0000	0.0000	0.0000	0.0000	0.0000

Source: Processed on Stata 13

Optimal Lag Determination

Optimal lag determination is one of the most important considerations before the VAR panel estimation stage. Optimal lag determination is done because each economic variable in influencing other economic variables always has a time lag. When the optimal lag is not determined, the resulting estimation results may be biased and tend to be invalid.

Table 5: Lag Optimal Test Results

First Model (rPUAB)				Second Model (LT_rPUAB)			Third Model (HT_rPUAB)		
MBI	MAIC	MQIC	MBIC	MAIC	MQIC	MBIC	MAIC	MQIC	MBIC
81.15	15.525	41.909	81.157	15.525	41.909	81.157	15.525	41.909	81.157
786*	81*	34*	86*	81*	34*	86*	81*	34*	86*
52.80	9.0525	26.641	52.807	9.0525	26.641	52.807	9.0525	26.641	52.807
729	86	61	29	86	61	29	86	61	29
34.34	12.470	21.264	34.347	12.470	21.264	34.347	12.470	21.264	34.347
78	44	95	8	44	95	8	44	95	8

Source: Processed on Stata 13

(*) indicates the level of significance

Table 5 in this study the optimal lag determination uses the selection criteria from the Moment and Model Selection Criteria (MMSC). In this MMSC method there are three criteria, that are MMSC-Akaike Information Criteria (MAIC), MMSC-Bayesian Information Criteria (MBIC), and MMSC-Hannan-Quin Information Criteria (MHQIC). Of the three criteria, the smallest value will be selected among the values of the proposed lag.

**Model Stability Test**

Model stability tests are required to obtain more valid estimates of IRF and FEVD. There are two criteria that can be decisive from the instability of a model. First, the model is said to be stable if the value of all moduli is less than one. Conversely, for the second criterion if using a graphic form, then the model is said to be stable if all the roots of all variables are within the circle unit. Based on Table 5 it can be concluded that the model in this study is in stable condition.

Table 6: Model Stability Test Results

First Model (rPUAB)			Second Model (LT_rPUAB)			Third Model (HT_rPUAB)		
Eigenvalue		Modulus	Eigenvalue		Eigenvalue	Modulus		Eigenvalue
Real	Imaginary		Real	Imaginary		Real	Imaginary	
-0.0343712	-0.3177942	0.3196475	-0.0343712	-0.3177942	0.3196475	-0.0343712	-0.3177942	0.3196475
-0.0343712	-0.3177942	0.3196475	-0.0343712	-0.3177942	0.3196475	-0.0343712	-0.3177942	0.3196475
-0.0883666	0	0.0883666	-0.0883666	0	0.0883666	-0.0883666	0	0.0883666

Source: Processed on Stata 13

Estimation Results**Panel VAR Estimation Results**

VAR panel test results are used to determine the effect among variables used in this research model. The level of influence between variables can be seen by comparing the z-statistic value with the z-table value. If the value of z-statistics exceeds the z-table, then it can be said that these variables are statistically significant affecting other variables. The second way is to compare the value $p > |z|$ with alpha significance levels of 1%, 5% or 10%. If value $p > |z|$ less than alpha, then it can be said that these variables are statistically significant other variables.

However, according to some econometric experts, the VAR estimation results cannot be measured. According to it is because the coefficients in the VAR estimate are difficult to interpret, so to analyse the VAR estimation results the researchers usually use impulse response and variance decomposition only. It is also supported by (Miao, Hou, & Abrigo, 2016).



According to them the VAR panel estimation results themselves are rarely interpreted by the researchers, because the main estimation results in the VAR panel are the result of Impulse Response Function (IRF) and Forecast Error Variance Decomposition (FEVD). Therefore, researchers are usually only interested in analysing the impact of changes that occur between variables through analysis of the results of IRF and FEVD.

First VAR Model Panel Estimation Results (rPUAB)

VAR estimation test results for the first model can be seen in Table 7. For the first model, Table 1.7 shows that all variables are statistically significant. This is evident from the significance level of all variables in the first model is statistically significant at 10%.

