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MONETARY POLICY TRANSMISSION MECHANISM IN INDONESIA

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Abstract

Changes in the behavior of the central bank, government, banking and financial sector as well as economic actors have an effect on changes in the transmission mechanism of monetary policy. The purpose of this study is to determine what monetary policy instruments can be used to achieve the inflation target and through what transmission mechanism these instruments work. The data used are secondary time series data obtained from Indonesian Economic and Financial Statistics and the Indonesian Economic Report published by Bank Indonesia from 2010 to 2018. The simultaneous equation as the research model consists of 18 behavioral equations, 4 identity equations and 7 predetermined variables. Testing the role of this path uses a simultaneous equation analysis tool with the two stage least square (TSLS) method. The results show that the channels that play a role in transmitting monetary policy instruments are the interest rate channel and the loan channel.

Keywords: inflation targeting frame, monetary policy, interest rate, loan channel, interest rate channel

INTRODUCTION

Indonesia as a country with an open economic system, the monetary policy transmission mechanism (MTKM) is influenced by changes in economic and financial conditions in other countries. Transmission occurs through changes in currency exchange rates, export and import volumes, as well as the amount of funds flowing in and out of the country concerned. The speed and magnitude of the transmission mechanism of monetary policy are also different in an economy that is expanding compared to when an economy is contracting, or there is asymmetry. Interest rates rise faster than they fall, as well as credit being more expansive in an upswing economy, a phenomenon known as financial accelerator. Just like a road map, MTKM describes a process of how the monetary policy adopted by the central bank affects various economic and financial activities until it finally achieves the desired goals, namely price stability (inflation) and economic growth (Taylor, 1995; Warjiyo, 2004). To achieve the targets set, the understanding of MTKM by the central bank is very important to determine the monetary policy stance, the selection of instruments as well as the measurable and appropriate timing and dose of response. Based on Law no. 23 of 1999, Bank Indonesia implicitly in 2000 implemented an inflation targeting frame (ITF). In accordance with this law, Bank Indonesia's objective is to achieve stability in the value of the rupiah currency in terms of price stability (inflation) and stability in the rupiah exchange rate (exchange rate). Starting from July 2005, Bank Indonesia has implemented a monetary policy framework with inflation as the final target (Inflation targeting Frame) or commonly known as the ITF. One of the important elements that emerged and attracted attention in the implementation of the ITF was the important role of interest rates in the transmission of monetary policy. Along with the implementation of the ITF, Bank Indonesia set the BI rate as a policy interest rate that represents a signal of monetary policy response in controlling inflation in accordance with the target. In practice, the BI rate then becomes a reference for the movement of interest rates on the interbank money market (PUAB) which is used as the operational target of the policy. The implementation of the inflation targeting framework in Indonesia is not merely carried away by the general trend of the central bank in the country, but because there are objective conditions that make Bank Indonesia implement MTKM with a new target. Taylor (2014) assesses the emerging market experience with inflation targeting in recent years. The research shows that a shift away from rules based policy by many developed country central banks has adversely affected the inflation targeting performance of the emerging market countries.

The main characteristic of the inflation targeting framework is that it targets price stability or inflation as the most important objective of implementing monetary policy. The target that must be realized is a low and stable inflation rate (Masson, Savastano & Sharma, 1998). Low inflation is actually still a debate and high inflation in every country is difficult to say the same (Miskhin &

Schmidt-Hebel, 2007). The main objective in targeting inflation does not have to be interpreted in absolute terms. That is, the main goal of inflation should not be intended to eliminate other goals such as economic growth and employment (Debelle, 2001). The inflation targeting framework (ITF) is not a fixed and rigid rule but rather a framework within which the central bank formulates and implements its monetary policy (Bernanke, Gertler & Gilchrist, 1999). Fiscal policy or monetary policy that has a short-term orientation in pursuing economic growth has been proven to lead to weak macroeconomic stability so as to encourage price increases or inflation. Ismail (2006) stated that the implementation of inflation targeting in Indonesia, in the past, was not satisfied either in decreasing the inflation rate or in bringing the actual inflation to the rate of it's target. Monetary policy that is too tight or prioritizes inflation without paying attention to GDP growth can result in greater social loss to the Indonesian economy (Yunanto & Medyawati, 2013). In principle, based on inflation forecasts and reliable monetary transmission, monetary policy is formulated in such a way as to ensure that future economic and financial movements remain on track to achieve the expected price stability (Warjiyo & Juhro 2016). In order to achieve the expected level of inflation, the central bank must use a target between short-term interest rates. The use of short-term interest rates as an intermediate target is a shift from the old paradigm of MTKM which uses base money. Through the use of short-term interest rates, inflation targeting can be categorized as a price approach which is studied as a development of the Keynesian path and the previous paradigm, namely the old paradigm in MTKM, is categorized as a monetarist path. In the study of monetary policy in Indonesia, it was found that the multiplier coefficient of monetary policy was larger so that it could be explained that monetary policy was more effective in influencing the increase in GDP. The Indonesian economy does not seem to respond to capital outflows, because most of the foreign funds are used in the form of foreign exchange reserves, thereby increasing the cost of debt (Yunanto, 2014). To make this condition clearer, the following is data on the Indonesian economy for 2010-2018 which reflects the dynamics of the economy after the global crisis.

Table 1. Indonesian Economic Annual Data 2010-2018

Year	World Economic Growth (%)	BI *Rate* (%)	Investment (Milion Rp)	GDP (Milion Rp)	CPI	Exchange Rate (Rp)
2010	5.2	6,5	2127841	6864133	125,17	8991
2011	3.9	6,5	2316359	7287635	129,91	9068
2012	3.1	6	2527729	7727083	135,49	9670
2013	3.3	5,75	2654375	8156498	146,84	12189
2014	3.4	7,5	2772471	8564867	154,92	12440
2015	3.1	7,75	2911356	8982517	158,25	13795
2016	3.2	7,25	3041585	9434613	161,23	13436
2017	3.7	4,75	3228763	9912704	164,78	13548
2018	3.6	5,25	3444118	10425316	167,89	14481

Source: Bank Indonesia (processed)

Based on the dynamics of monetary policy that has been implemented throughout 2011, referring to Table 1, it can be seen that the fluctuations in the rupiah exchange rate and the inflation rate that occur indicate that monetary policy has not been able to fully control the exchange rate, both inflation and the exchange rate. In terms of the GDP component, the combination of fiscal and monetary expansion policies provides a large enough multiplier effect so that it is able to encourage aggregate demand by increasing consumption, investment, government spending and exports and imports. The increase in aggregate demand further affects the business sector to increase aggregate supply capacity in the long term (Yunanto & Medyawati, 2015). The conducive economic conditions in 2012 changed in 2013, triggered by shifts in global factors that previously benefited the Indonesian economy. Changes in the global economy that were not in line with expectations in the midst of the weak structure of the domestic economy had an unfavorable impact on Indonesia's economic growth in 2013. On the one hand, imports remained large given the insufficient capacity of the domestic industrial sector to meet strong domestic demand. On the other hand, investment, especially non-construction investment, is on a downward trend, given that there is a close relationship between non-construction investment and export performance. Household consumption is still high enough to encourage real imports to continue to grow positively and even increase in the third quarter of 2013. Amidst the global economic turmoil that has yet to show improvement, Indonesia's balance of payments (BOP) in 2014 recorded an improvement, although less significantly. Foreign exchange reserves at the end of 2014 rose to 111.9 billion US dollars, equivalent to 6.4 months of imports and servicing of government external debt, which was above the international adequacy standard of about 3 months of imports. The rupiah exchange rate in 2014 weakened against the US dollar by 1.7% to a level of Rp 12,385 per dollar.

The purpose of this study is to build a model of the monetary policy transmission mechanism that integrates various alternative pathways of monetary policy transmission mechanism and analyze the impact of monetary policy in monetary policy transmission mechanism pathways on the Indonesian economy. This research is a summary of Hudiyanto's dissertation (2020) which as a whole discusses the impact of monetary policy on the Indonesian economy. This study uses 2010 as the initial year of research and ends in 2018. The reasons for choosing this year are as follows. Inflation that occurred in Indonesia in 2010 recorded a fairly strong increase when compared to 2009. The deteriorating inflation situation was related to the influence of global economic factors and internal domestic factors that occurred throughout 2010. Inflationary pressures arose mainly as a result of disruptions in the economy. the smooth flow of food supply, which is heavily influenced by weather anomalies. The

contribution and benefit of this research is to enrich research models related to the analysis of monetary policy mechanisms in developing countries, especially in Indonesia.

