

COVID-19 and Quantitative Easing in Indonesia: Evidence from the VECM Model

Inda Fresti Puspitasari¹, Budi Wahyono², Fitra Prasapawidya Purna³, Seliana Putri⁴

^{1,4}Faculty of Economics and Business, Universitas Muhammadiyah Surakarta, Indonesia

²Faculty of Teacher Training and Education, Universitas Sebelas Maret, Indonesia

³Faculty of Economics, Chulalongkorn University, Thailand

³Faculty of Economics and Business, Universitas Muhammadiyah Yogyakarta, Indonesia

Received: April 2025 | Revised: September 2025 | Accepted: December 2025

Abstract

Introduction/Main Objectives: This study was conducted to determine the effectiveness of Quantitative Easing (QE), which has been carried out by Bank Indonesia since early 2020, to mitigate the impact of COVID-19. **Background Problems:** The application of quantitative easing to stimulate the economy during a crisis or pandemic is considered an alternative to reduce the impact that may arise due to expansionary monetary policy. However, systemic risks that may arise as a result of the QE policy also need to be considered. Policymakers need to consider whether the QE policy can prevent the crisis or whether they will actually cause the economy to become more vulnerable to crisis. **Novelty:** Several previous studies have shown that an effective QE policy can maintain the exchange rate stability, but other studies have also proven that the QE policy is not effective enough to use during the COVID-19 pandemic. Indonesia is one of the countries that implemented the QE policy during the COVID-19 pandemic. However, research regarding the effectiveness of this QE policy in Indonesia is still rare. **Research Methods:** This study used time series data from January 2018 to December 2025, which was analyzed using the Vector Error Correction Model (VECM). **Finding/Results:** The results of this study show the different impacts of QE policies on price stability in the real sector and stock price stability in the financial market. We found that QE policy through RR reduction has the potential to cause an increase in the inflation rate. However, these findings also prove that QE policies during the pandemic provided economic stimulus through M0 and reduced shocks to the stock price to maintain financial market stability. **Conclusion:** Therefore, to mitigate inflationary pressures resulting from the QE policy, we suggest the central bank implement the Tapering Off (TO) policy, such as significantly increasing the minimum reserve requirements to control economic stability after the pandemic and keep risks that may arise as a result of QE under control.

Keywords: Quantitative Easing, VECM model, COVID-19

JEL classification: C32, C54, E58

How to Cite: Puspitasari, I. F., Wahyono, B., Purna, F. P., Putri, S. (2025). COVID-19 and Quantitative Easing in Indonesia: Evidence from the VECM Model, *Jurnal Ekonomi Pembangunan: Kajian Masalah Ekonomi dan Pembangunan*, 26(2), 250-270. doi: <https://doi.org/10.23917/jep.v26i2.9031>

1. INTRODUCTION

The relationship between the financial sector and the real sector is very clear, especially during times of economic crisis in 2008. It gives economists an anticipation of a crisis in 2023, which might occur after the COVID-19 pandemic that has spread throughout the world. The COVID-19 pandemic has caused unpredictable shocks on the demand and supply sides; this certainly has the potential to have different policy effects from normal conditions. The existence of the global economic crisis shows that central banks have the duty to maintain price stability and be aware of systemic risks. In early 2020, Bank Indonesia implemented a Quantitative Easing (QE) policy in an attempt to mitigate COVID-19. QE is an unconventional monetary policy where central banks increase the money supply by purchasing government or private bonds after traditional monetary tools have been exhausted (Lu, 2013). However, systemic risks that may arise due to the policy also need to be taken into account whether it can prevent a crisis or become one of the triggers of the economic crisis. Cobham & Kang (2012) suggest that, in theory, with the flow of funds approach, a financial crisis would result in a decrease in banks' borrowing and aggregate demand. Then, with the QE policy, purchases of government bonds in the non-financial private sector by Bank Indonesia can increase non-financial private sector deposits and minimum mandatory demand deposits at the central bank.

This study aims to analyze the effectiveness of QE monetary policy in order to prevent the economic crisis that is predicted to happen in 2023 after the COVID-19 pandemic. The implementation of QE to stimulate the economy during a crisis or pandemic is considered an alternative in order to reduce the impact that may arise due to expansionary monetary policy. Neely (2015) stated that if QE can carry out its role effectively, it will be able to reduce currency exchange rates through several channels, including (1) liquidity channels; (2) expectation channels; and (3) portfolio-rebalancing channels. The low exchange rate can encourage exports, so real sector production and investment can also increase. However, Aloui (2021) points out that during the COVID-19 pandemic, QE policy did not have a significant effect on the exchange rate. This is because the crisis caused by COVID-19 has affected investor behavior in decision-making. Which is, it means the ineffective QE implementation can actually harm the economy, such as prolonged inflation and uncontrolled currency depreciation. Based on the data obtained from Bank Indonesia, the implementation of QE policy in Indonesia during the COVID-19 pandemic seems to be decreasing in line with the recovery of post-pandemic conditions. More details can be seen in Figure 1 below.

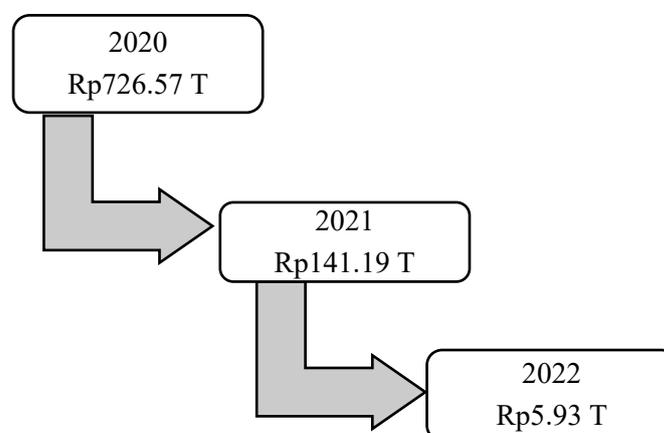


Figure 1. Timeline Quantitative Easing Policy of Bank Indonesia 2020-2022
(Bank Indonesia, 2023)

Based on Figure 1 above, we can see that total liquidity injected through QE policy to stimulate the economy during the COVID-19 pandemic (2020-2022) continues to decline as the pandemic and economic conditions improve. Several previous studies (Kiley, 2018; Indrajaya, 2022a; Retnasih & Herdianti, 2023) have shown that the impact of QE policies on the economy is inconsistent. Some studies have shown that effective QE policies can maintain economic stability. However, other studies have proven that QE policies are not effective enough, especially during the COVID-19 pandemic. Indonesia is one of the countries that implemented the QE policy during the COVID-19 pandemic. However, research on the effectiveness of this QE policy in Indonesia remains rare. Most of the studies on QE policy point to how it affects currency stability. In this study, therefore, we will focus on the impact of QE on maintaining economic stability in both the real and financial sector.