Table 7: First VAR Model Panel Estimation Results

drPUAB		Coef	Std. Err.	z	p> z
	drPUAB	0.7013315	0.1194408	5.87	0.000
	dINF	-0.2694276	0.111077	-2.43	0.015
	drLENDING	-1.02114	0.1032173	-9.89	0.000
dINF					
	drPUAB	1.042052	0.0900444	11.57	0.000
	dINF	-0.4881336	0.0918073	-5.32	0.000
	drLENDING	-1.461852	0.1307516	-11.18	0.000
drLENDING					
	drPUAB	0.3256502	0.0412199	7.90	0.000
	dINF	-0.057291	0.0327975	-1.75	0.081
	drLENDING	-0.370307	0.0512495	-7.23	0.000

Source: Processed on Stata 13

These results indicate that changes in the high or low PUAB rates are determined by changes in the high or low lending rates, inflation rate and interest rates on the PUAB itself. The inflation variable is influenced by the PUAB money market rate, loan interest rate and inflation variable itself. Value $p > |z|$ less than 1% alpha indicates that the high or low variable of inflation is influenced by high or low variable of PUAB interest rate, loan interest rate and inflation variable itself. Furthermore, for the changes that occur on the variable lending rate are affected by the interest rate of PUAB money market, inflation, and variable interest rate of the loan itself. As a result, changes in lending rates are influenced by the variable interest rates on interbank money market, inflation, and variable interest rates on the loan itself. Thus, from the above explanation it can be concluded that the changes that occur in the PUAB money market rate using the mechanism of transmission through the interest rate can affect the rate of inflation occurring in the Asia-Pacific region countries.

Second Panel VAR Model Estimate Results (LT_rPUAB)

The result of VAR panel estimation for model two can be seen in Table 1.8. The test results show that the inflation variable does not affect the changes that occur in the variable LT_rPUAB with the value $p > |z|$ which is quite large, ie 0.991. From the test results, it can be concluded that the shock that occurs in the variable LT_rPUAB is only influenced by the variable lending rate and variable LT_rPUAB itself at a significance level of 1%. Changes that occur in the variable of inflation are statistically significant influenced by variable LT_rPUAB, loan interest rate, and variable itself at alpha level 10%. The estimation results indicate that the change in the rise or fall of the inflation variable is influenced by the rise or fall of LT_rPUAB variable, loan interest rate, and the inflation variable itself (Natsir, 2011).

Table 8: Second Panel VAR Model Estimate Results

drPUAB		Coef	Std. Err.	z	$p > z $
	drPUAB	0.4015239	0.0807401	4.97	0.000
	dINF	-0.0007316	0.064115	-0.01	0.991
	drLENDING	-1.1589	0.162711	-7.12	0.000
dINF					
	drPUAB	0.7100247	0.074391	9.54	0.000
	dINF	-0.1577095	0.0817189	-1.93	0.054
	drLENDING	-1.541723	0.2061663	-7.48	0.000
drLENDING					
	drPUAB	0.1805095	0.0330698	5.46	0.000
	dINF	0.778776	0.0294455	2.64	0.008
	drLENDING	-0.4182557	0.068996	-6.06	0.000

Source: Processed on Stata 13

Furthermore, the shocks occurring in the variable lending rates are statistically significantly influenced by the variable LT_rPUAB, inflation, and the variable itself at the 1% alpha level. The results of this test also show that the changes which occur in the variable lending rate is influenced by the rise and fall of LT_rPUAB variable, inflation, and variable interest rates on the loan itself.

Third Panel VAR Model Estimate Results (HT_rPUAB)

Table 4.8 shows the VAR panel estimation results for the third model. From Table 1.9 it appears that the variable lending rates are statistically significant, and does not affect the shock that occurs in the variable HT_rPUAB because the value $p > |z|$ which is great enough at 0.365. Shocks that occur on the HT_rPUAB variable are statistically significant only in self-influencing and the inflation variable at 10% alpha level.