THEORETICAL FRAMEWORK AND LITERATURE REVIEW

The monetary policy transmission mechanism is defined as a path traversed by a monetary policy instrument in order to influence macroeconomic conditions (Hakim, 2001). In general, the macroeconomic conditions referred to are national income (economic growth) and the inflation rate (price stability). The systematic mechanism for transmitting monetary policy begins when the central bank changes its instruments. In general, the tools owned and used as policy instruments by the central bank consist of the management of the money supply (M), interest rates (i) and general reserves of commercial banks (banks) or statutory reserves (GWM). Interest rates have an important role in achieving the final target, especially the rate of growth of gross domestic product in the transmission mechanism of monetary policy in Indonesia. Interest rates are a rarity and also store information about the efficiency level of the banking intermediation process (Sussanto, 2006). For Indonesia, all of these tools or instruments can be controlled directly by Bank Indonesia as the central bank, except for the money supply. This money supply, although it can be controlled by the central bank, is indirect in nature, that is, it must be through securities transactions through open market operations. The operational goals will then influence the intermediate goals, assuming there is a stable money multiplier and velocity. Some of the monetary quantities that are usually set as intermediate targets are money supply in a broad sense (M2), bank credit and exchange rates. In the long and short term, credit plays a more important role than interest rates in transmitting monetary instruments (Hakim & Nopirin, 2001). A more comprehensive empirical study by Bank Indonesia on the transmission mechanism of monetary policy was first conducted by Warjiyo and Agung (2002). This study focuses on empirical mapping of the transmission mechanism of the interest rate channel, bank credit channel and company balance sheet conditions, exchange rate channel, asset price channel, and expectation channel. In this study, three methods were used, namely the vector auto regressive (VAR) model, the second was a study of the supply and demand of credit under investigation, the third was the use of individual bank panel data that were investigated to determine the impact of unequal monetary policy on bank characteristics, especially in terms of aspects of capital strength and the size of each bank's assets. Agung, Kusmiarso, Pramono, Hutapea, Pramuko, and Prastowo (2001) analyzed the credit crunch phenomenon in Indonesia. This research concludes that the continuing slow growth of credit is more due to supply factors. This is particulary due to the capital problem being experience by bank after the crisis (capital crunch), increasing non-performing loans

higher credit risk in the business sector as reflected from the continuing high leverage ratio and the lack of information regarding potential borowers. The study conducted by Agung et.al (2002) for the case of Indonesia using data from 1992 to 1999 proves the importance of balance sheet conditions, especially cash flow and leverage, in influencing the company's investment decisions and these effects show greater results for companies. smaller than large companies. Agung (2003) find significant differences of balance sheet behavior across bank clashes in response to a change in monetary policy, consistent with the predictions of the bank lending view. The research also found that because of access to foreign funds and the existence of bank loan commitment, the monetary policy was unable to constrain loan supply by the large (state) banks, indicating that the bank lending channel operates through smaller (non-state) banks.

The evidence once again shows that the company's balance sheet channel in the transmission of monetary policy in Indonesia is an important channel. Deriantino (2013), shows that commercial banks that are more competitive are relatively more responsive in adjusting their loan interest in the event of changes in monetary policy. Cetorelli and Goldberg (2012) found that having global operations insulates banks from changes in monetary policy while bank without global operations are more affected by monetary policy than previously found. A study conducted by Hakim and Nopirin (2001) shows that in the pre-crisis period, money circulation in a broad sense (M2) played a much more important role than credit in influencing real output. However, different results were obtained, namely during the credit crisis, it played more role than the money supply in a broad sense (M2). By using the VAR model through a comparison of the role of the SBI interest rate and the interbank money market interest rate in influencing credit, empirical evidence is produced that the interbank money market interest rate, both before the crisis and during the crisis, has more of a role than the SBI interest rate. Natsir (2011) conclude that mechanism of monetary policy transmission through Interest Rate Channel is effective to reach the final target of monetary policy of Indonesia period of 1990:2-2007:1. Yunanto and Medyawati (2013) stated that the fiscal and monetary policy mix found the fact that in the short term the pursuit of economic growth has resulted in weak macroeconomic stability, thus encouraging inflation. Mayo, Maski and Pratomo (2014) conducted a study of the transmission mechanism of monetary policy in the investment credit channel and working capital credit in influencing inflation by analyzing data from 2002-2012. The results of the study stated that in the trade, hotel and restaurant sector, sectoral investment credit was the most effective in explaining inflation than other sectors. The mining and extracting sectors of working capital credit were found to be the most effective in explaining inflation than other sectors. Another researcher, namely Yarasevika, Tongato and Muthia, (2015) whose empirical study

shows that credit channels are more dominantly influenced by economic growth and credit behavior in the past than credit interest rates and minimum statutory reserves. Fazaalloh and Sasongko (2014) in a study with monthly micro data of foreign banks from 2002-2007, proved that foreign banks with small total assets or capital reacted more strongly in response to changes in monetary policy in lending than banks with large assets and capital. . Meanwhile, Silalahi, Wibowo and Nurlian (2012) in relation to the transmission of the 1997/1998 global financial crisis conducted a study of foreign bank credit in Indonesia by combining macro factors related to the drivers and pullers of foreign capital flows. In general, this study shows that the global crisis has an effect on credit for foreign banks in Indonesia, with a stronger impact on foreign bank offices than joint venture banks. The study also proves that foreign bank credit is influenced by push and pull factors for foreign capital flows, including economic growth, risk factors, and liquidity conditions both in Indonesia and globally. Ciccarelli, Maddaloni, and Peydro (2013) suggest that the bank-lending channel has been to a large extent neutralized by the ECB non-standard monetary policy interventions. According to them, the policy framework until the end of 2011 was insufficient to overcome credit availability problems stemming from deteriorated firm net worth and risk conditions, especially for small firms in countries under stress. Smets (2014) state that the new macroprudential policy framework should be the main tool for maintaining financial stability, monetary policy authorities should also keep an eye on financial stability. Beck, Colciago and Pfaifar (2014) conduct paper surveys research on the role of financial intermediaries and financial frictions in the transmission of monetary policy. The research shown that there is a fundamental link between the real economy and the financial system. The study of instruments and policies aimed at isolating as much as possible the former from shocks originating in the latter is at heart of the current economic debate. Fitrawaty (2018) states that the results of the interpretation of VAR and SVAR, specifically obtained that the relationship between monetary instruments and unemployment has a different direction. The open market operating variable, the discount rate, and the domestic interest rate, have a negative direction on the unemployment variable, while the minimum reserve requirement variable, the exchange rate has a positive direction. Ippolito, Ozdagli and Perez-Orive (2018) show that firms—especially financially constrained firms—with more unhedged loans display a stronger sensitivity of their stock price, cash holdings, inventory, and fixed capital investment to monetary policy. This effect disappears when policy rates are at the zero lower bound, revealing a new limitation of unconventional monetary policy. The floating-rate channel is at least as important as the bank lending channel operating through *new* loans. Nizamani, Karim, Zaidi and Khalid (2017) analyze monetary policy in Pakistan. Nizamani et.al analyzed the effect of monetary policy and exchange rate shocks on the trade balance by examining the effect on the

trade surplus and trade deficit sector. The results of the SVECM are consistent with standard theoretical expectations, the findings reveal that contractionary monetary policy shocks have an effect on the deteriorating trade balance and support their effect on changes in monetary policy in Pakistan. The effectiveness of monetary policy is limited to the trade surplus sector Janah and Pujiati (2018) show that the flow of the monetary policy transmission mechanism of the expectation path in influencing inflation in Indonesia is running continuously, showing a two-way relationship between the exchange rate variable and inflation. In the short term, the BI Rate, Exchange Rate and Output Gap variables are significant and have a positive effect on inflation, the inflation expectation variable is significant and has an effect on inflation and the GDP variable is not significant for inflation in Indonesia, while in the long term the only variable that affects the inflation rate is the BI Rate. and inflation expectations. The study of monetary policy in Nigeria was conducted by Osisanwo, Tella and Adesoye (2019). This study examines the impact of monetary policy on the balance of payments in Nigeria in the period 1989 – 2015. The results show that there is a long-term relationship between monetary policy variables and the balance of payments. The findings further reveal that in the long run, the money supply and trade balance have a unidirectional impact on the balance of payments in Nigeria.