Bedford et al., (2009) explain that quantitative easing (QE) is the purchase of private or government assets using central bank money. Shiratsuka (2010); Indrajaya (2022); and Olasehinde-Williams et al. (2023) show that QE policy is a non-conventional policy of the Central Bank to stimulate the economy by increasing the money supply through the purchase of securities from the private or government. Bedford et al. (2009) show that the purpose of QE policy is to provide an injection of money into the economy to generate nominal expenditure. This QE policy is issued to stimulate the economy if conventional monetary policy is deemed ineffective. This usually occurs when economic conditions are unstable due to shocks such as pandemics, natural disasters, wars, etc.

Chen & Yeh (2021) and Fendel et al., (2021) proved that during the crisis caused by the COVID-19 pandemic, the European Central Bank (ECB) adopted a QE policy to overcome deflation, stimulate economic activity, loosen credit, and reduce the *Euro* exchange rate. Meanwhile, in the United States, Stefański (2022) discovered that QE can reduce unemployment primarily through increasing stock prices and reducing market volatility through Treasury purchases. Similarly, in the press release of the Financial System Stability

Committee (KSSK) No. 1/KSSK/Pers/2022. It is explained that the policies adopted by Bank Indonesia to accelerate post-pandemic economic recovery consist of a low-interest rate policy, exchange rate stabilization, and a quantitative easing (QE) policy. Bank Indonesia injected liquidity into the banking industry in the form of SBN purchases, liquidity provision through term-repurchase agreement (repo) mechanisms, and lower minimum statutory demand deposits. The QE policy can be regarded as an alternative measure to stimulate the economy during the unstable economic conditions caused by a crisis. The transmission mechanism of quantitative easing application by the central bank can be seen in Figure 2 below.

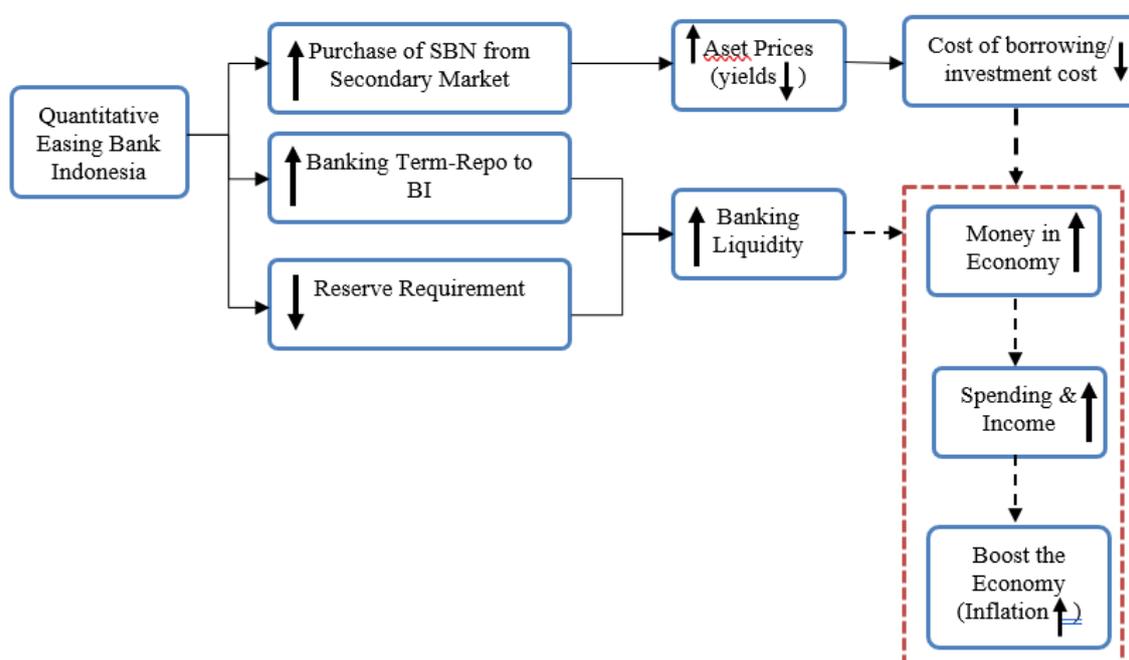


Figure 2. Quantitative Easing Mechanism of Bank Indonesia
Source: Author (2023)

Solikin & Suseno (2002) describe the money supply in a broad sense, which is often referred to as economic liquidity and is given the symbol “M2”. This money supply is defined as the obligations of the monetary system to the private sector, consisting of currency (banknotes and coins), demand deposits, and quasi-money. The implementation of the quantitative easing (QE) policy was carried out to increase the money supply through liquidity injection and credit easing. The amount of money supply in Indonesia over the past 5 years can be seen in Figure 3. From Figure 3, it can be seen that during the COVID-19 pandemic, the money supply continues to increase as long as the expansionary policies (including QE policy) are in place during the pandemic. During a crisis, the money supply usually tends to be high in line with government policies that want to stimulate the economy.

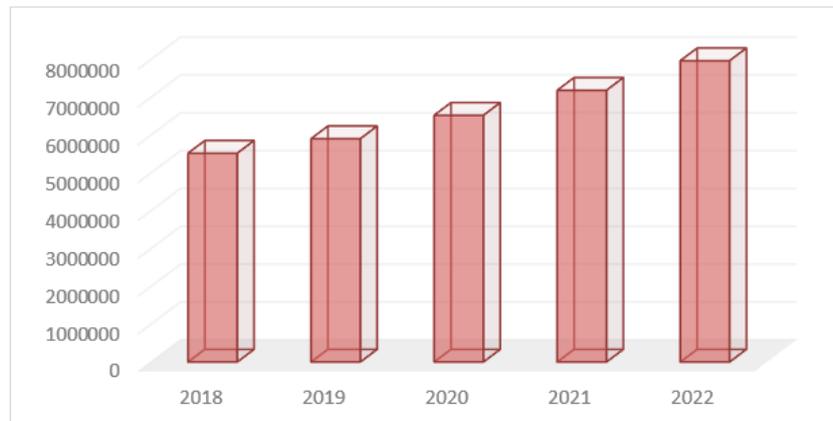


Figure 3. Money Supply (M2) in Indonesia over the past 5 years (Billion Rupiahs)
Source: Bank Indonesia (2023)

Krishnamurthy & Vissing-Jorgensen (2011); Martin & Milas (2012); and Alekseevskaya & Mumladze (2020) conducted research on the implementation of QE in the US during the economic crisis in 2008-2010 and found that QE policy works through several channels that have different impacts on certain assets, so it cannot focus solely on bond-rate policy targets. Fawley & Neely (2013) pointed out that the policies issued by the central bank during the financial crisis in 2007-2009 could not be effective. Developed countries such as Japan, the United Kingdom, the United States, and European countries respond with QE policies, so that central banks can respond effectively to the economic conditions (easing the credit conditions and providing liquidity injections) even though in the short-term the interest rates are close to zero. The financial crisis was felt again by all countries in the world during the COVID-19 pandemic in 2019.

