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Causality of Dual System Monetary Policy to Inflation in Indonesia

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ABSTRACT

The paradigm shift from a conventional economy to an Islamic economy has encouraged the development of Islamic finance. This development will change the direction of monetary policy, in which the Islamic monetary magnitude will more or less affect the achievement of inflation in the economy. This research aims to identify the causality of dual system monetary policy with inflation in Indonesia during the observation period. The research method used is descriptive quantitative. The data used are monthly data from January 2016 to November 2020. This study uses secondary data published by Bank Indonesia, OJK, BPS, and various literature that will be used to answer research questions. VECM is used to answer the causality between dual system monetary policy and inflation. From the model estimation results, it is found that there is only a one-way relationship between the dual system monetary policy (SBIS) and inflation. However, the cointegration test results show that there is a cointegration relationship between the dual system monetary policy variables and inflation. This indicates that the dual system monetary policy tends to short-term and long-term relationships.

1. PRELIMINARY

Indonesia is a country that adopts a dual system in which the economy does operate not only conventional banking but also Islamic banking. Since its establishment in 1992, Islamic banking has shown significant performance in Indonesia regarding the number of banks, assets, third-party funds, and financing. Following are some indicators of the performance of Islamic banking in Indonesia.

Table 1. Development of Number of Banks, Assets, Third Party Funds, Financing in Islamic Banks in Indonesia

Year	Number of Banks (Units)	Total Assets (Rp billion)	Third-Party Funds (Billion Rp)	Total Financing (Rp billion)
2002	229	4,045	2,918	3,277
2012	1,745	149,321	116, .871	106,532
2021	1,954	362,691	428,750	179,564

Source: Bank Indonesia and OJK

The development of Islamic banking performance cannot be separated from the government's role as a regulator. The government has created a legal umbrella for Islamic banking by issuing the Sharia Banking Law No. 21 of 2008. The issuance of this legal umbrella has created certainty that will give birth to public trust in using Islamic banking products. In effect, the existence of Islamic banking will affect the performance of Bank Indonesia as a regulator in the monetary sector. It is based on the premise that every rupiah saved by customers will be a source of Islamic banking financing.

Furthermore, every rupiah from financing distributed by Islamic banking will create a multiplier effect in creating the money supply in the economy, which will impact economic growth and inflation. According to the Classical theory, any increase in the money supply will cause inflation because this group assumes that the volume of money and institutions' velocity is assumed to be constant. Therefore, the impact of changes in the money supply will cause inflation proportionally (Case & Fair, 2007). On the other hand, every time there is an increase in inflation, it will encourage an increase in the need for money to consume the same amount. The effect of inflation will cause the amount of money in circulation to increase. Here it is seen that there is a causal relationship between inflation and the money supply. Based on this transmission

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mechanism, Bank Indonesia can use Islamic monetary policy instruments to control inflation in Indonesia. In Ascarya's (2012) study, it was revealed that PLS and SBIS as a shocking rate for Islamic policies had a positive and permanent impact on inflation and output. In line with Ascarya, Noviasari (2012) found that Islamic monetary policy is more effective at influencing inflation than conventional monetary policy. Observing the development of research that has been done before, The author considers it important to carry out further research considering that Islamic banking has experienced a very rapid development compared to the data used by previous researchers. Besides, technological developments in the financial sector, including in the Islamic framework, have experienced tremendous developments so that more or less will affect people's consumption and saving behavior. Therefore, the authors focus on investigating the causality between Islamic monetary policy and inflation in Indonesia from 2016 to 2020?

2. LITERATURE REVIEW

2.1 The Concept of Money in Islam

Talking about inflation is closely related to the concept of money. Money is anything that is generally accepted as a legal tender. In Islamic economics, money has the main function as a medium of exchange and a unit of account (Karim, 2006). Although in practice, it is still permissible to use money as a store of value and a standard deferred payment, as long as it considers money only as a medium of exchange and not a commodity that is contested. In conventional economic concepts, money is a personal item to accumulate money as capital stock. The terms money and capital are often used together (interchangeable). Because in a conventional economy, money is synonymous with capital. Meanwhile, Islamic economics clearly distinguishes between money and capital. As a consequence of this distinction, money can be further distinguished as a public good (public goods) and capital as a private good (private goods). Besides, money is a flow concept, while capital is a stock concept (Rianto & Amalia, 2010). Microeconomic Theory. Jakarta: Golden.). The effect is that in an Islamic economy, money must flow and circulate in society, or it cannot be deposited and hoarded. Another consequence of the separation between money and capital concepts is that money cannot be a source of income until it is spent for productive purposes (investment). Thus, to get results, someone who has money must "exchange" it with capital (in the form of capital goods) to become productive private goods to generate income.

2.2 Dual System Monetary Policy

There are many definitions in the conventional literature of monetary policy. According to Djohanputro (2006), monetary policy is government action to achieve macroeconomic management objectives (output, prices, and unemployment) by influencing the money market or creating the money supply. Through changes in the money supply, it will change market interest rates and the real sector through investment activities or credit creation by the banking sector (Mishkin, 2007). According to monetarists, changes in the money supply effectively influence inflation in the long run and real national output. To move the real sector, monetarists believe more in monetary power. This is in contrast to the physicists who Keynes initiated. Keynes believes that monetary policies only cause inflation (Nopirin, 2010). Therefore Keynes rolled out the idea of the importance of fiscal policy as a source of economic growth. According to Keynes, the effect of fiscal policy is faster than monetary policy. Another definition of monetary policy from Mishkin (2007) is an important but undesirable instrument for influencing output changes. According to Nopirin (2010), monetary policy is an action taken by monetary authorities to influence circulation and credit money.