RESEARCH METHOD

The data in this study are quarterly data from 2010:1 to 2018:4 which is a description of the state of the Indonesian economy after the global financial crisis of 2008/2009. This period was chosen to describe the state of the Indonesian economy after the global financial crisis in 2009 and the measures to control Bank Indonesia's monetary policy in overcoming the impact of the crisis. In this study, Indonesia is assumed to be a small open country. Most of the data collected in this study were obtained from the Indonesian Economic Statistics (SEKI), the Indonesian Economic Report (LPI) specifically for data on the national minimum wage and world economic growth in various publications and Bank Indonesia publications for interest rate data. Specifically, BI Rate data is only available until August 2016 and then followed by 7-Day (Reverse) Repo Rate data which is effective since August 19, 2016. This instrument change is an improvement made by Bank Indonesia with the aim of strengthening policy effectiveness in achieving the inflation target set. The model in this study is composed of 18 behavioral equations and 4 identity equations modifying Haryanto's (2007) model as follows:

Exchange Rate Model:

KURS = f (fdi, tb, inf, bot, cd, pdb, ms) (1)

Deposit Interest Model (BD)

BD = f (mo, rbi, gwm) (2)

Loan Interest Rate Model (TB)

TB = f (gwm, bd, rbi, ms) (3)

Inflation Model (INF)

INF = f (inv, md, kurs, pdb, rbi, um) . (4)

Export Model (EKP)

EKP = f (ped, inf, kurs, kred) (5)

Import Model (IMP)

IMP = f (kon, inf, kurs, pdb, kred) (6)

Investment Model (INV)

INV = f (gexp, tb, pdb, kred) ..(7)

Currency model (UKA)

UKA = f (kurs, pdb, tb, kred) (8)

Demand deposit model (UGI)

UGI = f (kred, pdb, tb) (9)

Savings and deposit model (TD)

TD = f (inf, kred, tb, pdb) (10)

Money demand model (MD)

MD = f (m0, tb, pdb, kurs) (11)

Money supply model (MS)

MS = f (pdb, inf, gwm, rbi, md,kred) (12)

Base model (M0)

M0 = f (pdb, inf, tb, gwm, kon, td) (13)

Consumption model (KON)

KON = f (td, tb, yd) (14)

Loan model (KRED)

KRED = f (rbi, tb, gwm) (15)

Government expenditure model (Gexp)

GEXP = f(fdi, bop, tax, pdb) (16)

Government revenue model (GREV)

GREV = f (pdb, tax) (17)

Tax model (TAX)

TAX = f (inf, pdb) (18)

Balance of Payments identity equation (BOP)

BOP = bot + Net Capital Inflow (nci) (19)

Balance of Trade identity equation (BOT)

BOT = Ekp – Imp (20)

National Income Identity Equation (PDB)

PDB = kon + inv + gexp + (ekp – imp) (21)

Disposable Income Identity Equation (Yd)

Yd = pdb - tax (22)

The identification problem relates to whether we can estimate the structural equation coefficients from the reduced form coefficients or not. There are three possibilities that occur, namely not identified (under identified), exactly identified (exactly identified) and too identified (over identified). The following are the results of the simultaneous equation identification test.

Table 2. Simultaneous Equation Identification Test

Equation	K	k	M	(K-k)	(m-1)	Description
Exchange rate	7	2	4	5	3	*Over identified*
Interest rate	7	1	5	6	4	*Over identified*
Inflation	7	2	4	5	3	*Over identified*
Export	7	1	4	6	3	*Over identified*
Import	7	0	5	7	4	*Over identified*
Investment	7	1	5	6	4	*Over identified*
Currency	7	1	4	6	3	*Over identified*
Demand deposit	7	0	3	7	2	*Over identified*
Savings and deposit	7	0	4	7	3	*Over identified*
Money demand	7	0	4	7	3	*Over identified*
Money supply	7	2	4	5	3	*Over identified*
Base money	7	1	5	6	4	*Over identified*
Consumption	7	1	3	6	2	*Over identified*
Loan	7	2	1	5	0	*Over identified*
Government expenditure	7	1	3	6	2	*Over identified*
Government revenue	7	0	2	7	1	*Over identified*
Tax	7	0	2	7	1	*Over identified*
Deposit interest	7	2	2	5	1	*Over identified*

From the results of the identification test using the order condition for eighteen equations, it was concluded that all the existing equations were overidentified so that to estimate the parameters of the existing equations, the Two Stages Least Square (TSLS) method was used, namely to obtain the structural parameter values in the identified excess equations. as in the case of this study. The unit root test in this study used the Augmented Dickey-Fuller (ADF) test. The next test that is the cointegration test which is carried out to determine the relationship between the estimated variables. If the variables are cointegrated with each other, then there is a long-term balance between the variables. From the long-term balance, it is possible to perform regression between these variables. If the residual test is cointegrated so that it has a long-term relationship, according to Granger, the stationarity test can be ignored. This cointegration test can be expressed as

a pretest in order to avoid spurious regression. Two variables are said to have a long-term relationship or are in equilibrium if they are cointegrated (Gujarati, 2003). The implementation of the classical assumption test used in this study includes the normality test, heteroscedasticity test, multicollinearity test and autocorrelation test using Eviews 9.0. The statistical test tools used are the White test, Jarque-Bera test, and the Durbin-Watson test.

RESULTS AND DISCUSSION

In this section, we will briefly describe the condition of the Indonesian economy in the last three years of the research period, 2016, 2017 and 2018. Indonesia's economic growth in 2016 increased from 4.9% in 2015 to 5.0% which was supported by by domestic demand as a result of the easing of monetary and macroprudential policies, while real export performance has not been strong. Indonesia's economic recovery continued until 2017 with the achievement of economic stabilization getting stronger. Economic growth in 2017 increased by 5.07%, higher than growth in 2016 which was 5.03%. The process of Indonesia's economic recovery cannot be separated from three positive momentums from global and domestic. The first momentum came from global in the form of improving world economic growth which in turn played a role in encouraging the volume of world trade. World GDP grew 3.7% higher than 2016 which was 3.2%. The prices of some of Indonesia's mainstay export commodities, such as coal and crude palm oil (CPO) and several types of metals, increased significantly. The composite of Indonesia's non-oil and gas export prices in 21.7%, higher than 2016 which was 5.4%. In 2018, the uncertainty of the global economy increased slightly again. Developments until the third quarter of 2018 showed the increase in the United States Federal Fund Rate and the uncertainty in world financial markets had reduced foreign capital flows to developing countries, including Indonesia. To overcome this condition, the central bank raised the policy interest rate by 175 bps to maintain the attractiveness of the domestic economy. This measurable step was taken to control the rupiah exchange rate and in addition to remain consistent to maintain the inflation rate of 3.5 ± 1%. However, it is necessary to be wary of the decline in credit growth because the results of previous studies stated that banks with more competitive performances tend to be more responsive in adjusting their loan interest rates in the event of changes in monetary policy (Deriantino, 2013). The next stage is to perform data processing, preceded by a data stationarity test and a cointegration test. The empirical test results are described in the table 3.

Table 3. Unit Root Test Results

No	Variables	ADF test statistic	Test Critical Value	Prob*	Stasionerity
1	Exchange rate	-3.182602	-2.960411 (5%)	0.0308	Level
2	Interest rate	3.238852	-2.951125 (5%)	0.0262	1st difference
3	Inflation	-6.198012	-3.632900 (1%)	0.0000	level
4	Export	-8.381424	-3.639407 (1%)	0.0000	1st difference
5	Import	-6.159434	-3.653730 (1%)	0.0000	1st difference
6	Investment	-21.78465	-3.661661 (1%)	0.0001	2nd difference
7	Currency	-8.713008	-3.653730 (1%)	0.0000	Level
8	Demand deposit	-7.037007	-3.646342 (1%)	0.0000	1st difference
9	Savings & deposit	-9.020555	-3.653730 (1%)	0.0000	1st difference
10	Money demand	-8.669463	-3.639407 (1%)	0.0000	1st difference
11	Money supply	-10.77060	-3.639407 (1%)	0.0000	1st difference
12	Base money	-15.52357	-3.661661 (1%)	0.0000	2nd difference
13	Consumption	-11.72654	-3.661661 (1%)	0.0000	2nd difference
14	Loan	-6.197245	-3.653730 (1%)	0.0000	1st difference
15	Government Expenditure	-5.699974	-3.632900 (1%)	0.0000	Level
16	Government Revenue	-6.591155	-3.646342 (1%)	0.0000	2nd difference
17	Tax	-6.773980	-3.646342 (1%)	0.0000	2nd difference
18	Balance of payment	-6.331122	-3.639407 (1%)	0.0000	1st difference
19	Balance of trade	-6.338163	-3.639407 (1%)	0.0000	1st difference
20	GDP	-101.9671	-3.661661 (1%)	0.0001	2nd difference
21	Disposible revenue (Yd)	-53.64386	-3.661661 (1%)	0.0001	2nd difference
22	Foreign Direct Investment	-5.187955	-5.187955 (1%)	0.0001	Level
23	Net capital inflow	-5.845685	-3.632900 (1%)	0.0000	Level
24	BI rate (rBI)	-3.965729	3.639407 (1%)	0.0043	1st difference
25	Statutory reserve requirement	-3.048945	-3.048945 (5%)	0.0425	1st difference
26	Foreign exchange reserves	-3.052170	-2.948404 (5%)	0.0398	Level
27	World economic growth	-3.009695	-3.009695 (5%)	0.0440	Level

No	Variables	ADF test statistic	Test Critical Value	Prob*	Stasionerity
28	Minimum wage	-28.28579	-3.661661 (1%)	0.0001	2nd difference
29	Deposit interest	-3.182602	-2.960411 (5%)	0.0308	Level

Based on the results of the stationarity test in Table 3 which produces stationary results at different levels, namely 8 stationary variables at the level, 13 stationary variables in the first derivative and the remaining 8 stationary variables in the second derivative. Thus the data on the second derivative can be used. However, Sim (1989) state that it is not recommended to use derived data because it will eliminate important information about the relationship between variables in a system such as the possibility of a cointegration relationship. According to Granger (Gujarati, 2003) the stationarity test can be ignored if the residual test is cointegrated with each other, so it has a long-term relationship. In the cointegration test below, all equations are proven to be cointegrated, so in this study no derived data is used.