Fendel et al., (2021) analyze the impact of the COVID-19 announcement on monetary policy and fiscal policy by the European Central Bank (ECB) and the European Commission. They showed that the announcement of COVID-19 had a more dominant influence on government bond yields in developed countries such as Germany and the Netherlands. Apart from that, they also see that market conditions are very sensitive to national development during the COVID-19 crisis. This proves that the COVID-19 pandemic had a direct impact on economic conditions. Cobham & Kang (2012) examine the relationship between the financial crisis and quantitative easing with the money supply. They show that implementation of QE, which is when the central bank buys government bonds from the non-financial private sector, will increase the money supply (M2). Montgomery & Volz (2019) also proved that non-conventional monetary policy in Japan has a significant influence on the bank lending channel. Moreover, Chen & Yeh (2021) show that in the US, the implementation of QE during the COVID-19 pandemic was proven to increase investors' confidence in the economy, besides that, the impact of QE policy on stock performance was more significant for industries affected by the pandemic. Meanwhile, in Indonesia, Dinata &

Oktora (2020) proved that the QE policy has a negative and significant relationship to the rupiah exchange rate.

On the other hand, some previous studies proved that QE policy cannot be effective, especially during the crisis. Cui & Sterk (2018) show that QE intervention is a powerful tool for stabilizing output and inflation, but it comes with strong side effects on inequality. This evidence is consistent with Woodford (2016), who noted that QE increases financial stability risk but less than other policies. Aloui (2021) analyzed the QE policy and exchange rate in Europe using the TVP-BVAR-SP model and showed that QE policy did not have the expected effect on the exchange rate during the pandemic period because the COVID-19 pandemic changed investor behavior in decision-making. Indrajaya (2022) also shows that non-conventional monetary policy (QE policy) cannot be effective during the COVID-19 pandemic due to the credit crunch, which is a condition where banks are still hesitant to distribute credit to the public when the economic conditions are not stable yet due to the effects of the pandemic. It is necessary for policymakers to consider whether QE policies can effectively mitigate the risk of crisis during the pandemic or whether they will actually cause the economy to become more vulnerable to crisis in the short and long term. Therefore, this study was conducted to determine the effectiveness of QE policy to maintain economic stability in Indonesia during the COVID-19 pandemic. This study uses the Vector Error Correction (VECM) model to be able to see the relationships between QE policy and other monetary policy instruments towards economic stability indicators. Then, we conduct an Impulse Response Function (IRF) test to trace the shock of a variable against other variables during the observation period and future periods.

2. RESEARCH METHOD

This study used quantitative analysis methods to analyze the relationship between quantitative easing monetary policy and macroeconomic variables. The data used in this study is secondary data obtained from an online database. These data were then analyzed using the Vector Error Autoregressive (VECM) model. The VECM model is employed to capture the volatility of the data and to determine the long- and short-run correlation between variables. In this study, we used dummy variables as a proxy for the existence of a quantitative easing policy. Variable CPI is used to show the price stability in the real sector, while IDX is used to present the stock price index as a financial market stability indicator. Meanwhile, macroeconomic variables associated with the QE policy in this study include the money supply (M0), the interest rate (IR), and the minimum reserve requirement (RR) during the research period. Data for each variable were obtained from Statistics Indonesia (BPS), CEIC, and the International Financial Statistics (IFS) database on the IMF's official website. The research period used was the pre-COVID-19 pandemic until the post-COVID-19 pandemic, which is from January 2018 to December 2025. For more details, the variables used in this study can be described as follows.

Table 1. Operational Definition of Variables

Variable	Notation	Description
Inflation Rate	CPI	<i>The consumer price index</i> is a proxy for the level of inflation rate in Indonesia which is used as an indicator of rupiah stability
Money Supply	M0	Base Money in circulation issued by Bank Indonesia
Interest Rate	IR	The interest rate determined by Bank Indonesia (BI-Rate)
Composite Stock Price Index	IDX	The composite stock price index (IDX composite) is used as an indicator of financial sector stability
Reserve Requirement	RR	Reserve Requirement Ratio of Bank Indonesia
Quantitative Easing	QE	Dummy variable for the implementation of QE policy

Source: Author (2025)

The vector error correction (VECM) is often referred to as the restricted form of VAR. The model is used to analyze the relationship between variables in the time series data and analyze the impact of disturbance factors (shocks) in the model. VECM is applied when variables exhibit long-run equilibrium relationships (cointegration) while being non-stationary at their levels. Table 2 shows the comparison between VECM to standard VAR Models

Table 2. VECM and VAR Model Characteristic

VECM	VAR
All variables in the model are endogenous variables	It is theoretical and not structural
suitable for the analysis of policy implications	Better at forecasting than the others
Captures both short-run dynamics and long-run equilibrium relationships	Captures the short-run relationships between variables
All variables don't need to be stationary at their levels	All variables in the model should be stationary at their levels

Source: Nachrowi & Usman (2006)

According to Pesaran (2015), VECM is a general model to accommodate cross-section cointegration and dynamic links between panel units. The VECM model can be used even if the data are not stationary at their levels. The VECM model can generally be formulated as follows:

$$\Delta y_t = -\alpha \beta' y_{t-1} + \sum_{j=1}^{p-1} \Gamma_j \Delta y_{t-j} + u_t$$

Where $\beta'y_t$ is the $r \times 1$ vector of cointegrating relations, also known as the long-run relations. The VAR/VECM analysis process flow diagram used in this study can be seen in Figure 4 below.

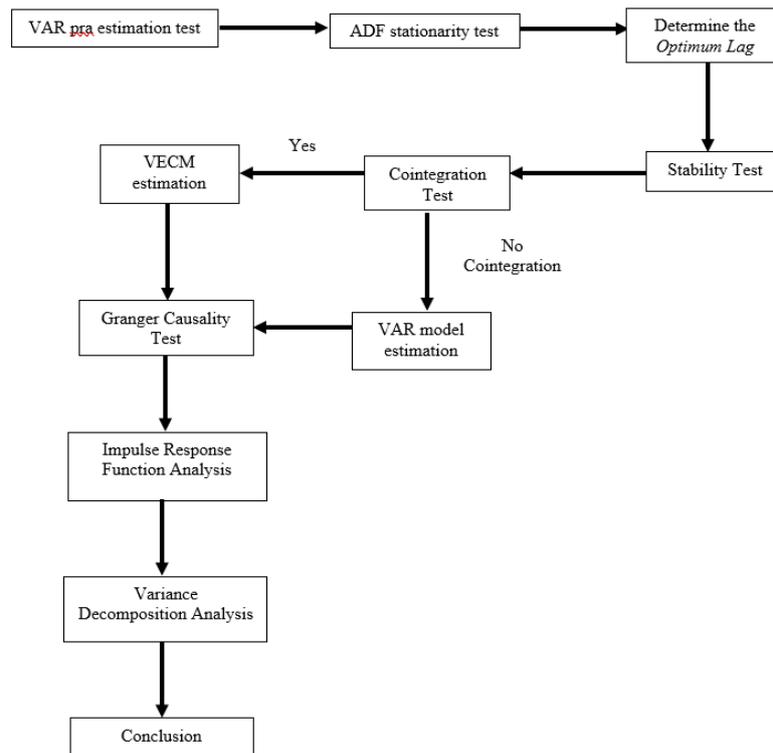


Figure 4. VAR/VECM model flow diagram

3. RESULTS AND DISCUSSIONS

3.1 Results

3.1.1 Pre-estimation Result

The first step before carrying out an estimation test using the vector error autoregressive (VECM) model is to test the stationarity of the data. VECM model estimation can be continued if all of the variables in the model are stationary at 1st difference. Several variables, such as the money supply (M0) and the composite stock price index (IDX), which had large numbers, have been converted into natural logarithms (Ln). Then, in this study, the stationarity test used is the Augmented Dickey-Fuller (ADF) test, and the results of the ADF test are shown in Table 3.

