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Monetary Policy Dynamics and Economic Growth: An Empirical Analysis of Indonesia's Economy using Time-Series Data and Error Correction Model (ECM)

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Abstract: This study investigates the relationship between monetary policy variables and GDP growth in Indonesia using time-series data from 1986 to 2021. Employing the Error Correction Model (ECM) framework, the research explores the presence of a long-run relationship among the variables and identifies significant monetary policy instruments that drive economic growth. The findings reveal a robust long-run relationship between monetary policy variables and GDP growth, indicating the sustained impact of monetary policy on Indonesia's economic performance. Specifically, the core finding highlights the significance of the inflation rate, exchange rate, and total reserves as influential monetary policy instruments driving growth in Indonesia. This finding helps policymakers better understanding about the relationship between monetary policy and economic development in the context of Indonesia by offering insightful information. By utilizing an extensive time-series dataset and employing the ECM methodology, this study contributes to the existing literature on the role of monetary policy in shaping economic growth, particularly in Indonesia.
Keywords: Monetary policy; GDP growth; Time series; Error Correction Model; Cointegration.

1. INTRODUCTION

Economists and decision-makers have long been interested in the connection between monetary policy and economic growth. Analysis and discussion surrounding the efficiency of monetary policy in promoting robust and sustained economic growth are continuing. Understanding the impact of various monetary policy instruments on economic growth is crucial for formulating effective policies and promoting economic stability (Papademos, 2003).

In the context of Indonesia, a rapidly growing emerging market economy, the role of monetary policy in driving economic growth has gained significant importance (Prasad, Rogoff, Wei, S & Kose, 2005). Over the past few decades, Indonesia has experienced notable economic transformations, accompanied by evolving monetary policy frameworks. The country's central bank, Bank Indonesia, has implemented a range of policy measures to influence interest rates, inflation, exchange rates, and the overall monetary environment (Goeltom, 2008). Investigating the link between these monetary policy factors and Indonesia's GDP growth can offer important insights into the efficiency of policy choices and their effects on the economy.

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This research aims to contribute to the existing literature by examining the impact of monetary policy on GDP growth in Indonesia. It focuses on five key monetary policy variables: interest rate, inflation rate, exchange rate (IDR per USD), money supply to total reserves ratio (M2), and total reserves (including gold, current US$). These variables are selected based on their relevance to monetary policy transmission and their potential influence on economic growth dynamics.

To achieve this objective, the study utilizes a time-series dataset covering the period from 1986 to 2021, providing a comprehensive view of Indonesia's economic performance and monetary policy developments. The analysis employs the Error Correction Model (ECM) framework, which allows for the examination of long-run relationships and short-run dynamics between the variables of interest (Obamuyi, 2009). By considering the presence of cointegration among the variables, the study captures both the short-term and long-term impacts of monetary policy on GDP growth.

The core finding of this research reveals the significance of the inflation rate, exchange rate, and total reserves as key monetary policy instruments that drive growth in Indonesia. The identification of these influential variables will assist policymakers in formulating effective strategies to enhance economic growth and stability. Additionally, this study contributes to the body of literature by offering actual data on the link between Indonesian monetary policy and economic growth, enhancing knowledge of transmission mechanisms and policy ramifications.

2. LITERATURE REVIEW

In-depth research has been done on the connection between monetary policy and economic growth in the literature. The effects of monetary policy tools on a range of economic outcomes, including GDP growth, inflation, investment, and employment, have been the subject of several studies (Baghebo & Stephen, 2014; Chugunov et al., 2021; Dimitrijević & Lovre, 2013; Epstein & Yeldan, 2008; Idris, 2019; Kamaan & Nyamongo, 2014; Lee & Werner, 2018; Mouabbi & Sahuc, 2019; Twinoburyo & Odhiambo, 2018). This review of the literature gives a broad overview of the key conclusions and theoretical viewpoints regarding how monetary policy affects economic growth, with a particular focus on the variables of interest rates, inflation, exchange rates, the money supply-to-reserves ratio, and total reserves.