Table 4. Cointegration Test Result

Equation	Variable	Trace Statistic	0.05 Critical Value	Description
Exchange Rate	KURS TB FDI BOT CD MS PDB	274.6788	159.5297	*cointegrated*
Interest rate	TB MS M0 INV RBI INF PDB	93.6817	88.8038	*cointegrated*
Inflation	INF MD KURS PDB RBI UM INV	190.3756	125.6154	*cointegrated*
Export	EKP KURS KRED INF PED	83.0356	69.8188	*cointegrated*
Import	IMP KURS PDB KRED INF KON	145.4170	95.7536	*cointegrated*
Investment	INV PDB TB FDI KRED GEXP	112.6667	95.7536	*cointegrated*
Currency	UKA TB PDB KRED KURS	189.1794	159.5297	*cointegrated*
Demand deposit	UGI TB PDB KRED	129.2544	63.8761	*cointegrated*
Savings and time deposit	TD TB PDB KRED INF	94.71445	69.8188	*cointegrated*
Money supply	MD PDB KURS M0	59.0773	47.85613	*cointegrated*
Money demand	INF GWM RBI MD KRED PDB	225.5845	125.6154	*cointegrated*
Base money	M0 TB INF GWM KON TD PDB	175.4945	125.6154	*cointegrated*
Consumption	KON YD TB TD	91.9896	47.8561	*cointegrated*
Loan	KRED TB GWM RBI	56.3725	47.8561	*cointegrated*
Government expenditure	GEXP GREV IMP PDB MS	151.1191	69.8188	*cointegrated*
Government revenue	GREV TAX PDB	124.4935	42.9152	*cointegrated*
Tax	TAX PDB INF	105.8373	42.9152	*cointegrated*
Deposit interest	BD RBI GWM M0	47.3617	40.1749	*cointegrated*

Classic Assumption Test Results

The results of the Jarque Bera Normality Test show that based on the probability value of the error term distribution with a 95% confidence level, each equation except the exchange rate equation (probability value 0.0096), imports (probability value 0.0003), credit (0.0364) and inflation (0.0010), has a normal distribution. The results of the autocorrelation test show that all of the equations studied have a value that is close to number 2, namely in the range of values from 1.643 to 2.383 so it can be concluded that the equations are free from autocorrelation problems.

The results of the heteroscedasticity test show that the chi-square probability value for the 18 equations in the study is in the range of values from 0.021 to 0.9881. Based on the results of the white test, the results show that all equations except the credit and import equations are free from heteroscedasticity symptoms. As a result of not fulfilling the assumption of homoscedasticity, it means that the resulting parameter becomes inefficient. To overcome this, White (1980) has derived a heteroscedasticity consistency covariance matrix estimator that is able to produce a correct estimate of the covariance of the estimated coefficient if in a certain equation a symptom of heteroscedasticity is found in an unknown form. The steps taken are: before making an estimate, on the options tab on the Heteroskesdaticity Consistence Covariance and White menu, check is done. Thus the problem of heteroscedasticity has been resolved and the resulting parameters are efficient.

Testing for the possibility of multicollinearity to an equation is carried out by looking at the correlation matrix between each parameter generated by estimation. In this study, in the tax equation, credit and demand deposits there are no indications of multicollinearity symptoms, while in the other equations there are multicollinearity symptoms. In this study, the model is allowed to contain symptoms of multicollinearity with the consideration that this model still produces a BLUE estimator (Best Linear Unbiased Estimator), because the BLUE estimator problem does not require the assumption of no correlation between independent variables. The simulation in the model shows relatively good results, supported by the results of the calculation of RMSE (range of values 0, 3195-585692) and U-Theil (range of values 0.0057 – 0.3165) which are relatively small. The results of these two calculations show that the model is quite good and suitable for future forecasting.

Equation Estimation Result

Exchange Rate Equation Model

KURS =

-7015,265 + 959,579*TB + 0,012*FDI - 11,884*INF + 0,003*MS -0,033*CD- 0,001*PDB + 0,0002*BOT

t-stat -0,697 4,610 0,219 -0,042 1,958 -1,627 -0,200 0,861

R^2 = 0,9742 F-stat = 147,107 DW = 1,405

In this exchange rate equation model, the coefficient of determination R^2 is 0.9742, meaning that the interest rate variables, foreign direct investment, inflation, money supply, foreign exchange reserves, gross domestic product and trade balance are able to explain 97.42% of the effect on the exchange rate, while 2,58% is explained by other variables. In the exchange rate model, all variables are significant so that interest, foreign direct investment, inflation, money supply, foreign exchange reserves, gross domestic product and trade balance are able to predict changes in exchange rates.

Deposit Interest Equation Model

BD = 1.6287 + 0.8660*rBI -0.1826*GWM + 0,0000013*M0

t-stat 2,044 9,135 -2,122 2,995

R^2 = 0,7346 F-stat = 29,096 DW = 0,675

In this deposit interest model, the coefficient of determination R^2 is 0.7346, meaning that the BI rate, GWM and M0 variables are able to explain 73.46% of the effect on deposit interest, while the remaining 26.54% is explained by other variables. In the deposit interest model, all variables are significant so that the BI rate, GWM and M0 variables are able to predict changes in deposit interest rates.

Interest Rate Equation Model

TB = 10,551 - 0,0000044*MS + 0,348*BD + 0,255*rBI – 0,110*GWM

t-stat 21,451 -7,917 2,251 1,787 -2,166

R^2 = 0,9151 F-stat = 75,961 DW = 0,676

In this interest rate equation model, the coefficient of determination R^2 is 0.9151, meaning that the money supply, deposit interest, BI rate and GWM variables are able to explain 91.51% of the effect on the loan interest rate, while the remaining 8.49% is explained by other variables. In the interest rate model, all variables are significant so that it can be said that the money supply, deposit interest, BI rate and GWM variables are able to predict changes in interest rates.

Inflation Equation Model

INF =

0,067 + 0,000051*MD + 0.0013*KURS +0,0000007 *KRED -1.563*rBI - 0,0000069*UM - 0,000006*INV

t-stat 0,019 0,518 1,008 0,170 -0,796 -1,400 -0,393

R^2 = 0, 1897 F-stat = 1,101 DW = 2,735

In this inflation equation model, the coefficient of determination R^2 is 0.1897, it shows that the variables of money demand, exchange rate, loan, BI rate, minimum wage and investment are able to explain 18.97% of the effect on inflation and the remaining 81.03% explained by other variables. The inflation model of all variables is not significant so that the variables of money demand, exchange rate, loan, BI rate, minimum wage and investment are not able to predict changes in inflation.

Export Equation Model

EKP = 24833084 – 1045,329*KURS + 0,457*KRED* - 1077036*INF - 2244885*PED

t-stat 3,008 -4,413 1,298 -1,021 -0,717

R^2 = 0, 1544 F-stat = 5,974 DW = 1,969

In this export equation model, the coefficient of determination R^2 is 0.1544, it shows that the variables of exchange rate, loan, inflation and world economic growth are able to explain 15.44% of their effect on exports, while the remaining 84.66% is explained by other variables. The export model of all variables is statistical significant so that the variables of exchange rate, loan, inflation and economic growth are able to predict changes in exports.

Import Equation Model

IMP = 6147296 – 439,69*KURS - 0,232*PDB + 0,341*KRED+ 50411,11*INF + 2,772*KON

t-stat 0,714 -1,356 -0,027 2,283 0,101 0,379

R^2 = 0, 6685 F-stat = 8,832 DW = 1,698

In this import equation model, the coefficient of determination R^2 is 0.6685, it shows that the exchange rate, gross domestic product, credit, inflation and consumption variables are able to explain 66.85% of the effect on imports, while the remaining 33.15% is explained by the variable other. The import model of all variables is significant so that the variables of exchange rate, gross domestic product, credit, inflation and consumption are able to predict changes in exports.

Investment Equation Model

INV

= -964333,6 + 0,721*PDB* + 16299,64*TB - 9,479 *FDI + 0,012*KRED - 20,94*GEXP

t-stat - 4,745 20,459 1,313 -1,815 1,958 -1,112

R^2 = 0, 9817 F-stat = 315,97 DW = 2,043

In this investment equation model, the coefficient of determination R^2 is 0.9817, it shows that the variables of gross domestic product, loan interest rate, foreign direct investment, credit and government spending are able to explain 98.17% of the effect on investment, while 1.83 The remaining % is explained by other variables. The investment model of all variables is significant so that the variables of gross domestic product, loan interest rate, foreign direct investment, loan and government spending are able to predict changes in investment.