Broadly speaking, it can be concluded that monetary policy is an action taken by the monetary authority (in this case, the central bank) to influence macroeconomic stability (economic growth, inflation, unemployment, and balance of payments) through changes in money in circulation and credit extended by banks. According to Ascarya (2008), three things distinguish conventional monetary policy from Islamic monetary policy, namely: first, 100 percent reserve banking system. With this concept, banks make all their deposits as reserves to create new money for the bank. All reserves are left to the central bank so that no new purchasing power is created. Thus, this concept does not contain an element of usury and does not cause an inflationary effect, and no party will be disadvantaged. Second, Full-bodied money, namely the intrinsic value of money is the same as its nominal value, or if you use trust money, the issuance of 100% money is backed up 100 percent with something that has a stable value (generally gold) that is kept by the money issuer (Hasanah, 2007). Third, do not use the concept of interest but use the concept of profit sharing. The Islamic monetary system does not use an interesting instrument because the concept of interest is usury. As a substitute, the monetary system uses a profit-sharing system. In a dual system like Indonesia, the main differentiator from conventional and Islamic monetary policy is the non-use of interest. In a dual system, The Islamic monetary policy system still uses money created by the conventional system using the fractional reserve banking system, namely integrating the Islamic monetary system in the dominance of the conventional system which is still dominant. Therefore, the Islamic banking system still operates in a fractional reserve banking system that can create demand deposits and electronic money regarding sharia principles (Ascarya, 2012).

2.3 Conventional Monetary Policy Mechanisms

To see how monetary policy impacts the real sector, we will first discuss the working monetary policy mechanism.

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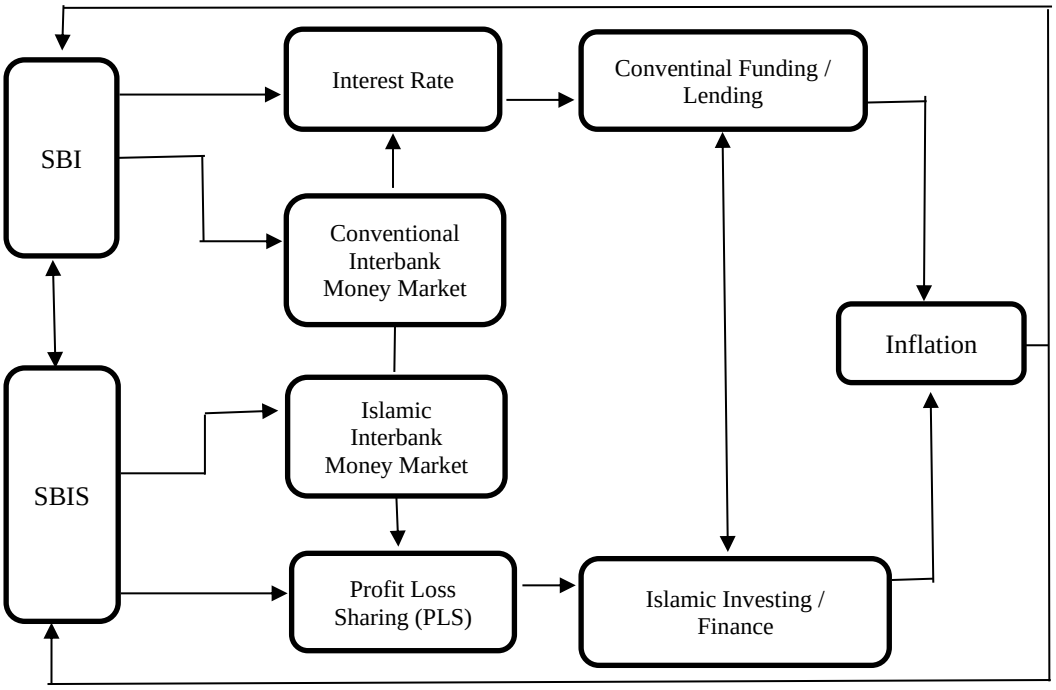
In determining the monetary policy instrument to be used, in general, the central bank will look at the ultimate goal of monetary policy (Nopirin, 2010). Initially, monetary policy's ultimate goal was macroeconomic stability through four indicators, namely high economic growth, price stability, low unemployment, and a balanced balance of payments (Case and Fair, 2007). However, in its development, achieving all four indicators at the same time is not easy. Often there is a tradeoff between the final objectives, thus making monetary policy ineffective. Therefore, the central bank changed its monetary policy's ultimate goal into a single target, namely the achievement of stable prices (Ismail, 2006). With inflation under control, it will be easier to achieve high economic growth and low unemployment (assuming that external conditions are conducive to that achievement). After the final goal is determined, the central bank will determine the intermediate target of monetary policy. This intermediate target will be used to monitor the extent of the achievement or deviation from monetary policy achievement. The intermediate target can be used as an initial indicator to see the final target of monetary policy achievement. Because the effect of monetary decisions on the real sector is not direct, the central bank needs signs of a monetary policy's success or failure rate. According to Warjiyo (2004), the complexity of monetary policy transmission is influenced by the following factors, namely: a) Changes in the behavior of the Central Bank in banking and economic and financial actors; b) The length of time between monetary policies rolled in and the results are visible in the final target; c) There are changes in the monetary transmission channels themselves according to economic and financial developments in the countries concerned. There are many channels of monetary policy mechanisms, namely: a) Interest Rate Channels. Interest rates can be targeted between monetary policies because central banks can easily monitor movements of interest rates. There are two stages of monetary policy transmission through interest rates; the first stage, the central bank, will change the benchmark interest rate (BI Rate), which will affect the development of SBI interest rates. PUAB interest rates, credit interest rates, and credit volume in banks. This transmission process requires a deadline between policy interest rates and changes in the volume of loans disbursed. The second stage, the transmission of monetary policy to the real sector, is strongly influenced by this policy's impact on investment and consumption activities. The effect of interest rates on consumption because the high and low deposit interest rates will affect the public's return on assets. If the deposit interest rate is low, the attractiveness to consume will be high; on the other hand, if the deposit rate is high, the public will prefer to save their funds in the banking sector. Furthermore, interest rates will affect investment activities because credit interest rates are part of the funds' cost. The higher the credit interest rate, the lower the desire to invest. Conversely, the lower the credit interest rate, the higher the investment activity; b) Line of monetary quantities (money supply). To influence the real sector, the central bank can use a monetary quantity (money supply). Changes in the money supply will affect the balance in the money market, which results in changes in interest rates. If inflation is high, then the central bank will reduce money in circulation, resulting in an increase in interest rates and a decrease in investment activity. People's purchasing power will decline and will be followed by a decrease in inflation (Nuryati, Siregar, & Ratnawati, 2007). b) Line of monetary quantities (money supply). To influence the real sector, the central bank can use a monetary quantity (money supply). Changes in the money supply will affect the balance in the money market, which results in changes in interest rates. If inflation is high, then the central bank will reduce money in circulation, resulting in an increase in interest rates and a decrease in investment activity. People's purchasing power will decline and will be followed by a decrease in inflation (Nuryati, Siregar, & Ratnawati, 2007). b) Line of monetary quantities (money supply). To influence the real sector, the central bank can use a monetary quantity (money supply). Changes in the money supply will affect the balance in the money market, which results in changes in interest rates. If inflation is high, the central bank will reduce money in circulation, resulting in rising interest rates and lower investment activity. People's purchasing power will decline and will be followed by a decrease in inflation (Nuryati, Siregar, & Ratnawati, 2007). then the central bank will reduce money in circulation, which results in rising interest rates and decreasing investment activity. People's purchasing power will decline and will be followed by a decrease in inflation (Nuryati, Siregar, & Ratnawati, 2007). then the central bank will reduce money in circulation, which results in rising interest rates and decreasing investment activity. People's purchasing power will decline and will be followed by a decrease in inflation (Nuryati, Siregar, & Ratnawati, 2007).