Table 3. ADF stationarity test result

Variable	Level	<i>1st Difference</i>	Decision
	<i>Prob.</i>	<i>Prob.</i>	
CPI	0.696	0.000*	I (1)
L(M0)	0.992	0.000*	I (1)
IR	0.435	0.000*	I (1)
L(IDX)	0.641	0.000*	I (1)
RR	0.881	0.000*	I (1)
QE	0.550	0.000*	I (1)

**shows significance at 1%*

From Table 3, it can be seen that the variable data used during the estimation period is not stationary at the level. Therefore, A stationary test carried out at the *1st Difference* shows that the data for CPI, M0, IR, IDX, RR, and QE are stationary. The next estimation stage is carried out using *1st Difference* level. The next step after carrying out the data stationarity test is to determine the optimum lag length through the *Lag Order Selection Criteria* test. Determining the optimum lag is carried out to ensure that the model used can produce efficient estimates and can explain the dynamics of the economic variables used as a whole. The Lag Length Criteria selection test used in this study is based on the Akaike Information Criterion (AIC), Schwarz Information Criterion (SC), and Hannan-Quinn Information Criterion (HQ) values. Optimum Lag test results can be seen in Table 4.

Table 4. The result of Lag Order Selection Criteria test

<i>Lag</i>	AIC	SC	HQ
0	9.778	9.947	9.846
1	-1.565	-0.383*	-1.089*
2	-1.601	0.593	-0.717
3	-1.580	1.629	-0.287
4	-1.523	2.698	0.177
5	-2.029	3.206	0.079
6	-2.447	3.802	0.070
7	-2.474	4.788	0.451
8	-3.126*	5.150	0.208

Source: Author (2025)

According to the results of the optimum lag test, as presented in Table 4, the optimal lag length is determined to be 1 or 8. Therefore, the subsequent VECM estimation model will employ a lag length of 1 to ascertain the presence of cointegration between variables, to examine the causal relationship between variables, and to evaluate the impact of exogenous shocks on these variables. Therefore, the following step involves the implementation of a cointegration test. If the results of the cointegration test show that there is a long-term cointegration between variables, then in the next stage, we should use the Vector Error

Correction Model (VECM) estimation. The cointegration test used in this study is the Johansen cointegration test, which is shown in Table 5.

Table 5. Cointegration test result

Hypothesized No. Of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.
None *	0.577025	161.6924	95.75366	0.0000
At most 1 *	0.353669	87.69430	69.81889	0.0010
At most 2 *	0.212080	50.16017	47.85613	0.0299
At most 3	0.149747	29.66136	29.79707	0.0518
At most 4 *	0.115564	15.71035	15.49471	0.0464
At most 5 *	0.058116	5.149125	3.841465	0.0233

* denotes rejection of the hypothesis at the 0.05 level

Source: Author (2025)

The result of the cointegration test, as presented in Table 5, indicates that there is long-run cointegration between variables at the 0.05 level of significance. This finding is supported by the *Trace Statistics* test, which indicates that certain equation values exceed the critical value of 0,05. Therefore, the analysis of data in this study can be continued using the VECM estimation model. Subsequent to the evaluation of the existence of cointegration between variables, the next stage in the pre-estimation test is to assess the stability of the VECM model utilized. The results of the stability test are illustrated in Figure 5.

Inverse Roots of AR Characteristic Polynomial

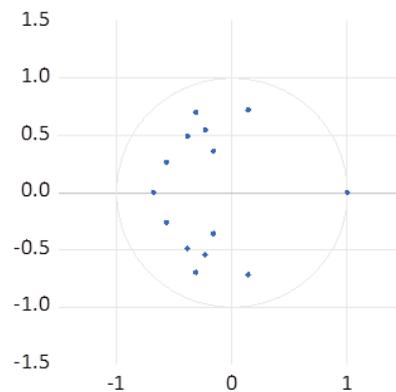


Figure 5. VECM model stability test result

Source: Author (2025)

Figure 5 shows that all the points of the Inverse Roots of the AR Characteristic polynomials are inside the circle. It means that the VECM estimation used in the model is stable and ready for the next stage of the estimation test. The result of the VECM estimation can be seen in Table 6. Based on the estimation results, we can see that all variables (M0, IR, IDX, RR, and QE) have significant long-term correlation with the inflation rate (CPI). This can be seen from the t-statistic value, which is lower than the t-table value.

Table 6. VECM Estimation Results

<i>Vector Error Correction Estimates</i>						
<i>Sample (adjusted): 2018-2025. Included observation: 92 after adjustments. T-table : 1.987</i>						
Cointegrating Eq:			CointEq1			
D(CPI ₁)			1.0000			
D(L(M0 ₁))			178.976 (24.214) [7.391]*			
D(IR ₁)			10.871 (4.001) [2.716]*			
D(L(IDX ₁))			-91.320 (20.554) [-4.442]*			
D(RR ₁)			-12.978 (2.252) [-5.761]*			
D(QE ₁)			-32.089 (6.270) [-5.117]*			
Error Correction: D(CPI ₂)	D(L(M0 ₂))	D(IR ₂)	D(L(IDX ₂))	D(RR ₂)	D(QE ₂)	
CointEq1	-0.662	-0.0068	-0.0045	0.0040	0.0066	-0.0083
	[-4.170]*	[-5.232]*	[-1.426]	[3.640]*	[0.775]	[-2.214]*
D(CPI _{1,2})	-0.2823	0.0068	0.00636	-0.0007	-0.011	0.0049
	[-1.766]	[5.209]*	[1.964]	[-0.637]	[-1.297]	[1.305]
D(CPI _{2,2})	-0.1265	0.0044	0.0053	0.0025	0.0013	0.0022
	[-0.881]	[3.725]*	[1.832]	[2.503]*	[0.170]	[0.653]
D(LM0 _{1,2})	59.981	-0.0131	0.7955	-0.6276	-1.9677	0.9467
	[2.537]*	[-0.067]	[1.660]	[-3.754]*	[-1.549]	[1.689]
D(LM0 _{2,2})	26.420	-0.1303	0.2230	-0.2332	-2.8882	0.5019
	[1.777]	[-1.058]	[0.740]	[-2.218]*	[-3.616]*	[1.425]
D(IR _{1,2})	11.849	0.0788	-0.3157	-0.0290	-0.3095	0.2048
	[2.169]*	[1.742]	[-2.852]*	[-0.752]	[-1.054]	[1.582]
D(IR _{2,2})	4.2946	0.0714	-0.1369	-0.0276	-0.2330	0.1861
	[0.773]	[1.553]	[-1.216]	[-0.703]	[-0.781]	[1.414]
D(LIDX _{1,2})	-23.409	-0.311	-0.1795	-0.4766	-0.5257	0.1376
	[-1.542]	[-2.475]*	[-0.583]	[-4.441]*	[-0.644]	[0.382]
D(LIDX _{2,2})	-10.353	0.033	0.0529	-0.2128	0.4330	0.0597
	[-0.759]	[0.293]	[0.191]	[-2.206]*	[0.591]	[0.185]
D(RR _{1,2})	-6.704	-0.0427	-0.0212	0.0678	-0.6234	-0.1106
	[-2.468]*	[-1.899]	[-0.385]	[3.531]*	[-4.271]*	[-1.718]
D(RR _{2,2})	-3.2190	-0.0305	0.0421	0.0492	-0.2124	-0.0627
	[-1.482]	[-1.696]	[0.957]	[3.206]*	[-1.821]	[-1.220]
D(QE _{1,2})	-11.985	-0.2668	-0.2519	0.0158	0.4108	-0.8455
	[-1.750]	[-4.705]*	[-1.815]	[0.328]	[1.116]	[-5.210]*
D(QE _{2,2})	-8.2031	-0.1521	-0.2546	-0.1600	0.1834	-0.4383
	[-1.283]	[-2.874]*	[-1.966]	[-3.540]*	[0.534]	[-2.895]*
R-squared	0.504139	0.661419	0.280922	0.572293	0.546814	0.415971
Adj. R-squared	0.421496	0.604989	0.161075	0.501008	0.471283	0.318632
Sum sq. resids	4159.577	0.285304	1.707811	0.208069	12.00944	2.336118
S.E. equation	7.302596	0.060479	0.147970	0.051648	0.392386	0.173061
F-statistic	6.100176	11.72104	2.344013	8.028291	7.239590	4.273456
Log likelihood	-305.8658	135.1532	52.84015	149.6746	-36.88193	38.42937
Akaike AIC	6.953605	-2.633764	-0.844351	-2.949448	1.106129	-0.531073
Schwarz SC	7.337355	-2.250014	-0.460601	-2.565698	1.489879	-0.147323
Determinant resid covariance	7.21E-09					
Log likelihood	79.16956					
Akaike information criterion	0.235444					
Schwarz criterion	2.702412					
Number of coefficients	90					