Currency Equation Model

UKA = 67920,67 – 28806,10*TB + 0,228*PDB + 0,012*KRED + *14,194*KURS*

t-stat 0,183 -1,456 1,408 0,444 0,843

R^2 = 0, 9674 F-stat = 221,735 DW = 2,987

In this currency equation model, the coefficient of determination R^2 is 0.9674, it shows that the interest rate, gross product, credit, and exchange rate variables are able to explain 96.74% of the effect on currency, while the remaining 3.26% is explained. by another variable. The currency equation model of all variables is significant so that the interest rate, gross product, credit, and exchange rate variables are able to predict changes in currency.

Demand Deposit Equation Model

UGI = -15385,22 – 40328,06*TB + 0,516*PDB – 0,004*KRED

t-stat -0,082 -3,539 15,920 -0,867

R^2 = 0, 9719 F-stat = 373,020 DW = 1,764

In the demand deposit equation model, the loan interest rate variable has a negative effect on demand deposits. GDP variable has an influence on demand deposits. In this demand deposit equation model, the coefficient of determination R^2 is 0.9719, this shows that the interest rate, gross domestic product and credit variables are able to explain 97.19% of the effect on demand deposits, while the remaining 2.71% is explained by other variables. In this model, all variables are significant so that the interest rate, gross domestic product and loans are able to predict changes in demand deposits.

Savings and Time Deposit Equation Model

TD = -2436973 + 41031,99*TB + 1,677*PDB + 0,031*KRED – 3062,36*INF

t-stat -3,235 1,020 11,995 1,684 -0,059

R^2 = 0,9675 F-stat = 230,706 DW = 1,866

In this savings and time deposit equation model, the coefficient of determination R^2 is 0.9675, it shows that the interest rate, gross domestic product, loan and inflation variables are able to explain 96.75% of their effect on savings and time deposits, while the remaining 3.25% explained by other variables. The savings and time deposit models are all significant variables so that the interest rate, gross domestic product, loan and inflation variables are able to predict changes in savings and time deposits.

Money Demand Equation Model

MD = 7542,13 – 71000,71*TB + 0,7277*PDB + 26,75*KURS – 0,1314M0

t-stat 0,015 -2,576 3,474 1,207 -0,843

R^2 = 0, 9893 F-stat = 704,577 DW = 2,000

In the money demand equation (MD) model, the coefficient of determination R^2 is 0.9893, it shows that the interest rate, gross domestic product, exchange rate and M0 variables are able to explain 98.93% of the effect on money demand (M1), while 1 The remaining 0.07% is explained by other variables. The money demand model (M1) all variables are significant so that the variables of interest rate, gross domestic product, exchange rate and M0 are able to predict changes in money demand.

Money Supply Equation Model

MS =

-3953375 – 8637,96*INF + 42785*GWM + 27264*rBI + 1,677*MD -0,015*KRED + 2,333*PDB

t-stat -1,196 0,123 0,991 0,355 0,665 -0,371 0,949

R^2 = 0,9848 F-stat =312,90 DW = 1,623

In this money supply equation model, the coefficient of determination R^2 is 0.9648, inflation, minimum statutory reserves, BI rate, MD, loan and gross domestic product are able to explain 96.48% of the effect on the money supply, while the remaining 3.52% is explained by another variable. The money supply model is all significant variables so that the variables of inflation, reserve requirements, BI rate, MD, loan and gross domestic product are able to predict changes in the money supply.

Base Money Equation Model

M0 = - 192195,7 - 1727,60*TB + 409,01*INF + 15564,08*GWM -0,128 *KON+ 0,486*TD + 0,071*PDB

t-stat -0,296 0,079 0,016 1,108 -0,24 1,689 0,157

R^2 = 0,9710 F-stat =157,468 DW = 1,959

In this base money equation model, the coefficient of determination R^2 is 0.9710, meaning that the variables of interest rates, inflation, minimum statutory reserves, consumption, savings and deposits and gross domestic product are able to explain 97.10% of the effect on base money and the remaining 2 ,90% is explained by other variables. The base money model is all significant variables so that the variables of interest rate, inflation, minimum statutory reserves, consumption, savings and deposits and gross domestic product are able to predict changes in exchange rates.

Consumption Equation Model

KON = - 902773,0 + 0,610*YD + 24590,8 *TB +0,208*TD +0,278*UM

t-stat -3,908 4,169 3,003 3,021 5,168

R^2 = 0, 9972 F-stat = 2788,664 DW = 1,706

In this consumption equation model, the coefficient of determination R^2 is 0.9972, meaning that the disposable income variables, interest rates and savings and deposits and the minimum wage are able to explain 99.72% of the effect on consumption, while the remaining 0.28% is explained by other variables. The consumption model of all variables is significant so that the variables of disposable income, interest rates and savings and deposits as well as the minimum wage are able to predict changes in exchange rates.

Loan Equation Model

KRED = 42743358 - 356242*TB + 144945,5*GWM + 1433945*rBI

t-stat 8,050 -6,245 0,568 3,058

R^2 = 0,6485 F-stat =19,922 DW = 1,542

In this loan equation model, the coefficient of determination R^2 is 0.6485, meaning that the interest rate variable, minimum statutory reserve requirement and the BI rate are able to explain 64.85% of the effect on loan and the remaining 35.15% is explained by other variables. In the loan equation model, all variables are significant, so it can be concluded that the interest rate, minimum reserve requirement and BI rate are able to predict changes in loan.

Government Expenditure Equation Model

GEXP = - 5736,749 – 0,018*TAX + 0,003*PDB + 0,0003BOP - 0,313*FDI

t-stat -3,109 -1,189 2,451 3,245 -9,254

R^2 = 0,7540 F-stat =25,909 DW = 1,9435

In this government expenditure equation model, the coefficient of determination R^2 is 0.7540, meaning that the variables of tax, GDP, BOP and FDI are able to explain 75.40% of their effect on government spending, while the remaining 24.60% is explained by other variables. In the government spending model, all variables are significant so that the variables of tax, GDP, BOP and FDI are said to be able to predict changes in government spending.

Government Revenue Equation Model

GREV = -22,378 + 0.001*TAX + 0,0001*PDB

t-stat -0,404 1,297 1.645

R^2 = 0,9097 F-stat =158,232 DW =0,204

In this government revenue equation model, the coefficient of determination R^2 is 0.9097, meaning that the variables of tax and gross domestic product are able to explain 90.97% of their effect on government revenue and the remaining 9.03% is explained by other variables. In the government revenue model, all variables are significant, so it can be concluded that the tax and gross domestic product variables are able to predict government revenue.

Tax Equation

TAX = -64817,74 + 0,098*PDB - 996,106*INF

t-stat -3,573 15,148 -0,286

R^2 = 0,9490 F-stat =301,602 DW = 0.824

The tax equation model shows that GDP has an influence on taxes. The coefficient of determination R^2 obtained is 0.9490, meaning that the variables of gross domestic product and inflation are able to explain 93.46% of their effect on taxes, while the remaining 5.10% is explained by other variables. In this model all variables are significant so it can be said that the variables of gross domestic product and inflation are able to predict taxes.

Path Analysis of Monetary Policy Transmission Mechanisms

Here, study analyzes the operation of each monetary policy transmission mechanism channel based on the results of the simultaneous model estimation. The equations whose estimation results are analyzed are those related to the interest line, credit line, exchange rate line and money supply line.

Interest Rate Line

In this interest rate path, the relationship between monetary policy instruments and their targets is demonstrated by the operation of the monetary policy transmission mechanism. From 2010 to 2018 the development of money market interest rates followed the development of the BI rate. At Bank Indonesia as well as at the central banks of other countries, money market interest rates are used as a common operational target. In the deposit interest equation, the BI rate variable has an influence on deposit rates, thereby proving that the reference interest rate, namely the BI rate, is well responded to by deposit interest. In the loan interest rate equation, where this variable is the variable that determines the real sector, it turns out that it is influenced by deposit interest. In other words, it can be stated that changes in deposit interest are well

responded to by credit interest. The representation of the operation of the monetary policy transmission of the interest rate channel above is reflected in the state of the Indonesian economy between 2012 – 2013. Throughout 2013, money market interest generally followed the movement of the BI rate. Bank Indonesia's efforts to maintain this uniformity of movement are by maintaining interbank money market interest rates through the availability of banking liquidity in both rupiah and foreign currency. Between January and May 2013, the fixed BI rate responded the same to money market interest rates which were relatively fixed during that period. In the second half of 2013, in line with the increase in the BI rate, money market interest rates also increased. The BI rate increased by 175 bps, followed by an increase in market interest rates by 174 bps. Money market interest rates moved from 4.41% in 2012 to 6.15% at the end of 2013. The increase in BI and market interest rates was responded to by deposit rates. The deposit interest rate at the end of 2013 was recorded at 7.69% or an increase from 2012 which was only 5.76% or an increase of 193 bps. Furthermore, this increase in deposit rates was further transmitted to loan interest rates, although at a more limited scale. After tending to decline until June 2015 which was recorded at 11.93%, then after that it experienced an increase in line with the increase in the BI rate. The weighted average loan interest rate at the end of 2013 was recorded at 12.39% or an increase of 23 bps compared to 2012 which was only 12.16%. Based on this description, there is a fact that the magnitude of changes in loan interest rates is lower than changes in deposit rates and the BI rate. One of the reasons for the slow increase in loan interest rates is the banking strategy which tends to hold back on rising lending rates in order to maintain credit market share. In addition, banks are concerned that there will be an increase in non-performing loans (NPL) or uncollectible receivables if loan interest rates are increased by a large enough amount. If 2012 – 2013 is a representation of the role of the interest rate channel in transmitting contractionary monetary policy instruments, then 2017 is a representation of expansionary monetary policy. In 2017, the transmission of monetary policy through the interest rate channel grew stronger. The movement of interbank rates as an intermediate target set by BI is increasingly in line with policy interest rates. The decline in the BI Rate by 200 bps since 2016 was followed by a decrease in the interbank rate by 192 bps. This change in the interbank rate is transmitted to the deposit rate. At the end of December 2017, the weighted average deposit interest rate fell 187 bps compared to the initial level of 2016. The decline in deposit rates occurred in all tenors with the largest decline being dominated by short tenors. Meanwhile, the response of credit interest rates to monetary policy easing has been slower than the response of the deposit rate. The weighted average loan interest rate at the end of December 2017 was recorded at 11.3%, a decrease of 153 bps compared to the beginning of 2016. The decline in loan interest rates which was slower than the