2.4 Dual System Monetary Policy

Ascarya (2012) states that monetary policy appears in line with the separation of monetary policy from fiscal policy. Monetary authority developed along with the central bank's development from a circulating bank, which was marked by the emergence of the Bank of England (BOE) in 1694. At that time, fiat money was underdeveloped. Therefore the central bank's task was to regulate the amount of money in circulation. Control the value of currency or inflation. This money arrangement is not required when the money is full-bodied money where the value of money is the same as its intrinsic value. Furthermore, Ascarya revealed that monetary control is actually simple, namely maintaining the smoothness and availability of money in circulation in the economy following the real sector's needs as was done by Baitul Maal during the caliphate. This condition is no longer simple today. The money in circulation is money that is not fully valued (fiat money). The Islamic banking system still implements the fractional reserve banking system, which creates demand deposits through a money multiplier containing usury. With such a mechanism, Islamic monetary control is not simple. Chapra (2000) explains that the monetary policy mechanism does not only regulate the supply of money to be balanced with the demand for money, but it must also be able to meet the need to finance the government deficit and other socioeconomic goals of Islamic societies. There are six elements to the monetary policy mechanism, namely a) a growth target for the money supply and monetary bade; b) Public shares of deposit (demand deposit); c) Statutory mandatory reserves; d) Credit restrictions; e) Value-oriented credit

allocation; f) Other techniques such as buying and selling shares and production sharing certificates to replace government bonds in market operations, refinancing ratios and lending ratios. d) Credit restrictions; e) Value-oriented credit allocation; f) Other techniques such as buying and selling shares and production sharing certificates to replace government bonds in market operations, refinancing ratios, and lending ratios. d) Credit restrictions; e) Value-oriented credit allocation; f) Other techniques such as buying and selling shares and production sharing certificates to replace government bonds in market operations, refinancing ratios, and lending ratios.



Picture 1. Framework

2.5 The Relationship between Islamic Monetary Policy and Inflation

To strengthen this research study, the author will create a map of the research journey that previous researchers have done:

Table 2. Related Research Road Map

No.	Author / Year / Title	Data used	Findings
[1]	Ascarya (2012), Dual Monetary Policy and Transmission Flow in Indonesia	Inflation, SBI, SBIS, PUAB, INT, PLS, LOAN and FINC	Islamic monetary policy is more effective in reducing inflation than conventional
[2]	Aam (2009), Sharia Transmission Mechanism in Dual Monetary Systems in Indonesia	Inflation, SBI, SWBI, PUAB, PUAS	Islamic financing will reduce inflation because Islamic financing allows balanced growth between monetary policy and the real sector
[3]	Hasnah et al. (2008), Money Demand Behavior in the Dual Monetary System in Indonesia	Real GDP, M1 and M2, Inflation, Deposit Interest Rates and the rate of return	There is no long-term relationship between the money supply, both conventional and Islamic, and the price level
[4]	Tambunan, Kharina and Muhammad Ikhwanda Nawawi (2017), Granger Causality Analysis of Sharia Monetary Policy on the Indonesian Economy	OPTS (Sharia Open Market Operation), SBIS (Sharia Bank Indonesia Securities), GDP (Gross Domestic Product)	There is a one-way causality relationship between OPTS and GDP and between SBIS and OPTS, and a two-way relationship between SBIS and GDP.
[5]	Herianingrum, Sri and Ummi Muthi'ah Fathy, 2016, Analysis of Monetary Transmission Mechanisms for Profit Sharing in Indonesia	FASBIS, FLPS, DPK	There is a two-way causality relationship between inflation with FLPS, TPF with FLPS, and SBIS with FASNIS. Profit-sharing financing contributes to the final target of monetary policy (inflation), although the proportion of profit-sharing financing is relatively small in Islamic bank