*shows significant correlation by the t-statistic > t-table

Source: Author (2025)

The VECM estimation result in Table 6 shows a significant negative relationship between money supply (M0) and interest rate (IR) with the CPI in the long term. This indicates that during the estimation period, a decrease in the money supply and interest rates will cause the price level to rise in the long term. On the contrary, in the short term, an increase in the previous period's money supply (M0₋₁) and the previous period's interest rate are positively correlated with inflation. An increase in M0₋₁, with a coefficient of 59.98, led to a sharp rise in inflation. While an increase in IR₋₁ has been found to result in an increase in inflation. This might be due to the fact that an increase in interest rates in the prior period will lead to an increase in real investment costs, resulting in cost-push inflation. The minimum reserve requirement (RR) variable was found to have a negative correlation with inflation, both in the short and long term. This means that a decrease in the minimum reserve requirement can significantly increase inflation, and on the other hand, an increase in the RR can quickly reduce the inflation rate. From the estimation results, we can also conclude that the stock price (IDX) variable is strongly negatively affected by M0 and QE policy in the previous period. This is evident in column D(LIDX,2), where the coefficients of LM0₋₁ and QE₋₂ exhibit highly significant (negative) t-statistics. This proves that QE policies and changes in money supply will have a direct impact on financial market stability.

3.2 Discussion

Following the demonstration that no cointegration existed among the variables, a Granger causality analysis was implemented to ascertain the presence of a causal relationship between variables. The result of the Granger causality test can be seen in Table 7. Based on the results of the causality test, it was found that the implementation of QE policy through an increase in money base (M0) and a reduction in reserve requirement ratio (RR) significantly affects price level in the real sector (CPI) and stock prices (IDX). The findings indicate a statistically significant two-way reciprocal relationship between CPI and M0. A similar relationship is observed between stock prices (IDX) and M0, with a significance level below 0.05. This indicates the existence of an economic cycle in which prices and liquidity of money, as well as money supply and the activity in the stock market. The QE policy issued by the central bank during the COVID-19 pandemic has proven to have a direct effect on the financial market through the *composite stock price index* (IDX) and on the liquidity of money (M0). It can be concluded that QE policy in Indonesia has successfully provided economic stimulus through M0 and stimulated the stock market. This result aligns with the findings of Chen & Yeh (2021), who proved that the non-conventional monetary policy (QE) implemented by the central bank significantly impacts the stock market during the period of the pandemic. Shocks to stock prices have the potential to influence the exchange rate and balance of money supply and demand, which in turn can affect the aggregate output and the price level.

Table 7. Granger causality test result

Dependent Variable	Prob.					
	D(CPI)	D(LM0)	D(IR)	D(LIDX)	D(RR)	D(QE)
D(CPI)		0.037*	0.095	0.298	0.043*	0.198
D(LM0)	0.000*		0.133	0.004*	0.146	0.000*
D(IR)	0.094	0.165		0.673	0.194	0.095
D(LIDX)	0.003*	0.000*	0.676		0.001*	0.000*
D(RR)	0.258	0.000*	0.522	0.389		0.534
D(QE)	0.425	0.236	0.189	0.928	0.228	

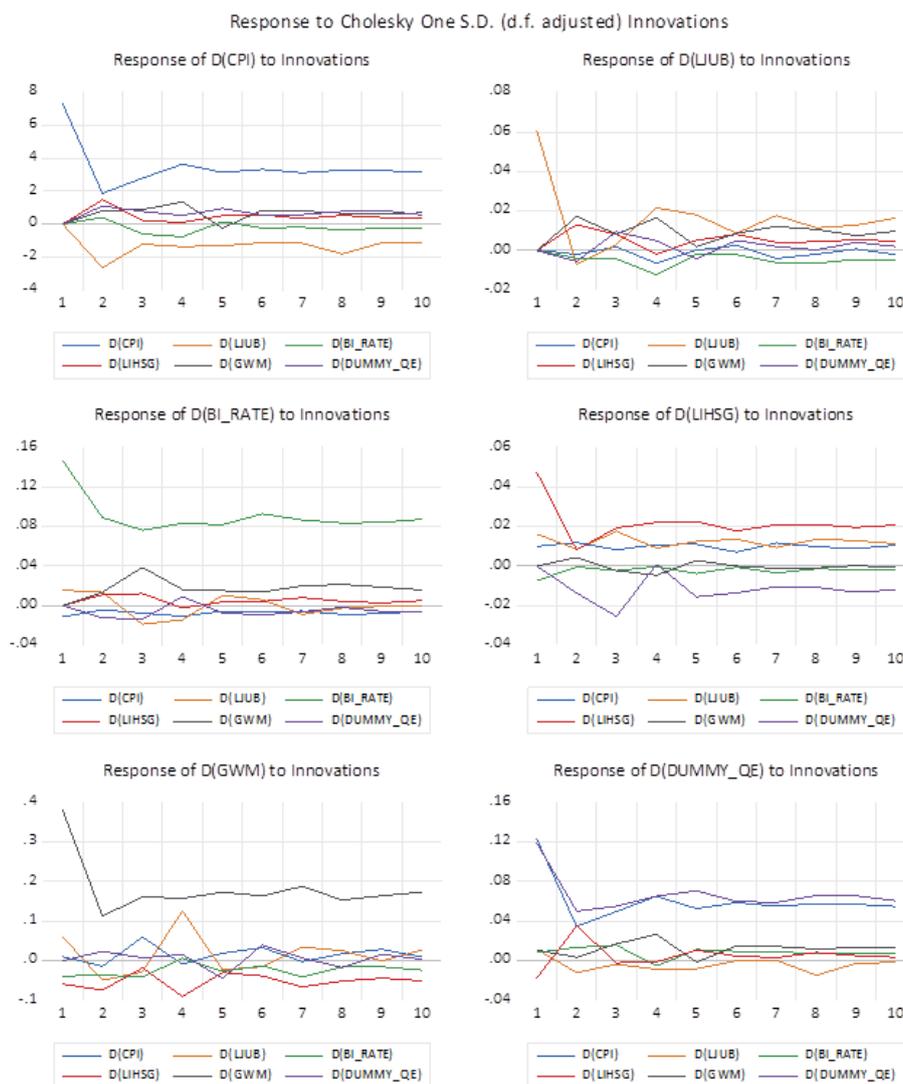
Source: Author (2025)