decline in deposit rates was influenced by the ongoing process of banking consolidation, including overcoming risks credit, improve banking efficiency and profitability. Based on the type of use, the largest decline occurred in working capital loans of 178 bps, followed by investment loans of 157 bps and consumption loans of 122 bps.

The consistency of the role of the interest rate channel in transmitting policy after the 2008/2009 financial crisis was demonstrated again in the tight monetary policy conditions in 2018. The increase in policy interest rates by 175 bps in 2018 accumulatively was followed by an increase in money market interest rates of 190 bps. The average spread of money market interest rates and policy interest rates throughout 2018 was 25 bps, lower than 2017 at 43 bps. The transmission of policy interest rates to deposit rates was faster, especially after the policy rate hike. At the beginning of the year until April 2018, the decline in the deposit interest rate continued following the decline in the policy interest rate since January 2016. In accumulation, the decline in the policy rate by 200 bps from January 2016 to April 2018 was followed by a decrease in the deposit rate by 213 bps. During the period of the BI7DRR increase, the transmission of the increase in monetary policy occurred through deposit rates since June 2018. The recorded deposit interest rate rose by 102 bps from June to December 2018 to 6.88%. The transmission of the increase in policy interest rates to lending rates is not as strong as the transmission to deposit rates. This was influenced by the 2018 financial cycle which was still low and below its long-term pattern as well as sufficient liquidity conditions. On the interest rate channel, export-import activities are indicated as the transmission of inflation. In the exchange rate equation model built in this study, the interest rate has a positive relationship with the exchange rate and has a weak influence on the exchange rate. Thus, the scheme of the transmission mechanism through the interest rate channel with an inflation targeting framework is:

Policy interest instrument↓ deposit interest ↓

Deposit interest ↓ loan interest↓

Loan interest ↓ → Inflation

In the exchange rate equation, the loan interest rate has a strong influence on the exchange rate. Thus, credit interest is transmitted to inflation through the rupiah exchange rate based on the performance of exports and imports. In Indonesia during the observation period, indicators of exchange rate stability and price stability were quite good. This is indicated by the achievement of the inflation target for 6 years from 9 years and the relatively stable exchange rate. If the 2013 and 2014 targets were not achieved, one of the biggest reasons is indicated by the increase in subsidized fuel prices in 2014. One to two years after the crisis, the central bank implemented a tight monetary policy and then gradually moved towards a more expansive

policy. The results of this study are similar to the results of the study of Wuryandani, Ikram and Handayani (2003) which concluded that inflation expectations were more influenced by exchange rate movements. The results of this study are in accordance with the results of the study of Kusmiarso et al (2001) through the structural model of the money market. The results of his study stated that the SBI interest rate and the condition of banking liquidity had an effect on interbank money market interest rates, deposit rates and loan interest rates. Furthermore, changes in interest rates affect investment and consumption through the effect of the cost of capital as well as the substitution effect and income. The difference with the results of this study is that the effect on investment and consumption in this study is estimated through the exchange rate (exports and imports). In this study, what happened was slightly different where the response of credit interest rates tended to be higher than deposit rates even though both were affected by changes in central bank policy interest rates. Natsir's study (2009) also concludes that transmission through interest rates is quite effective in achieving the final target of monetary policy. The VAR model for data from 1990 to 2007 shows that the SBI interest rate through the interbank money market rate can explain variations in inflation with a deadline of about 10 quarters.

Loan Line

On the loan line, the monetary policy transmission mechanism worked quite well. In this path, the policy interest instruments which are transmitted to short-term interest then affect the loans realized by banks. These results are in line with the results of research by Yeniwati and Riani (2010) that bank loan lines play a role in the Indonesian economy. The estimation results on the interest rate variable are in accordance with the theory, namely that interest is a burden on borrowed funds, the higher the interest rate, the greater the demand for return on investment. In the midst of declining global economic activity, the situation is becoming increasingly difficult and the act of reducing capital originating from loan is a natural choice. 2014 represented this situation, investment loan in 2014 grew at a slower pace in response to slowing export demand and moderation in household consumption. In addition, BI implemented a policy of stabilizing interest rates and loan to value (LTV) which resulted in a decline in investment credit. On the BI rate instrument, bank credit responded in the same direction. Thus, an increase in the BI rate which means an increase in deposit interest will cause an increase in loan interest. The three interest rates have a linear relationship, so an increase in the BI rate, which means an increase in deposit interest rates and an increase in loan interest rates, should immediately decrease loans. Thus, an increase in the BI rate should be immediately responded to by a decrease in the number of loans, but in reality this is not the case. This condition is

inseparable from the strategy of most banks not to immediately increase loan interest when market interest rates increase to maintain a share in loan. According to Bank Indonesia, commercial banks will adjust loan interest rates in 4 to 5 months. Only after that period did the trend of slowing loan growth occur (Warjiyo & Juhro, 2016). In the credit line, import activity is indicated to be the real sector that transmits inflation because in the import equation, loan affects imports. In the import model built in this study, it is found that the estimation results that loan has an effect on imports. Thus the transmission scheme on the loan line is:

Interest policy instrument (*BI rate*) ↑ loan interest ↑

Loan interest ↑ loan ↓

Loan ↓ → inflation

In the import equation, credit has a strong influence on imports. Based on the estimation results, credit related to import activities is indicated to transmit monetary policy on inflation in Indonesia. The results of this study are in line with the results of Hakim's (2001) research that credit plays a more important role than M2 during the crisis. In the research for the period before the crisis, it was found that M2 was considered more important than credit. The results of this study are also in accordance with Mayo et.al (2014) which states that the credit channel plays a role in transmitting monetary policy on inflation through trade credit and investment credit. However, a slightly different result was shown by the research of Yarasevika et al. (2015) which shows that credit channels are more influenced by economic growth and credit behavior in the past compared to loan interest rates and minimum statutory reserves.

Exchange Rate Line

In the exchange rate channel, it is indicated that the monetary transmission mechanism does not play a good role when referring to the exchange rate parity theory but plays a role if it is influenced by foreign exchange intervention monetary policy instruments. According to the exchange rate parity theory, an increase in the domestic interest rate will attract foreign funds into the country so that the rupiah will appreciate. However, this condition was not reflected during 2010 to 2018. In this study, the interest rate has a positive relationship with the exchange rate, meaning that the increase in domestic interest has an effect on the weakening of the rupiah, not the other way around, in accordance with the exchange rate parity theory. When viewed from the role of FDI, this direct flow of funds should have had the effect of strengthening the rupiah, but statistical results indicate otherwise, besides that the effect is also not significant. If viewed from the trade balance, the effect of the surplus is also indicated to cause pressure on the rupiah which is also not in accordance with the theory of exchange rate parity. The growth of the world economy, which was originally thought to be an important factor in exchange rate