**Table 9:** Third Panel VAR Model Estimate Results

drPUAB		Coef	Std. Err.	z	p> z
	drPUAB	0.1469402	0.0457821	3.21	0.001
	dINF	-0.0463044	0.0265115	-1.75	0.081
	drLENDING	0.0432527	0.0477569	0.91	0.365
dINF	drPUAB	0.2689777	0.1370027	1.96	0.050
	dINF	0.2433254	0.1111414	2.19	0.029
	drLENDING	-0.9993465	0.2786985	-3.59	0.000
drLENDING	drPUAB	0.1211154	0.0563989	2.15	0.032
	dINF	0.1720539	0.0316735	5.43	0.000
	drLENDING	-0.213453	0.091712	-2.33	0.020

Source: Processed on Stata 13

Inflation variable changes are statistically significant influenced by the variable itself, loan interest rate, and variable HT_rPUAB, which is significant at 10% level. These results indicate that the ups and downs of inflation variables are influenced by changes in the ups and downs of HT_rPUAB variables, lending rates, and inflation variables themselves. Furthermore, for changes in the ups and downs of interest rate variables are statistically significant, influenced by the rise and fall of HT_rPUAB variable, inflation, and the loan interest rate itself with an alpha significance level of 10%. Thus, from the estimation results of first, second, and third models, two drawbacks can be drawn: The monetary policy using the interest rate transmission mechanism statistically significant influences the change in the high or low variables of inflation. With the existence of central bank transparency in monetary policy also statistically significant can affect changes in high or low inflation variables.

Impulse Response Results

Impulse response is used to determine how a particular variable responds when there is a shock to the variable itself and / or other variables. The result of the impulse response will show the response form of a particular variable in a given period of time when a suspected or unexpected shock from the variable itself and / or other variables occurs. From these results it can be shown how long a variable in response to shock that occurs until the effect of the shock disappears and returns to the point of balance.

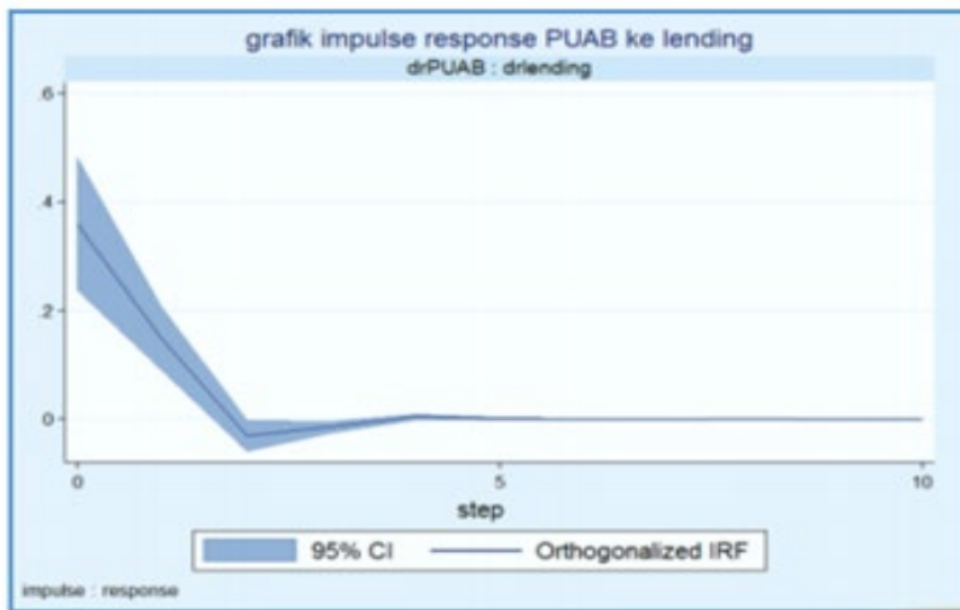
Impulse Response Panel VAR First Model Results (rPUAB)

In the first model the discussion of impulse response results will be more focused on the response of the variable inflation and lending rate to the shock caused by the variable interest

rate interbank money market. The horizontal axis of the impulse response graph shows the time period. Meanwhile, the vertical axis shows a change of one variable due to the change or shock of a particular variable.

Figure 4.5 shows that when interest rates are in shock, then will be directly responded negatively by variable interest rates on loans. This is because an increase in interbank interest rates will be responded to by a decrease in variable lending rates. However, the decline did not last long because when entering the third period the impact of the shock slightly disappeared and the variable loan interest rate finally returned to its equilibrium point.