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No.	Author / Year / Title	Data used	Findings
			financing.
[6]	Sudarsono, Heri (2017), Analysis of the Effectiveness of Conventional Monetary Policy Transmission and Sharia in Influencing Inflation	SBI, Credit, PUAB, SBIS and Financing, Return on Working Capital (IHMK)	In the dual transmission mechanism, credit and financing have a bigger contribution in influencing inflation than the SBI, PUAB, SBIS, and CPI variables.
[7]	Setiawan, Rifky Yudi, Karsinah (2016) Monetary Policy Transmission Mechanism in Influencing Economic Growth and Inflation	CPI, IPI, SBI, PUAB, R Credit, amount of credit extended, SBIS, PUAS, and PLS	Sharia variable VECM can reduce inflation and increase economic growth, while conventional variables can reduce the rate of inflation but restrain the rate of economic growth. Based on the results of FEVD, the conventional route is more influential in controlling economic growth and inflation with each contribution of 50.5% and 19.97%, while the Islamic route is 29.07%, respectively. and 19.47%
[8]	Dhuuayu, Violetta Puteri, Sri Ulfa Sentosa, Selli Nelonda (2017), Analysis of Monetary Policy Transmission Through Bank Loans in Indonesia	BI Rate, Bank Lending, inflation, and economic growth	There is a causal relationship between interest rates and loans and inflation
[9]	Ascarya (2012), Transmission Flow and Effectiveness of Dual Monetary Policy in Indonesia	SBI, PUAB, SBIS, PUAS Inflation, Economic Growth	Conventional transmission mechanisms from conventional policy rates are all linked to output and inflation, while the Islamic policy rate is not linked to output and inflation. Besides, the interest rate, credit, and conventional interbank rate shocks give negative and permanent impacts to inflation and output, while PLS, financing and Islamic interbank PLS, as well as SBIS (Central Bank Shariah Certificate) as Islamic policy rate shocks, give positive and permanent impacts to inflation and output. SBI (Central Bank Certificate), as conventional policy gives a positive impact on inflation and a negative impact on output
[10]	Ascarya (2009), Toward Optimum Synergy of Monetary Policy in Dual Financial / Banking System	PLS, Sukuk	PLS system is superior to the interest system in fairness, justice, efficiency, and stability. Therefore, the optimum synergy in the dual financial / banking system can be achieved when monetary policy in the conventional system benchmarks its policy rate to the PLS market return in the Islamic financial market of the Islamic system, which will ensure optimum market efficiency distributive social welfare and justice. Monetary policy in managing the money supply is only a response to the real sector's dynamic activity. While active monetary policy can be conducted, not by altering M, but by altering V, i.e., to increase the flow of money in the economy by issuing central bank SUKUK with PLS market return to finance government projects, commercially as well as socially, in the real sector

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No.	Author / Year / Title	Data used	Findings
[11]	Widodo, Arif (2017), Evaluating The Effectiveness of Dual Monetary Policy in Promoting Price Stability in Indonesia	Inflation, Credit interest rates, PLS, Money creation, Fractional Reserve Banking, Money Supply, Amount of Credit, Amount of Financing, Exchange rates, and Gold prices	Conventional monetary policy General compared to the policy Islamic monetary create instability at the price level due to the application of the paper system so far, which is very vulnerable to crises; consequently, it will increase the price level. Furthermore, the debt system, the interbank money market, and the fractional reserve banking, which all rely heavily on the interest system, have caused volatility in Indonesia's price level. On the other hand, the support from Islamic monetary policy has proven to stimulate price stability because all of these instruments can suppress the volatility that occurs in inflation.

3. METHODOLOGY

3.1. Research Methods and Types

This research uses a quantitative descriptive approach, namely research that aims to describe a phenomenon by using numbers that describe the characteristics of the subject under study (Sugiyono, 2015). The type of research is literature survey, namely the exploration of literature studies, both theoretical and empirical data.

3.2. Data and Data Sources

To answer research problems, the data used are secondary data published by Bank Indonesia and the Financial Services Authority, namely Islamic Banking Statistics, for various periods. The data used are monthly data from January 2016-November 2020.