The results of the causality test in Table 7 also confirm that monetary policy through minimum reserve requirements will directly impact the price level (CPI) and the stock market (IDX). After carrying out a causality test using the pairwise Granger causality test, the next stage of the estimation test is to analyze the results of the impulse response function (IRF), as shown in Figure 6. The IRF test is used to examine both the present and prospective reactions of monetary policy shocks (Saat et al., 2024). Figure 6 shows the response of each variable when there is a shock to other endogenous variables. However, the present study will focus on the response of the CPI and IDX (which represent the stability of the real and financial sector of the economy) to shocks in QE policy through the M0, RR, and interest rates.

According to the IRF results in Figure 6, we can see that the inflation rate in general is very fluctuating. The first shock comes from the inflation itself and how past inflation affects future inflation. CPI responded very strongly positively at the beginning, then declined sharply and stabilized at a positive level after the second period. The next shock comes from the interest rate. This shock was initially responded to positively by the inflation rate at the beginning of the period until the 2nd period, after which it was responded to negatively. This phenomenon is commonly known as *the price puzzle*, where there is an increase in the interest rate followed by inflation in the short-run. Even after implementing the quantitative easing (QE) policy starting in early 2020, the response of the inflation rate to shocks in interest rates became bigger, and the movement became more fluctuating. These findings are consistent with Kiley (2018), which shows that *quantitative easing* is beneficial when interest rates are low.

The other shocks in Figure 6 are from the money supply, reserve requirements, QR implementation, and the stock price index. Inflation rate (CPI) has a negative response in 2nd period to the shock money supply before slowly increased. It is consistent with (Retnasih & Herdianti, 2023) who proved that an increase in the money supply, it will cause inflation in the short run, but then reduce inflation in the long run. However, the inflation response to the shock in the stock price, reserve requirement, and QE policy does not move far from equilibrium. This implies that the QE policy issued by the central bank during the COVID-19 pandemic did not have a significant stabilizing effect on the inflation rate in the short run. The QE policy, which is an unconventional monetary policy, has almost the same impact as an expansionary monetary policy. The main aim of the QE policy is to provide stimulus to

the economy through liquidity injection. The increase in the money supply due to the QE policy can certainly cause various side effects that allow the emergence of systemic risks, such as inflation, an explosion in the amount of credit, etc.



As Figure 6 shows, the stock price index reaction to macroeconomic variable shocks is comparable to the inflation rate's response. However, the IDX composite response to the shocks in QE policy is persistently negative. It can be implied that the QE policy had quite a significant effect on the stability of stock prices in Indonesia. Meanwhile, the effect of inflation rate shocks on the stock price index increased until the end of the period. As Figure

6 previously showed, the inflation rate responded more strongly to shocks after QE. This evidence is consistent with Lima et al. (2016), who proved that QE had a positive impact on stock market. Then in Figure 6, it's confirmed by the presence of greater inflation shocks that the response of stock prices is also more fluctuating. After carrying out the IRF analysis, the final stage in the VECM model is to carry out a variance decomposition analysis to find out which variables are predicted to have the greatest shock value or contribution over the next 10 periods.

Table 8. The result of variance decomposition for inflation rate (CPI)

Variance Decomposition of D(CPI):							
Period	S.E.	D(CPI)	D(LM0)	D(IR)	D(LIDX)	D(RR)	D(QE)
1	7.302	100	0.000	0.000	0.000	0.000	0.000
2	8.251	83.498	10.263	0.242	3.228	0.984	1.782
3	8.896	81.657	10.734	0.662	2.831	1.820	2.294
4	9.847	80.317	10.680	1.144	2.323	3.373	2.160
5	10.47	79.888	11.009	1.031	2.302	3.036	2.732
6	11.11	79.930	10.836	0.958	2.316	3.283	2.673
7	11.65	79.912	10.854	0.899	2.184	3.472	2.676
8	12.29	78.819	11.921	0.894	2.152	3.410	2.801
9	12.82	78.93	11.759	0.858	2.0792	3.367	3.003
10	13.29	79.082	11.709	0.829	2.0110	3.398	2.968

Source: Author (2025)

The results of the variance decomposition test for inflation (CPI) in Table 8, show that inflation variation is entirely influenced by itself in the first period. Until the 10th period, inflation remained the largest contributor to its own fluctuation at 79.08%. This indicates strong inflation inertia or persistent inflation expectations in the future. Meanwhile, the external variables that most influence inflation are money supply (M0). The effect appeared in the second period (10,26%) and increased consistently to reach 11.7% in the 10th period. This indicates monetary transmission from the amount of money in circulation to the price level. Meanwhile, it was found that QE policy and reserve requirements (RR) had contributed almost equally to inflation shocks, with an average 3%, while IR and the IDX had contributed the most insignificantly, at around 0-2%. The low impact of interest rates suggests a disruption in the transmission of monetary policy to the real sector, so the interest rate policy is almost powerless in controlling inflation. This may be due to the fact that during the pandemic, banks were slow to respond to changes in benchmark interest rates or financial market structures, leading to the ineffectiveness of interest rates in controlling consumption and investment. The contribution between variables appears to stabilize (steady state) after the 8th period, indicating that the relationship in this VECM system is fairly consistent in the long term. The inflation rate is a macroeconomic indicator that plays a crucial role in the real sector. Therefore, maintaining price stability seems to be the best possible contribution that monetary policy can make to sustainable, non-inflationary economic growth (Baptiste & Mathu, 2023). Given the finding that inflation is more responsive to RR and QE policies than

IR, we can conclude that maintaining price stability (inflation rate) in the long term is more effective using reserve requirements (RR) than interest rates (IR). This is evidenced by the fact that in the post-pandemic period, Bank Indonesia significantly increased the minimum reserve requirement from 3% to 9% in 2022, and has maintained this elevated level since then. The movement of the minimum reserve requirement by Bank Indonesia during the research period (2018-2025) can be seen in Figure 7 below.