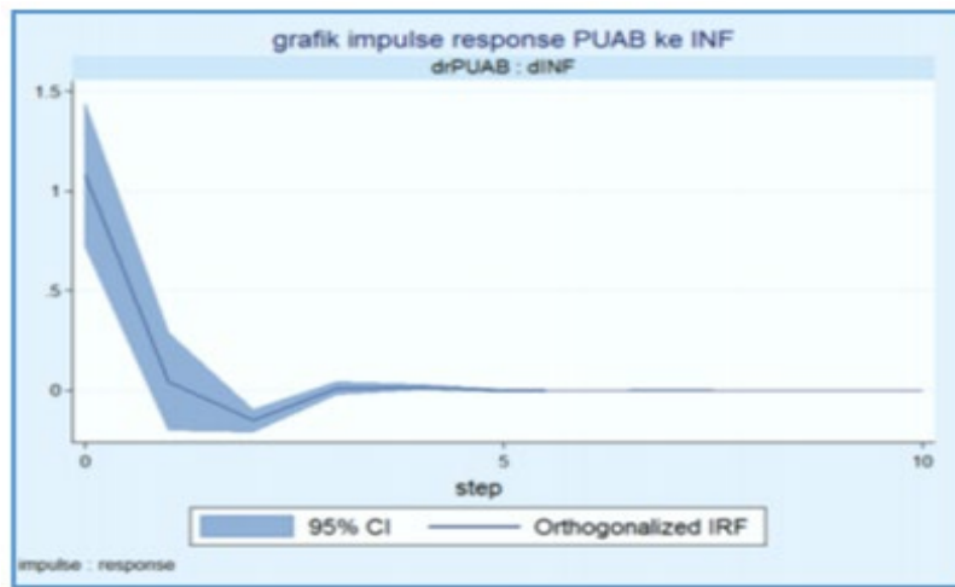
Figure 1. Response of the Lending Rate Variable to the PUAB Interest Rate Shock



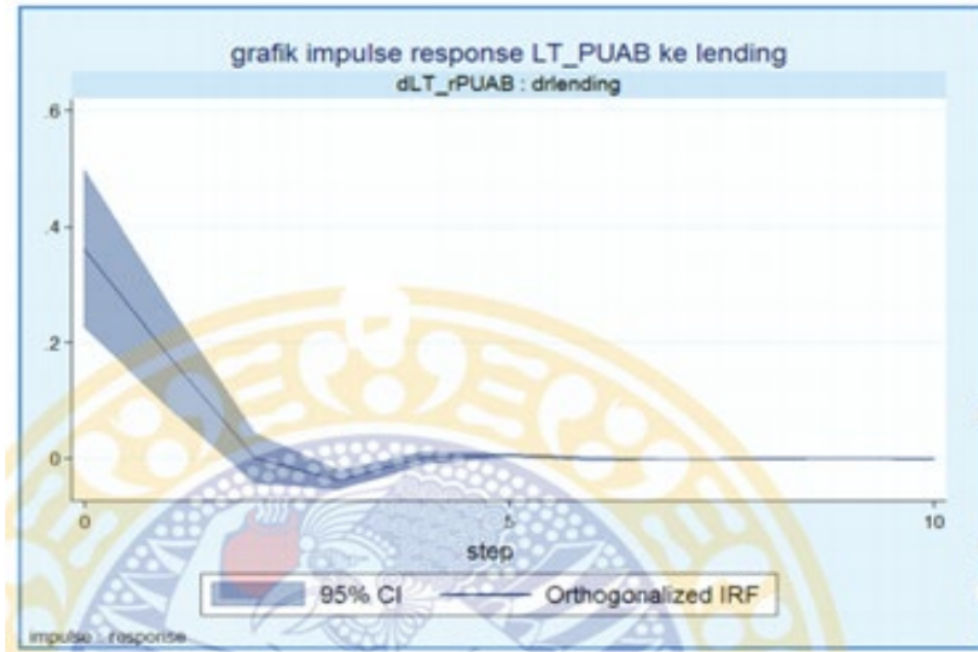
The same result is also shown by the inflation variable in response to the shock of the interbank money market rate. The inflation variable also responded negatively when the PUAB interest rate shock occurred. Inflation variables tend to return more rapidly to their equilibrium points. Entering the first period, variable begins to return to its balance point, although in the end its movement continues to decline until the second period. In the third period the response is changed to positive and the movement continues to increase until it reaches its equilibrium point.

Impulse Response Panel VAR Second Model Results (LT_rPUAB)

For the second model, the focus of the impulse response will be more focused on the response of the inflation and lending rates to the shocks that occur in the LT_rPUAB variable. Figure 4.6 shows the response of the loan interest rate to shock that occurs in LT_rPUAB variable. From the picture shows that the result of impulse response obtained is not much different from impulse response result in first model. The variable lending rates also respond negatively to the shocks that occur in the LT_rPUAB variable.