3.3. Analysis Methods and Models

The Vector Autoregressive Model (VAR) and the Vector Error Correction Model (VECM) are used to test the causality between dual system monetary policy and inflation. The VAR model is non-structural because it is theoretical. The VAR model has a simpler model structure with a small number of variables, where all variables are endogenous variables with the independent variable being lag. The VAR model is designed for stationary variables that do not contain trends (Gujarati, 2004). Stochastic trends in the data indicate that there are long-run and short-run components in the time series data. In 1987, Engle and Granger developed the concept of cointegration and error correction. In 1990, Johansen and Juselius developed the VECM concept. VECM offers an easy working procedure to separate the long-run and short-run components of the data generation process (Lutkepohl, 2011). Thus, VECM differs from VAR in that VECM can be used to model co-integrated and non-stationary time series data. VECM is often referred to as a constrained form of VAR (Juanda & Junaidi, 2012). The following are the steps for using the VAR or VECM model:

3.3.1. Unit Root Test

In modeling, using VECM is based on time series data which is not stationary but co-integrated. To check the stationarity of the data, the unit root test can be used, with the test statistic used is Augmented Dickey-Fuller (ADF), as follows:

$$\Delta Yt = \gamma + \delta t + \rho Yt - 1 + \sum \phi j \Delta Yt - j \; k \; j = 1 + et \quad (1)$$

Where $\Delta Yt = Yt - Yt - 1$ and $\rho = a - 1$.

Hypothesis $H0 : \rho = 0$ (there is a unit root).

At the 100% significance level (1 - 100), $H0$ is rejected if the ADF statistic is less than the critical value at the time α, or $p \; value$ is less than the significance value α. If $H0$ is rejected, the data is stationary.

3.3.2. Johansen Cointegration Test

For the cointegration test, the Johansen cointegration test is used as follows: In the $V\ (p)$ model:

$$yt = Atyt - 1 + \cdots + Apyt - p + Bxt + \varepsilon t$$

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Where yt is a vector with k the non-stationary variable I (1), xt is a vector with d the deterministic variable, εt is the error vector. The equation $VAR\ (p)$ can also be written as. To test the hypothesis, trace test statistics can be used:

$$LR\ (r \mid k) = -T \sum \log\ (1 - \lambda i)\ k\ i = r + 1 \text{ and the test statistics for your maximum Eigenvalues}$$

$$LRmax\ (r \mid r + 1) = -T \log\ (1 - \lambda r + 1) = LRtr\ (r \mid k)\ -LRtr\ (r + 1 \mid k) \text{ for } r = 0, 1,..., k - 1,$$

With the hypothesis used is $H0$: there is r cointegration equation. At the significance level (1 - α) 100%, $H0$ is accepted if the trace test statistic and the maximum Eigenvalue are less than the critical value at the time α, or $p\ value$ is greater than the significance value α.

3.3.3. Causality Analysis

In VECM modeling, causality analysis aims to look at long-term and short-term relationships. Analysis of the long-term causality relationship between the independent variable and the dependent variable in VECM modeling can be seen in the coefficient of the error correction term (ECT), which is based on the sign and the results of the coefficient significance test using the test statistic in the Ordinary Least Square (OLS) method. . Meanwhile, for short-term causality analysis for each variable, the Granger causality test can be used. The Granger causality test is based on the Wald test statistic with a chi-square distribution or test as an alternative. The hypothesis used is $H0$: There is no Granger causality relationship.

3.3.4. Operational Variables

Referring to previous research (Ascarya, 2012, Aam, 2009, Sudarsono, 2017), the proxies for dual system monetary policy are Bank Indonesia Syariah Certificate (SBIS), Sharia Interbank Money Market (PUAS), Total Financing and Profit Loss and Sharing. (PLS). Meanwhile, inflation uses the inflation rate from January 2016 to November 2020.

4. RESULTS AND DISCUSSION

4.1 VECM Stages Testing

Before estimating the VECM model, the first step is to carry out a stationary test to ensure that the variables used to meet the VECM assumptions. The data stationarity test was carried out through the unit root-unit test. If all data are not significant at the initial stage at the level, then further testing must be carried out to ensure the statistical data on the first drop I (1). The data is said to have passed the root test if the probability value is smaller than 0.05%. Suppose all the data is stationary at either the level or the first derivative. In that case, the next test can be carried out, namely determining the optimum lag length, cointegration test, stability test, VECM model estimation, impulse test, and decomposition variance test. The following are the results of the unit root test at the level.

Table 3. Unit Roots Test

The results of the unit root test at the level level are seen at 5% alpha, not all data are significant at the level. This means that the data that will be used in the VECM estimation are not stationary at the level. For this reason, researchers conducted a first difference test. The following are the results of the unit root test at the first degree level.

Table 4. Result First Difference Test

Method	**Statistics**	**Prob. ****	**Cross-sections**		**Obs**
Null: unit root (assumes common unit root process)					
Levin, Lin & Chu t *	-8.90145	0.0000	5		278
Null: unit root (assumes individual unit root process)					
Im, Pesar and Shin W-stat	-12.1260	0.0000	5	283	
ADF - Fisher Chi-square	133,493	0.0000	5		278
PP - Fisher Chi-square	197.169	0.0000	5		285
Null: Unit root (assumes individual unit root process)					
Im, Pesar and Shin W-stat	-1.87485	0.9696	5	283	
ADF - Fisher Chi-square	-0.54208	0.2939	5		278
PP - Fisher Chi-square	32.9476	0.0003	5		283
	31.9163	0.0004	5		290

*** Probabilities for Fisher tests are computed using an asymptotic Chi-square distribution. All other tests assume asymptotic normality.*

The unit root test results at the first-degree level seen at 5% alpha were significant. This means that the data used in the VECM estimation is stationary at the level of one degree / first difference. After all the data is stationary, then determine the optimal lag length.

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4.1.1 Determination of the Optimal Lag Length

The optimal lag test is used to eliminate autocorrelation problems in the model. Before determining the optimal lag, testing must be done first by doing *vector Autoregression Estimates.* Here are the results *vector Autoregression Estimates* in Table 5.