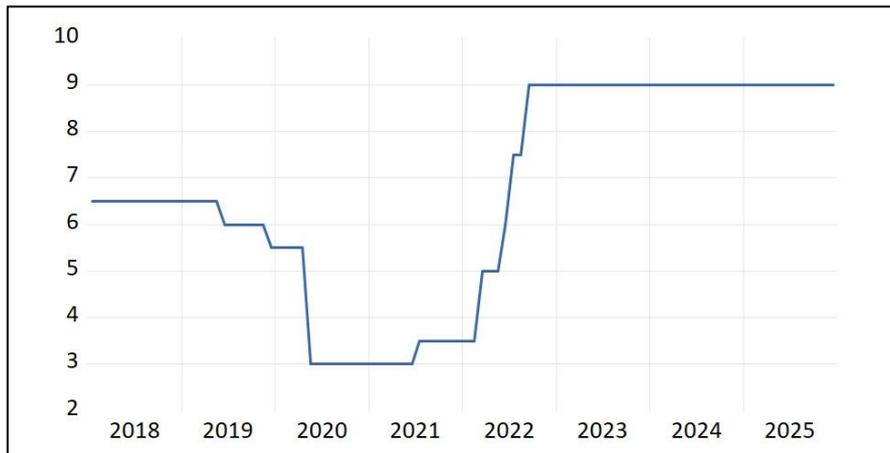


Figure 7. Bank Indonesia's Reserve Requirement Ratio

Source: CEIC (2025)

The results of the variance decomposition test for the stock price index variable (IDX) can be seen at Table 9. In the 1st period, LIDX variation was explained by its own shock of 84.26%. However, this contribution declined significantly to 55.26% in the 10th period. This shows that the stock price (IDX) is highly reactive to external factors in the long term and does not depend only on its past movement trends. The most prominent external factor affecting the IDX was identified as shocks to QE policy. The contribution exhibits a substantial increase from 0% in the initial period to 17.56% in the 10th period. This finding suggests that the stock price is highly responsive to the unconventional monetary policy, Quantitative Easing. However, contributions from M0 and CPI showed fairly stable increases, reaching 15.78% and 9.87%, respectively. This result suggests that the money supply and price stability are significant factors in maintaining liquidity in the stock market. Meanwhile, shock on the interest rate (IR) and reserve requirements (RR) have a very small impact on the IDX, less than 1%.

Table 9. The result of variance decomposition for IDX composite

Variance Decomposition of D(LIDX):							
Period	S.E.	D(CPI)	D(LM0)	D(IR)	D(LIDX)	D(RR)	D(QE)
1	0.051	3.715	9.896	2.124	84.26359	0.000	0.000000
2	0.056	7.608	10.66	1.800	73.35189	0.614	5.957730
3	0.067	6.751	14.07	1.365	58.91350	0.541	18.34965
4	0.072	8.081	13.76	1.182	60.21480	0.876	15.88101
5	0.079	8.631	13.92	1.208	58.28751	0.861	17.08704
6	0.084	8.434	15.084	1.088	56.70264	0.771	17.91764
7	0.088	9.333	14.703	1.132	56.59336	0.712	17.52561
8	0.093	9.531	15.393	1.046	56.20577	0.652	17.16953
9	0.097	9.554	15.817	0.995	55.47693	0.597	17.55770
10	0.101	9.870	15.783	0.958	55.26399	0.554	17.56907

Source: Author (2025)

Based on the data in Table 9, we can conclude that to stabilize the capital market, intervention through liquidity channels (QE policy) will be much more effective and have an immediate impact compared to the reserve requirement or discount rate policy. However, on the other hand, CPI contributes almost 10%, and uncontrolled inflationary pressure will be a real threat to the long-term stability of the stock market.

4. CONCLUSIONS

The inflation rate is a macroeconomic indicator that shows the stability of the rupiah and is often used as a reference for measuring economic stability, especially when there is a crisis such as the COVID-19 pandemic, which started to hit Indonesia at the beginning of 2020. IRF test results show that the COVID-19 pandemic caused the inflation rate to have a high level of fluctuation, even though after the quantitative easing (QE) policy, the impact of the shock on the inflation rate was even greater. According to the Granger causality test result, we found that the implementation of QE policy through an increase in money base (M0) and a reduction in reserve requirement ratio significantly affects price level in the real sector (CPI) and stock prices (IDX). Therefore, the estimation results show that a decrease in the minimum reserve requirement can significantly increase inflation, and on the other hand, an increase in the RR can quickly reduce the inflation rate. This indicate that QE policy through RR reduction has the potential to cause an increase in inflation rate. These findings are in line with the results of the variance decomposition analysis, which show that inflation is more responsive to RR and QE policies than IR. We can conclude that maintaining price stability (inflation rate) in the long term is more effective using reserve requirements (RR) than interest rates (IR).

The composite stock price index (IDX) is often used as an indicator that shows stability in the financial sector. The findings from granger causality test indicate a statistically significant two-way reciprocal relationship between stock price (IDX) and M0. These findings prove that QE policies during the pandemic provided economic stimulus through M0 and stimulated stock market. Moreover, from the IRF test, the QE policy has been proven to

reduce shocks to the stock price during the COVID-19 pandemic. Reducing shocks to the stock price means that the QE policy is effective in maintaining financial sector stability. This conclusion is strengthened by the results of the variance decomposition analysis, which shows that the most prominent external factor affecting the IDX was identified as shocks to QE policy. The stock price is highly responsive to the QE policy. So, we can conclude that QE policy during the estimation period is much more effective in stabilizing the financial market than the conventional monetary policy, such as the discount rate.

Based on the estimation results, we suggest that this QE policy should be used as a last resort in facing the post-pandemic crisis. Even though the QE policy was issued to provide stimulus to the economy and has been proven to be able to maintain the stability of the financial sector, it does not rule out the possibility that the systemic risks that might arise as a result of the QE policy are much greater. Therefore, to mitigate inflationary pressures resulting from the QE policy, the central bank can implement the *Tapering Off* (TO) policy, such as significantly increasing the minimum reserve requirements to control economic stability after the pandemic and keep risks that may arise as a result of QE under control.

This study still has many limitations; future researchers can develop the results of this research by adding other macroeconomic variables, such as the exchange rate and budget deficit policy which are also closely related to the implications of QE policy.

5. ACKNOWLEDGEMENT

We would like to thank Universitas Muhammadiyah Surakarta for the financial support provided for this research. Special thanks to the journal editor and reviewers for their time, dedication, and valuable suggestions, which significantly improved the quality of this study.