fluctuations, turned out to have a weak effect on exports so that the further impact on the exchange rate would be small. Foreign exchange reserves have an influence on the exchange rate, implemented by means of market intervention. To maintain exchange rate stability, supply and demand intervention in the foreign exchange market is the most common method used by central banks. In Indonesia, the exchange rate policy adopted by Bank Indonesia is directed at keeping the rupiah appreciation consistent with macroeconomic developments and not fluctuating. For example, in 2010, in the midst of heavy inflows of foreign capital and pressures of appreciation, Bank Indonesia adopted a policy of exchange rate stabilization to minimize exchange rate volatility. This exchange rate stabilization policy was used again in 2012 when the development of Indonesia's balance of payments performance recorded a surplus and contributed to an increase in Indonesia's foreign exchange reserve position. The position of foreign exchange reserves at the end of 2012 recorded an increase from the previous year to 112.8 billion US dollars, although it fell to 106.5 billion US dollars in the second quarter due to pressure from the balance of payments deficit. This fluctuation in foreign exchange reserves is part of market intervention policies to maintain adequate foreign exchange reserves as a cushion for exchange rate stabilization. The negative relationship between the amount of foreign exchange reserves and the rupiah exchange rate was reflected when the position of foreign exchange reserves decreased due to Bank Indonesia's efforts to maintain exchange rate stability in the second half of 2011, due to external turmoil triggered by the government debt crisis in Europe and delays in the economic recovery process. in the United States. Bank Indonesia took efforts to stabilize the rupiah exchange rate in response to increasing pressure on the rupiah. The turmoil in global financial markets has prompted investors to shift their investment from assets from emerging market countries to financial instruments that are considered safer. This condition led to increased pressure on rupiah depreciation, driven by foreign capital outflows. Facing these conditions, Bank Indonesia adopted a policy of rupiah stabilization through intervention in the foreign exchange market by utilizing previously accumulated foreign exchange reserves. The results of this study are in accordance with the results of a study by Siswanto, Kurniati, Gunawan, and Binhadi (2002) which states that most banks view that foreign exchange intervention by Indonesian banks is the most effective monetary instrument in influencing the rupiah exchange rate. Only a few banks are of the opinion that the SBI interest rate can affect the exchange rate. On the other hand, this research study shows that with a more flexible exchange rate system after the Asian crisis, the transmission of the exchange rate channel became stronger. The direct effect of the exchange rate on inflation (through changes in the price of imported goods) is stronger and immediate since the first month than the indirect effect (through aggregate demand) which has only started

to occur with a two-month deadline. The results of this study are consistent with the observations of Bank Indonesia which states that, with the credibility of Bank Indonesia's monetary policy after the implementation of the ITF in 2005 and the more stable Indonesia's macroeconomy, the exchange rate has an effect on inflation even though it is decreasing. This is shown by the results of Kuncoro's research (2015), with monthly data from 2003-2013 proving that with the application of the ITF the effect of 10% depreciation of the rupiah exchange rate on import price inflation and producer prices decreased from 6% and 3% respectively to 3 % and 1.5%. This result is slightly higher than Bank Indonesia's estimate of CPI inflation, which is around 0.7% to 1.2% for every 10% depreciation of the rupiah. The decline in the effect of the exchange rate on inflation after the implementation of the ITF was also proven by Siregar and Goo (2009). The description of the relationship between variables in the exchange rate path is:

FDI does not affect the exchange rate.

BOT does not affect the exchange rate.

CD ↑ Exchange Rate ↓

MS ↓ Exchange Rate ↓

Exchange Rate ↓ → Inflation

Money Supply Line (liquidity)

In the money supply channel or the liquidity channel, the transmission mechanism is indicated to be less active or weak. Base money as the core of the amount of money to be circulated by the central bank has no effect on the demand for money (M1) besides the direction is also opposite. The development of M2 was heavily influenced by M1 through rupiah demand deposits and the growth of currency, but the influence was weak. In this study also resulted that the minimum mandatory reserve (GWM) has no effect on base money (M0). Since the minimum reserves has no effect on M0 and M0 also has no effect on M2, it is stated that the transmission mechanism of the money supply channel does not play a role in transmitting the monetary policy instrument of the minimum statutory reserve. Based on this description, the final scheme of the simultaneous monetary policy transmission mechanism model in this study can be seen in Figure 1.

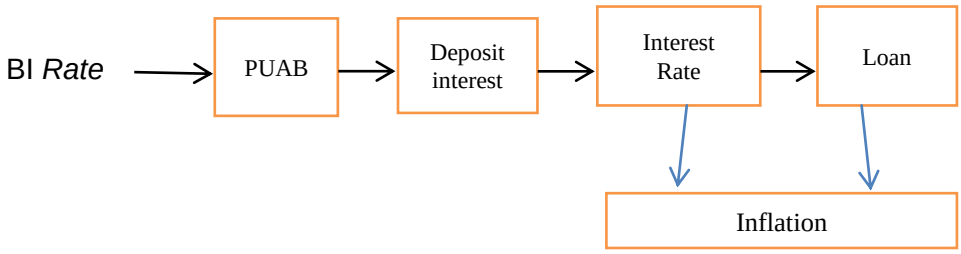

Figure 1. Monetary Policy Transmission Mechanism Model

The final scheme that can be formulated in the transmission mechanism of this simultaneous model of monetary policy is that the monetary policy instrument that can be applied is the Bank Indonesia interest rate (BI rate). The operational target is as determined by the central bank, namely money market interest rates. The BI rate is well transitioned to deposit interest and the deposit interest affects credit interest. Thus, this interest rate channel is a transition channel that has a role in targeting inflation in the economy. On the other hand, the amount of credit is significantly influenced by the interest rate so that the reference interest instrument is a good policy instrument to influence credit which in turn will affect inflation as the final policy target. Based on the results of the analysis, the main contribution of this research is that for the central bank, the policy interest rate is an important instrument in monetary policy in Indonesia. The interest rate channel and the credit channel can be used as a priority channel in influencing the economy within the inflation targeting framework.

CONCLUSION AND SUGGESTIONS

The monetary policy transmission mechanism model that has been developed reflects the relationship between variables consisting of policy instruments and macroeconomic variables within the inflation targeting framework in Indonesia. The impact that occurred as a result of the monetary policy carried out was the movement of policy interest rates during the 9 years of observation followed in the same direction by deposit interest. Deposit interest direction of movement is also the same as loan interest. The same direction of movement, besides showing the role of the interest rate channel, also indicates that the BI Rate instrument as a policy interest affects deposit rates in the money market. If the central bank wants a contractionary policy by increasing the policy rate, the deposit interest rate will also increase. The increase in deposit interest will be followed by an increase in interest rates in the credit sector, so it is expected that the number of loans will decrease. If the number of credits decreases, it will put pressure on expenditures for entrepreneurs to invest which will then be transmitted to inflation. Foreign exchange reserves have a negative effect on the exchange rate while the money supply has a negative effect on the exchange rate. The more foreign exchange reserves you have, the exchange rate will appreciate. Exchange rate and credit are macroeconomic variables that are affected by monetary policy. The channels that play a role in transmitting monetary policy instruments are the interest rate channel and the credit channel. To influence the inflation rate, the policy interest rate instrument is the right instrument for the central bank. The exchange rate and investment are macroeconomic variables that have the potential to be transmitted to inflation in Indonesia. This study found that the slowdown in world economic growth did not affect Indonesia's exports. Foreign exchange reserves are capable of

bearing exchange rate stability. This research involves only three markets. First, the money market by including the elements of money supply and demand variables, including currency, demand deposits, base money, M1 and M2. Second, the goods market includes the variables of consumption, investment, government spending, exports and imports. Third, foreign markets by incorporating the variable elements of foreign direct investment, net capital entry (NCI), exports and imports. This study does not discuss the labor market and the aggregate production function. In future research, it is recommended to add a labor market or production function. Overall the labor market has not recovered due to the Covid-19 pandemic, however, there are some other labor markets, in which those engaged in work related to digital technology have the opportunity to increase due to the acceleration of digital transformation. Likewise with production at manufacturing companies which had experienced problems during the Covid 19 pandemic. Both of these are expected to provide interesting analytical results to be discussed for researchers.

REFERENCES

Agung, J. (2003). Financial deregulation and bank landing channel of monetary policy in developing countries: The case of Indonesia. *Buletin Ekonomi Moneter dan Perbankan*, *3*(1), 121-145.

Agung, J., Kusmiarso, B., Pramono, B., Hutapea, E. G., Prasmuko, A. & Prastowo, N. J (2001). *Credit crunch in Indonesia in the Aftermath of the crysis*. Jakarta: Bank Indonesia Direktorat Riset Ekonomi dan Kebijakan Moneter, 1-97. https://www.bi.go.id/id/bi-institute/policy-mix/core/Pages/Credit-Crunch-In-Indonesia-In-the-Aftermath-of-the-Crisis-Facts-Causes-and-Policy-Implications.aspx

Beck, T., Colciago, A. & Pfajfar, D. (2014). The role of financial intermediaries in monetary policy transmission. *De Nederlandsche Bank NV Working Paper No. 420,* 1-23.

Bernanke, B.S., Gertler, M. & Gilchrist, S. (1999). *Financial accelerator in quantitative business fluctuations framework.* In J.B. Taylor dan M. Woodford (editor). Handbook of Macroeconomics*,* 1, 1343-1393.

Bukonla, G. Osisanwo. Tella, S.A. Adesoye, B. Abolaji. (2019). The empirical analysis of monetary policy on balance of payments adjustments in Nigeria: A bound testing approach. *Iranian Economic Review, 23*(1)*,* 129-147.

Cettorelli, N. & Goldberg, L. (2012). Banking globalization and monetary transmission. *Journal of Finance, 67*(5)*,* 1811-1843.

Ciccarelli, M., Maddaloni, A., & Peydro, J. L. (2013). Heterogeneous transmission mechanism: monetary policy and financial fragility in the Eurozone. *Economic Policy 28* (75), 459-512.