Figure 2. Respon Variabel Inflasi terhadap Shock Suku Bunga PUAB

Furthermore, for the response of the inflation variable to the shock occurring in the LT_rPUAB variable is shown in Figure 4.7. Test results from impulse response seen that the response given by variable inflation movement a little fluctuate. In the initial period when the shock variable LT_rPUAB directly responded decreased by the variable inflation. The inflationary variable of the movement continued to decline, until in the second period the response changed to positive. However, the increase in response does not occur permanently because in the fourth period the shock gradually disappears and eventually returns to its equilibrium.

Figure 3. Response of Lending Rate Variable to Shock Variable LT_rPUAB***Impulse Response Panel VAR Third Model Results (HT_rPUAB)***

Similar to the discussion of impulse response in models one and two, in the third model the focus of the discussion will also only be focused on the response of inflation and lending rate variables to the shocks that occur in the variable HT_rPUAB. Figures 4.8 and 4.9 show the impulse response to the shock that occurs in the variable HT_rPUAB. Figure 4.10 illustrates the response of the lending rate variable when a shock occurs in the HT_rPUAB variable. In the picture it appears that the impulse response given is different from the previous two models. In the third model the response is positively given by the lending rate variable when HT_rPUAB variable shock occurs, and the movement of the response is slightly fluctuated. After responding positively, the movement turns negative when entering the second period. Before reaching the point of balance, lending rate variable slightly responded positively but not so significantly.