Table 5. *Vector Autoregression Estimates*

Included observations: 56 after adjustments
Standard errors in () & t-statistics in []

	D (LOG (SBIS))	D (LOG (PLS))	D (LOG (PYD_AKAD))	D (LOG (SB_PUAS))	D (LOG (INFLATION))
D (LOG (SBIS (-1)))	0.396603 (0.15092) [2,62796]	-0.012315 (0.05002) [-0.24619]	0.005724 (0.02402) [0.23832]	-0.469172 (0.77138) [-0.60822]	-0.001249 (0.12735) [-0.00981]
D (LOG (SBIS (-2)))	-0.127346 (0.15245) [-0.83531]	0.047158 (0.05053) [0.93323]	-0.006126 (0.02426) [-0.25247]	1.733484 (0.77923) [2,22460]	0.216391 (0.12865) [1.68206]
D (LOG (PLS (-1)))	-0.615369 (0.45222) [-1.36077]	-0.607725 (0.14989) [-4.05440]	-0.005382 (0.07198) [-0.07478]	0.138179 (2.31144) [0.05978]	-0.102759 (0.38160) [-0.26928]
D (LOG (PLS (-2)))	-0.507106 (0.43420) [-1.16790]	-0.567329 (0.14392) [-3.94195]	-0.010655 (0.06911) [-0.15418]	-0.481331 (2,21935) [-0.21688]	-0.320076 (0.36640) [-0.87357]
D (LOG (PYD_AKAD (-1)))	1.224498 (0.97834) [1.25161]	0.032701 (0.32428) [0.10084]	-0.167276 (0.15571) [-1.07425]	-8.937291 (5,00062) [-1.78724]	-0.275384 (0.82557) [-0.33357]
D (LOG (PYD_AKAD (-2)))	0.805550 (1.00701) [0.79994]	-0.104925 (0.33379) [-0.31435]	-0.341734 (0.16028) [-2.13214]	-4.138248 (5,14717) [-0.80398]	0.191683 (0.84977) [0.22557]
D (LOG (SB_PUAS (-1)))	-0.004604 (0.02740) [-0.16801]	-0.014981 (0.00908) [-1.64945]	-0.008483 (0.00436) [-1.94507]	-0.526532 (0.14005) [-3.75952]	-0.005393 (0.02312) [-0.23324]
D (LOG (SB_PUAS (-2)))	-0.023474 (0.02668) [-0.87973]	-0.006023 (0.00884) [-0.68101]	-0.004938 (0.00425) [-1.16284]	-0.330110 (0.13639) [-2.42041]	-0.007216 (0.02252) [-0.32049]
D (LOG (INFLATION (-1)))	0.139558 (0.18409) [0.75811]	0.078695 (0.06102) [1.28971]	0.011143 (0.02930) [0.38031]	-0.421434 (0.94093) [-0.44789]	0.202979 (0.15534) [1.30666]
D (LOG (INFLATION (-2)))	-0.225571 (0.18125) [-1.24450]	0.015071 (0.06008) [0.25085]	0.020950 (0.02885) [0.72621]	1.682421 (0.92645) [1,81599]	-0.086007 (0.15295) [-0.56232]
C	-0.013991 (0.02179) [-0.64219]	-0.009548 (0.00722) [-1.32225]	0.015892 (0.00347) [4,58318]	0.189926 (0.11136) [1.70559]	-0.019712 (0.01838) [-1.07223]

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R-squared	0.219541	0.416301	0.258169	0.477597	0.121094
Adj. R-squared	0.046106	0.286590	0.093318	0.361508	-0.074219
Sum sq. resids	0.607943	0.066792	0.015401	15.88289	0.432902
SE equation	0.116232	0.038526	0.018500	0.594099	0.098082
F-statistic	1.265838	3,209456	1.566071	4.114042	0.620001
Log likelihood	47.18415	109.0220	150,1031	-44.17750	56.69209
Akaike AIC	-1.292291	-3,500786	-4.967968	1.970625	-1.631861
Schwarz SC	-0.894454	-3.102949	-4.570131	2.368462	-1.234024
Mean dependent	0.017033	-0.006557	0.009746	0.022090	-0.018378
SD dependent	0.119008	0.045613	0.019428	0.743499	0.094633

Determinant resid covariance (dof adj.)	1.50E-11
Determinant resid covariance	5.03E-12
Log likelihood	331,1297
Akaike information criterion	-9.861775
Schwarz criterion	-7.872591

Table 5 is a form of the VAR model. After estimating the vector autoregression, the next step is to determine the optimal lag test. The following are the results of the optimal lag test in table 6.

Table 6. Optimal Lag Test

Lag	LogL	LR	FPE	AIC	SC	HQ
0	265,0007	NA	3.77e-11	-9.811349	-9.625472 *	-9.739870 *
1	285.7423	36,78692	4.45e-11	-9.650653	-8.535393	-9.221778
2	315,8757	47.75853 *	3.76e-11 *	-9.844364 *	-7.799722	-9.058094
3	328,7233	17,93815	6.36e-11	-9.385783	-6.411758	-8.242116
4	347.5524	22,73711	9.17e-11	-9.152922	-5.249513	-7.651859
5	375.9726	28.95638	1.02e-10	-9.281984	-4.449192	-7.423525

For the Sharia SBI variable, PUAS Securities, Total Financing, the Rate of Profit-Sharing (PLS) with inflation, the optimum lag value is lag 2. That means that all variables have vector cointegration for the series of variables in the system at lag 2. This can be seen from the number of asterisks on models from LR, FPE, and AIC.

4.1.2 Stability Test

The next step is that it is necessary to carry out a stability test to prove that the VAR model or the optimal lag test can be continued to the VECM model. The following are the results of the model stability test.