Debelle, G. (2001). The case for inflation targeting in East Asian Countries. *RBA Annual Conference Volume (Discontinued)* in David Gruen & John Simon (ed.), Future Directions for Monetary Policies in East Asia, Reserve Bank of Australia, Sydney, 65-87.

Deriantino, E. (2013). Banking competition and effectiveness of monetary policy transmission : A theoretical and empirical assessment on Indonesia. *International Journal of Economic Sciences*, *2*(3), 21-35.

Fazaalloh, A.M. & Sasongko. (2014). Whether the Bank Lendinng Channel can Work? Evidence from Foreign Banks in Indonesia. *Review of Integrative Business Economic Research, 4*(1), 440-451.

Fitrawaty. (2018). Keterkaitan instrumen kebijakan moneter dengan tingkat pengangguran. *Economics Development Analysis Jurnal,* 7(4), 421-431.

Gujarati, D. (2003). *Basic Econometric*. Singapore: McGraw-Hill.

Hakim, L. (2001). Penerapan pentargetan inflasi dalam mekanisme transmisi kebijakan moneter 1990.1-2000.4. *Media Ekonomi Fakultas Ekonomi Universitas Trisakti Jakarta, 7*(2), 119-137.

Hakim, L. & Nopirin. (2001). Perbandingan peranan jalur kredit dan jalur tingkat suku bunga pada mekanisme transmisi kebijakan moneter 1990-1999. *Sosiohumanika, Program Pascasarjana UGM, 14*(1), 1-20.

Haryanto. F.R. (2007). *Dampak instrumen kebijakan moneter terhadap perekonomian Indonesia: Suatu analisis jalur mekanisme transmisi moneter* (Doctoral Dissertation), IPB, Bogor.

Hudiyanto, H. (2020). *Dampak kebijakan moneter pada perekonomian Indonesia tahun 2010-2018* (Doctoral Dissertation). Doctoral Program, Faculty of Economics, Gunadarma University, Indonesia.

Ismail, M. (2006). Inflation targeting dan tantangan implementasinya di Indonesia. *Jurnal Ekonomi dan Bisnis Indonesia, 21(2)*, 105–121.

Ippolito, F., Ozdagli, A. K & Perez-Orive, A. (2018). Transmission of monetary policy through bank lending: The floating rate channel. *Journal of Monetary Economics, 95*(May 2018), 49-71

Janah, I. A. & Pujiati, A. (2018). Analisis mekanisme transmisi kebijakan moneter jalur ekspektasi dalam memengaruhi inflasi di Indonesia. *Economics Development Analysis Journal 7*(4)*,* 384-394.

Kuncoro, H. (2015). Inflation targeting, exchange rate pass-through, and monetary policy rule in Indonesia. *International Journal of Business, Economics and Law*, *7*(3), 14-25.

Kusmiarso, B., Sukawati, E., Sudiro P., Dadal A., Andry P., & Hafidz, I.S., (2000). Interest Rate Channel of Monetary Transmission in Indonesia. In Perry Warjiyo dan Juda Agung (editor) Transmission Mechanism Of Monetary Policy In Indonesia. Directorate of Economic Research and Monetary Policy Bank Indonesia.

Masson, P. R., Savastano, M. A. & S. Sharma, S. (1998). Can inflation targeting be a framework for monetary policy in developing countries. *Finance and Development*, *35*(1), 34-37. Retrived from: https://www.elibrary.imf.org/view/journals/022/0035/001/article-A010-en.xml.

Mayo, R., Maski, G. & Pratomo, D.S. (2014). Efektivitas jalur kredit dalam mekanisme transmisi kebijakan moneter di Indonesia. *Jurnal Keuangan dan Perbankan, 18*(1), 152-160.

Mishkin, F. S & Schmidt-Hebel, K. (2007). Does inflation targeting make a difference?. *Research Paper*, Retrieved from: https://www.sedlabanki.is/lisalib/getfile.aspx?itemid=5188

Nizamani A. R., Karim, Z. A., Zaidi, M.A.S., & Khalid, N. (2017). Trade balance response to shocks in monetary policy SVECM Approach. *International Journal of Business and Society, 18*(3), 579-594.

Natsir, M. (2009). Analisis efektivitas mekanisme transmisi kebijakan moneter di Indonesia melalui jalur ekspektasi inflasi periode 1990:2-2007:1. *Ekuitas: Jurnal Ekonomi dan Keuangan*, 13(3), 288-307.

Natsir, M. (2011). Analisis empiris mekanisme transmisi kebijakan moneter di Indonesia melalui jalur suku bunga (*interest rate channel*) 1990.2-2007.1. *Majalah Ekonomi, XXI* (2) , 110-123.

Silalahi, T., Wibowo,W.A., & Nurlian, L. (2012). Impact of global financial shock to international bank lending in Indonesia. *Bulletin of Monetary, Economics and Banking,* Oktober, *15*(2), 75-110.

Sims, C. A. (1989). Model and their uses. *American Journal Agricultural Economics*, *71*(2), 489-494.

Siregar, R.Y. & Goo, S. (2009). Effectiveness and commitment to inflation targeting policy: Evidences from Indonesia and Thailand*. MPRA (Munich Personal RePEc Archive) Paper,* 17271. Retrieved from: *https://mpra.ub.uni-muenchen.de/17271/*

Siswanto, B., Kurniati, Y., Gunawan, & Binhadi S. H. (2002). *Exchange rate channel of monetary transmission in Indonesia* in Perry Warjiyo dan Juda Agung (editor). Transmission Mechanism of Monetary Policy in Indonesia. Bank Indonesia: Jakarta.

Smets, F. (2014). Financial stability and monetary policy: How closely interlinked?. *International Journal of Central Banking,10*(2), 263-300.

Sussanto, H. (2006). *Peran suku bunga dalam mekanisme transmisi kebijakan moneter di Indonesia tahun 1990–2005* (Doctoral Dissertation). Doctoral Program, Faculty of Economics, Gunadarma University, Jakarta, Indonesia.

Taylor, J.B. (1995). The monetary transmission mechanism: An empirical framework. *Journal of Economics 9*(4), 11-26.

Taylor, J.B. (2014). *Inflation Targeting in Emerging Markets: the Global Experience.* Economics Working Paper 14112. Retrived from: https://www.hoover.org/sites/default/files/14112_-_taylor_-_inflation_targeting_in_emerging_markets_-_the_global_experience.pdf

Warjiyo, P. (2004). *Mekanisme transmisi kebijakan moneter di Indonesia.* Buku seri Kebanksentralan No. 11, Pusat Pendidikan dan Studi Kebanksentralan (PPSK), Bank Indonesia, Mei, 1-56.

Warjiyo, P. & Agung, J. (2002). *Transmission mechanism of monetary policy in Indonesia.* Directorate of Economics Research and Monetary Policy, Bank Indonesia, 429-454. Retrived from: https://www.bi.go.id/id/bi-institute/policy-mix/core/Pages/Transmission-Mechanisms-of-Monetary-Policy-in-Indonesia.aspx

Warjiyo, P., & Juhro, S. M. (2016). *Kebijakan Bank Sentral teori dan praktek*. Jakarta: PT. Raja Granfindo.

White, H. (1980). A heteroskedasticity-consistent covariance matrix estimator and a direct test for heteroskedasticity. *Econometrica*, *48*(4), 817-838.

Wuryandari, G., Ikram, A. M., & Handayani, D. E. (2003). *Monetary policy transmission through inflation expectation channel.* In Perry Wajiyo and Juda Agung, Transmission Mechanism of Monetary Policy in Indonesia, Bank Indonesia, Directorate of Economics Research and Monetary Policy.

Yarasevika, S., Tongato, A., & Muthia, A.C. (2015). *Bank lending channel in Indonesia's monetary policy transmission mechanism: A VECM approach.* Proceedings of ISER 5th International Conference, Singapore, September, 1-6. Retrieved from: https://www.worldresearchlibrary.org/up_proc/pdf/62-144229776627-32.pdf

Yeniwati & Riani, N. Z. (2010). Jalur kredit perbankan dalam mekanisme transmisi kebijakan moneter di Indonesia. *Tingkap: Jurnal Ilmiah Ilmu-ilmu Sosial Budaya dan Ekonomi*, *6*(2), 1-14

Yunanto, M., & Medyawati, H. (2013). Macroeconomic structural change in Indonesia: Period of 1990 to 2011. *International Journal of Trade, Economics and Finance, 4*(3)*,* 98-103.

Yunanto, M & Medyawati, H. (2014). Monetary and fiscal policy analysis: Which is more effective? *Journal of Indonesian Economy and Business, 29*(3)*,* 222-236. Retrieved from: https://jurnal.ugm.ac.id/jieb/article/view/6470.

Yunanto, M & Medyawati, H. (2015). Fiscal policy and monetary policy sensitifity analysis. *International Journal of Trade, Economics and Finance, 6*(2)*,* 79-84. Retrieved from: http://www.ijtef.org/index.php?m=content&c=index&a=show&catid=68&id=763