Figure 4. Response of Inflation Variable to Shock Variable LT_rPUAB

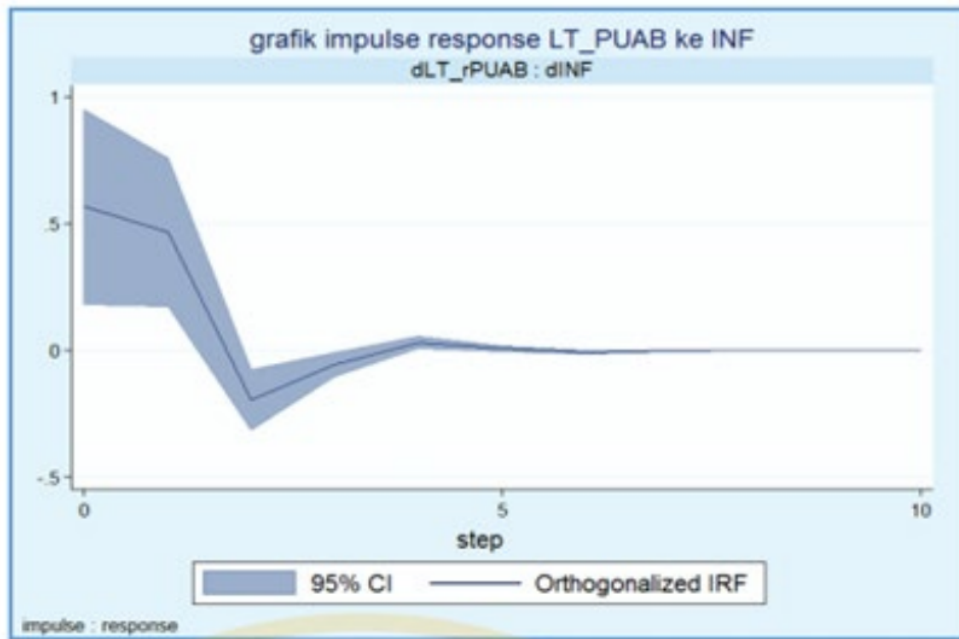


Figure 5. Respon Variabel Lending Rate terhadap Shock Variabel HT_rPUAB

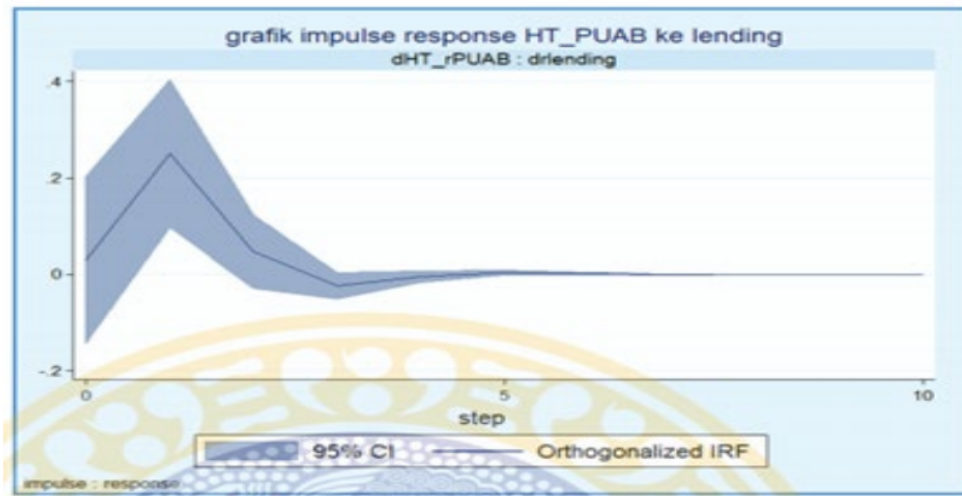
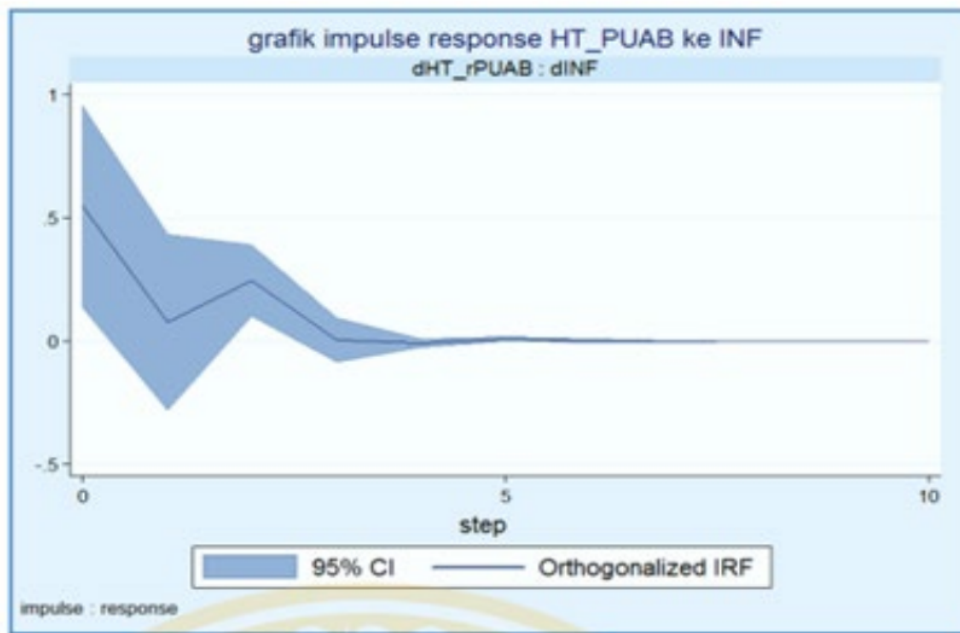


Figure 6. Respon Variabel Inflasi terhadap Shock Variabel HT_rPUAB



Limitations of Research

This study only analyses the impact of transparency on the ultimate goal of monetary policy, that is inflation, whereas the ultimate goal of monetary policy is not just price stability. This study has limitations in terms of analytical methods, where it only analyses partially generated impacts of the seven countries used as samples, so it can't individually analyse the impacts of each country (Nicolay & de Oliveira, 2019).

Conclusions

Based on the result of impulse response, this research reached the following conclusions: In the first model (rPUAB), the impulse response results show that inflation and lending rates respond negatively when there is a change in PUAB interest rates in the period before the transparency of the central bank.

In the second model, low transparency (LT_rPUAB) shows the same result as the first model. The second impulse response model shows that inflation and lending rates respond negatively when there is a change in the interbank money market rate during the low transparency period of the central bank.



In the third model high transparency (HT_rPUAB) impulse response results show different results with the previous two models. From the results of the third model impulse response it is seen that loan interest rates responded positively, while inflation responded negatively when there was a change in PUAB interest rate during period of high central bank transparency rate.



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