Table 7. Stability Test

Root	Modulus
-0.416482 - 0.605748i	0.735111
-0.416482 + 0.605748i	0.735111
-0.241004 - 0.645561i	0.689081
-0.241004 + 0.645561i	0.689081
0.448488 - 0.434514i	0.624455
0.448488 + 0.434514i	0.624455
-0.171365 - 0.507347i	0.535506
-0.171365 + 0.507347i	0.535506
0.029389 - 0.409604i	0.410657
0.029389 + 0.409604i	0.410657

No root lies outside the unit circle.
VAR satisfies the stability condition.

The stability test results show that the VAR model or the optimal lag test is stable because it meets the criteria, namely, the modulus value is smaller than 1. If the stability test shows stability, the VAR satisfies the stability condition statement on the stability test, which means that the optimum VAR or lag meets the conditions. Stability. VAR can be proven in a stable condition through AR Roots Graph (see figure 1), where no point exits the circle boundary.

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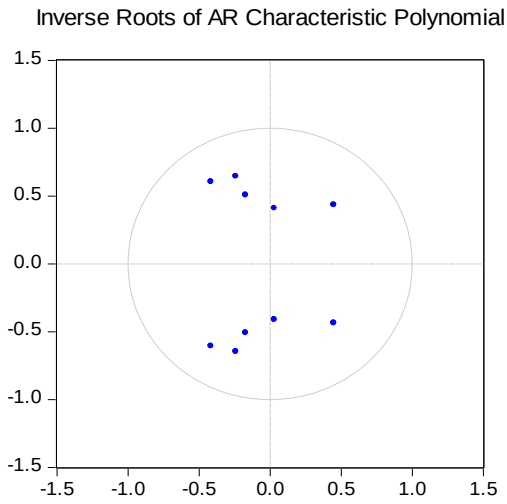

Figure 2. Inverse Roots of AR Characteristic Polynomial

4.1.3 Cointegration Test

When the VAR model or the optimal lag test meets the stability conditions, the next step is to carry out the cointegration test. This test is conducted to find cointegration between variables in the model. This test is to determine whether or not there is a long-term effect for the variable under study. If there is evidence of cointegration, the VECM stage can be continued. However, if it is not proven, VECM cannot be continued (Basuki, 2020). Cointegration testing in this study uses the Johansen-Juselius cointegration test. However, first, you have to choose the assumptions included in the cointegration test as in table 8.

Table 8. Determination of Cointegration Test Assumptions

Selected (0.05 level *) Number of Cointegrating Relations by Model

Trend Data:	**None**	**None**	**Linear**	**Linear**	**Quadratic**
Test Type	No Intercept No Trend	Intercept No Trend	Intercept No Trend	Intercept Trend	Intercept Trend
Trace	5	5	5	4	5
Max-Eig	5	3	5	3	3

* Critical values based on MacKinnon-Haug-Michelis (1999)

Information Criteria by Rank and Model

Trend Data:	**None**	**None**	**Linear**	**Linear**	**Quadratic**
Rank or No. of CEs	No Intercept No Trend	Intercept No Trend	Intercept No Trend	Intercept Trend	Intercept Trend
	Log-Likelihood by Rank (rows) and model (columns)				
0	277,6907	277,6907	277,8708	277,8708	278.2610
1	297.1676	298.4823	298.6561	299.4556	299.8325
2	313.3730	315.3245	315.4745	316.2770	316.6520
3	326.7910	328,9054	329,0501	330.2548	330.3778
4	332,8261	336,7359	336,8175	338.7830	338,8229
5	335,2187	342,0087	342,0087	343,9778	343,9778
	Akaike Information Criteria by Rank				

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	(rows) and model (columns)				
0	-8.279660	-8.279660	-8.104393	-8.104393	-7.936762
1	-8.624278	-8.635722	-8.496587	-8.489294	-8.357545
2	-8.849927	-8.848164	-8.744527	-8.700983	-8.605526
3	-8.974220 *	-8.942015	-8.874551	-8.809267	-8.741011
4	-8.830042	-8.826762	-8.793363	-8.719383	-8.684470
5	-8.553407	-8.618499	-8.618499	-8.508282	-8.508282

	Schwarz Criteria by Rank (rows) and model (columns)				
0	-6.454812 *	-6.454812 *	-6.097060	-6.097060	-5.746944
1	-6.434460	-6.409407	-6.124284	-6.080494	-5.802757
2	-6.295140	-6.220382	-6.007255	-5.890716	-5.685769
3	-6.054462	-5.912767	-5.772308	-5.597533	-5.456284
4	-5.545315	-5.396047	-5.326152	-5.106184	-5.034774
5	-4.903711	-4.786318	-4.786318	-4.493616	-4.493616

Determination of the suggested cointegration test assumption is assumption 1, namely no intercept and no trend based on the best advice from SC and AIC, which is marked by the presence of a star at the end of the value. After the best assumptions have been selected, then input these assumptions into the assumption options for the cointegration test. Following are the cointegration test results using the Johansen-Juselius cointegration test with assumption 1 in table 9.