6. REFERENCES

- Alekseievskaya, H., & Mumladze, A. (2020). Quantitative Easing as The Main Instrument of Unconventional Monetary Policy. *Three Seas Economic Journal*, 1(1), 39–45. <https://doi.org/10.30525/2661-5150/2020-1-7>
- Aloui, D. (2021a). The COVID-19 pandemic haunting the transmission of the quantitative easing to the exchange rate. *Finance Research Letters*, 43. <https://doi.org/10.1016/j.frl.2021.102025>
- Aloui, D. (2021b). The COVID-19 pandemic haunting the transmission of the quantitative easing to the exchange rate. *Finance Research Letters*, 43. <https://doi.org/10.1016/j.frl.2021.102025>
- Baptiste, A. J., & Mathu, M. (2023). An Empirical Assessment of the Monetary Policy Credibility and Economic Growth Relationship: A GMM Approach on COMESA and ECOWAS Regions. *Kajian Masalah Ekonomi Dan Pembangunan*, 24(2), 293–307. <https://doi.org/10.23917/jep.v24i1.21703>

- Bedford, J., Berry, S., & Nikolov, K. (n.d.). *Bank of England Quarterly Bulletin 2009 Q2*. Retrieved www.bankofengland.co.uk/markets/money/publications/redbookjan08.pdf.
- Chen, H. C., & Yeh, C. W. (2021). Global financial crisis and COVID-19: Industrial reactions. *Finance Research Letters*, 42. <https://doi.org/10.1016/j.frl.2021.101940>
- Cobham, D., & Kang, Y. (2012). Financial crisis and quantitative easing: Can broad money tell us anything? *Manchester School*, 80(SUPPL.1), 54–76. <https://doi.org/10.1111/j.1467-9957.2012.02323.x>
- Cui, W., & Sterk, V. (2018). Quantitative Easing. *Comparative Political Economy: Monetary Policy EJournal*. <https://api.semanticscholar.org/CorpusID:199521864>
- Dinata, A. V., & Oktora, S. I. (2020). Pengaruh Quantitative Easing dan Tapering Off serta Indikator Makroekonomi terhadap Nilai Tukar Rupiah. *Kajian Ekonomi Dan Keuangan*, 4(1), 64–85. <https://doi.org/10.31685/kek.v4i1.520>
- Fawley, B. W., & Neely, C. J. (2013). *Federal Reserve Bank of St. Louis REVIEW Four Stories of Quantitative Easing*.
- Fendel, R., Neugebauer, F., & Zimmermann, L. (2021a). Reactions of euro area government yields to Covid-19 related policy measure announcements by the European Commission and the European Central Bank. *Finance Research Letters*, 42. <https://doi.org/10.1016/j.frl.2020.101917>
- Fendel, R., Neugebauer, F., & Zimmermann, L. (2021b). Reactions of euro area government yields to Covid-19 related policy measure announcements by the European Commission and the European Central Bank. *Finance Research Letters*, 42. <https://doi.org/10.1016/j.frl.2020.101917>
- Indrajaya, D. (2022a). Efektivitas Kebijakan Moneter Non Konvensional pada BPD Indonesia di Masa Pandemi. *Ekonomi, Keuangan, Investasi Dan Syariah (EKUITAS)*, 3(3). <https://doi.org/10.47065/ekuitas.v3i3.1061>
- Indrajaya, D. (2022b). Efektivitas Kebijakan Moneter Non Konvensional pada BPD Indonesia di Masa Pandemi. *Ekonomi, Keuangan, Investasi Dan Syariah (EKUITAS)*, 3(3). <https://doi.org/10.47065/ekuitas.v3i3.1061>
- Kiley, M. T. (2018). Quantitative Easing and the “New Normal” in Monetary Policy. *Finance and Economics Discussion Series*, 2018.0(4). <https://doi.org/10.17016/feds.2018.004>
- Komite Stabilitas Sistem Keuangan (KSSK). (2022). Siaran-Pers-Bersama-KSSK-2-Februari-2022. *Siaran Pers Komite Stabilitas Sistem Keuangan*.
- Krishnamurthy, A., & Vissing-Jorgensen, A. (2011). *The Effects of Quantitative Easing on Interest Rates: Channels and Implications for Policy*.

- Lima, L. R., Vasconcelos, C. R. F., Simão, J. C. D., & Mendonça, H. F. (2016). The quantitative easing effect on the stock market of the USA, the UK and Japan: An ARDL approach for the crisis period. *Journal of Economic Studies*, 43, 1006–1021. <https://api.semanticscholar.org/CorpusID:157784054>
- Lu, Y. (2013). Quantitative Easing: Reflections on Practice and Theory. *World Review of Political Economy*, 4, 341. <https://api.semanticscholar.org/CorpusID:152870655>
- Martin, C. A., & Milas, C. (2012). Quantitative easing: a sceptical survey. *Oxford Review of Economic Policy*, 28, 750–764. <https://api.semanticscholar.org/CorpusID:154915787>
- Montgomery, H., & Volz, U. (2019). The Effectiveness of Unconventional Monetary Policy in Japan. *Journal of Economic Issues*, 53(2), 411–416. <https://doi.org/10.1080/00213624.2019.1594525>
- Nachrowi, D., & Usman, H. (2006). *Pendekatan Populer dan Praktis Ekonometrika untuk Analisis Ekonomi dan Keuangan*. Badan Penerbit Universitas Indonesia.
- Neely, C. J. (2015). Unconventional monetary policy had large international effects. *Journal of Banking and Finance*, 52, 101–111. <https://doi.org/10.1016/j.jbankfin.2014.11.019>
- Olasehinde-Williams, G. O., Olanipekun, I. O., & Özkan, O. (2023). Stock Market Response to Quantitative Easing: Evidence from the Novel Rolling Windows Nonparametric Causality-in-Quantiles Approach. *Computational Economics*, 64, 947–977. <https://api.semanticscholar.org/CorpusID:262207017>
- Pesaran, M. H. (2015). *Time Series and Panel Data Econometrics*. Oxford University Press.
- Retnasih, N. R., & Herdianti, Y. M. (2023). Pandemic Shock and Economic Variables Responses in ASEAN Countries Using Panel Vector Autoregressive Model. *Jurnal Ekonomi Pembangunan: Kajian Masalah Ekonomi Dan Pembangunan*, 95–111. <https://doi.org/10.23917/jep.v24i1.19850>
- Saat, P. H. R., Ranita, S. V., Agustin, E. S. A. S., & Sinaga, W. F. H. (2024). Navigating the Economic Landscape: VAR Analysis and Strengthening the Bank Lending Channel's Impact on Monetary Policy. *Jurnal Ekonomi Pembangunan: Kajian Masalah Ekonomi Dan Pembangunan*, 339–355. <https://doi.org/10.23917/jep.v25i2.23175>
- Shiratsuka, S. (2010). *Federal Reserve Bank of Dallas Globalization and Monetary Policy Institute Size and Composition of the Central Bank Balance Sheet: Revisiting Japan's Experience of the Quantitative Easing Policy*. <http://www.dallasfed.org/assets/documents/institute/wpapers/2010/0042.pdf>
- Solikin, & Suseno. (2002). *Uang*. Pusat Pendidikan dan Studi Kebanksentralan, Bank Indonesia.
- Stefański, M. (2022). Macroeconomic effects and transmission channels of quantitative easing. *Economic Modelling*, 114. <https://doi.org/10.1016/j.econmod.2022.105943>

Available online at <http://journals.ums.ac.id>, Permalink/DOI: 10.23917/jep.v26i2.9031

Jurnal Ekonomi Pembangunan: Kajian Masalah Ekonomi dan Pembangunan, 26 (2), 2025, 250-270

Woodford, M. (2016). Quantitative Easing and Financial Stability. *Econometrics: Mathematical Methods & Programming EJournal*.
<https://api.semanticscholar.org/CorpusID:31569207>