Table 9. Johansen-Juselius cointegration test table

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE (s)	**Eigenvalue**	**Trace Statistics**	**0.05 Critical Value**	**Prob. ****
None *	0.736102	193,7666	60.06141	0.0000
At most 1 *	0.646278	119.1638	40.17493	0.0000
At most 2 *	0.370356	60.96604	24,27596	0.0000
At most 3 *	0.287870	35.06037	12,32090	0.0000
At most 4 *	0.249175	16,04863	4.129906	0.0001

Trace test indicates 5 co-integrating eqn (s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
** MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE (s)	**Eigenvalue**	**Max-Eigen Statistics**	**0.05 Critical Value**	**Prob. ****
None *	0.736102	74.60280	30.43961	0.0000
At most 1 *	0.646278	58.19771	24.15921	0.0000
At most 2 *	0.370356	25,90567	17,79730	0.0024
At most 3 *	0.287870	19.01175	11,22480	0.0018
At most 4 *	0.249175	16,04863	4.129906	0.0001

The max-eigenvalue test indicates 5 co-integrating eqn (s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
** MacKinnon-Haug-Michelis (1999) p-values

The cointegration results can be read by comparing the trace statistic value with the 5% critical value and the

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eigenvalue value. Based on the table of cointegration test results, the trace statistic value is greater than the eigenvalue and 5% critical value. This means that all the variables in this study have a stable long-term equilibrium relationship.

4.1.4 Granger's Causality Test

According to Basuki (2020), the Granger Causality Test is conducted to see whether two variables have a reciprocal relationship or not. In other words, does one variable have a significant causal relationship with other variables because each variable in the study has the opportunity to become an endogenous or exogenous variable? The bivariate causality test in this study used the VAR Pairwise Granger Causality Test and used a five percent real level. Following are the results of the analysis of the Bivariate Granger Causality test.

Table 10. Bivariate Granger Causality Test Analysis

Pairwise Granger Causality Tests

Date: 02/16/21 Time: 12:34

Sample: 2016M01 2020M11

Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
PLS does not Granger Cause SBIS	57	1.88684	0.1618
SBIS does not Granger Cause PLS		0.24158	0.7863
PYD_AKAD does not Granger Cause SBIS	57	1.90206	0.1595
SBIS does not Granger Cause PYD_AKAD		0.06116	0.9407
SB_PUAS does not Granger Cause SBIS	57	0.17207	0.8424
SBIS does not Granger Cause SB_PUAS		2,09522	0.1333
INFLATION does not Granger Cause SBIS	57	3,69770	0.0315
SBIS does not Granger Cause INFLATION		0.58308	0.5618
PYD_AKAD does not Granger Cause PLS	57	3.31356	0.0442
PLS does not Granger Cause PYD_AKAD		2,62969	0.0817
SB_PUAS does not Granger Cause PLS	57	0.87987	0.4209
PLS does not Granger Cause SB_PUAS		0.03920	0.9616
INFLATION does not Granger Cause PLS	57	0.94503	0.3952
PLS does not Granger Cause INFLATION		1.22767	0.3013
SB_PUAS does not Granger Cause PYD_AKAD	57	3.75375	.0300
PYD_AKAD does not Granger Cause SB_PUAS		0.66633	0.5179
INFLATION does not Granger Cause PYD_AKAD	57	0.82123	0.4455
PYD_AKAD does not Granger Cause INFLATION		3.06363	0.0552
INFLATION does not Granger Cause SB_PUAS	57	0.39336	0.6768
SB_PUAS does not Granger Cause INFLATION		0.14687	0.8638

The model built in this study is to determine the causal relationship between dual system monetary policy instruments, namely SBIS, PLS, financing, and PUAS, on inflation in Indonesia. Using monthly data from January 2016 and November 2020, it can be concluded that SBIS only influences inflation, and there is no reciprocal relationship; namely, inflation is not proven to affect SBIS. When the profit-sharing of Bank Indonesia Securities is increased, the return from holding SBIS will

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increase. Investors will have a greater return, and consumption will increase, which will push prices to be more expensive. An increase in income will encourage demand for goods and services to be greater than supply and increase inflation.

On the other hand, higher inflation did not cause an increase in Bank Indonesia Certificates. SBIS is Bank Indonesia's policy interest rate which will be used to control inflation in Indonesia. Besides, inflation significantly affects the level of financing channeled by banks to the public. The higher the inflation, the financing channeled by banks will increase. When inflation, the prices of goods and services in general increase, so that the need for money to buy goods and services also increases, the demand for financing will decrease due to the decline in purchasing power. This study's findings are not in line with the findings of Herianingrum, Sri, and Ummi Muthi'ah Fathy (2016). SBIS is Bank Indonesia's policy interest rate which will be used to control inflation in Indonesia. Besides, inflation significantly affects the level of financing channeled by banks to the public. The higher the inflation, the financing channeled by banks will increase. When inflation, the prices of goods and services in general increase, so that the need for money to buy goods and services also increases, the demand for financing will decrease due to the decline in purchasing power. This study's findings are not in line with the findings of Herianingrum, Sri, and Ummi Muthi'ah Fathy (2016). SBIS is Bank Indonesia's policy interest rate which will be used to control inflation in Indonesia. Besides, inflation significantly affects the level of financing channeled by banks to the public. The higher the inflation, the financing channeled by banks will increase.

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5. CONCLUSION

From the results of the causality test, it was found that there was no reciprocal relationship between the dual system monetary policy (SBIS, PLS, Financing, and PUAS) and inflation. SBI and not vice versa only influence inflation; SBIS is not significantly affected by inflation. Inflation is significantly affected by financing but not the opposite. However, the cointegration results indicate a short and long-term relationship between the dual system monetary policy and inflation. SBIS statistically influences inflation. This indicates that the government can consider Islamic financial instruments as one of the variables for macroeconomic stability in the long run. For future researchers, they can carry out cross-country testing to obtain a comprehensive model of the dual monetary system.

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