One of the primary channels through which monetary policy affects economic growth is through the manipulation of interest rates. Lowering interest rates stimulates investment and consumption, leading to increased economic activity and GDP growth. Empirical studies, such as Shivanda & Obwogi (2018), Arouju (2017) and Jebai (2021), have found evidence supporting the positive relationship between lower interest rates and economic growth.

Inflation is another crucial consideration in the context of monetary policy. High and volatile inflation can erode purchasing power, disrupt price stability, and hinder economic growth. Research by Mawar, Ismail and Muhammad (2016) following with Fu, Ye, Tian & Wan (2023) has highlighted the negative relationship between inflation and long-term economic growth. Controlling inflation through appropriate monetary policy measures is essential for promoting stable economic conditions conducive to sustainable growth.

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The exchange rate is a critical variable in an open economy. Fluctuations in exchange rates can impact a country's export competitiveness, import costs, and overall trade dynamics. Empirical studies of Akpan & Atan (2011) have examined the effects of exchange rate movements on economic growth, emphasizing the importance of maintaining a stable and competitive exchange rate regime.

Sustainable economic growth depends on the banking system's liquidity and financial stability. The ratio of broad money to total reserves reflects the liquidity and stability of the financial system. Studies by Hassan, M.K., Sanchez & Yu (2011) following with Masoud & Hardaker (2012) have demonstrated the positive relationship between financial development and economic growth. Maintaining an appropriate balance between broad money supply and total reserves is essential for promoting financial stability and supporting economic growth.

For the purpose of maintaining currency stability and acting as a safety net against external shocks, total reserves, which include gold and foreign currency assets, are extremely important. Adequate reserves allow countries to manage exchange rate volatility, ensure confidence in the domestic currency, and support the smooth functioning of the economy. Studies by Sheng & Cho (1993) and Alkhareif, Barnett & Alsadoun (2017) have highlighted the importance of maintaining sufficient reserves for promoting macroeconomic stability and reducing vulnerability to external crises.

Despite a sizable amount of literature evaluating each of these monetary policy factors' effects on economic development separately, there are few studies that have thoroughly examined their combined effects. This research aims to fill this gap by investigating the joint impact of interest rates, inflation rates, exchange rates, broad money to total reserves ratio, and total reserves on GDP growth in the context of Indonesia.

By employing a time-series dataset covering the period from 1986 to 2021 and utilizing econometric techniques, including regression analysis and error correction modeling, this study aims to provide empirical evidence on the specific effects of these monetary policy variables on economic growth. The findings will contribute to a deeper understanding of the transmission mechanisms and policy implications of monetary policy in Indonesia, thereby informing policymakers' decisions and strategies aimed at fostering sustainable and inclusive economic development.

In conclusion, this literature review has highlighted the importance of investigating the impact of monetary policy variables, including interest rates, inflation rates, exchange rates, broad money to total reserves ratio, and total reserves, on GDP growth. The existing literature provides valuable insights into the individual effects of these variables on economic growth, but there is a need for comprehensive analysis that considers their collective influence.

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3. METHODOLOGY

3.1. Variable Operation Definitions

This study uses one dependent variable and five independent variables. Each variable's operational definition in this study is as follows:

i) GDP Growth (GDP)

It is a metric used to determine how much a nation's economy has grown over a given time period, usually in a year (Kira, 2013). In this study, the money supply, interest rates, inflation rates, exchange rates, and total reserves all have an impact on GDP growth.

ii) Interest Rate (IR)

The cost of borrowing money is known as the interest rate, which is typically stated as a percentage of the amount borrowed. Interest rates affect GDP growth by influencing the cost of capital and the availability of credit (Suhendra & Anwar, 2014). While low interest rates can encourage investment and borrowing and boost economic activity, high interest rates can deter investment and borrowing and slow down the economy (Abdullah, 2013).

iii) Inflation Rate (INF)

The rate of overall price increases for goods and services is known as the inflation rate and it affects GDP growth by influencing consumer and business spending (Olusola, Chimezie, Shuuya & Addeh, 2022). When inflation rates are low, purchasing power increases and spending is encouraged, which boosts economic activity. Conversely, when inflation rates are high, purchasing power decreases and spending is discouraged, which slows down economic activity (Lavoie, 2012).

iv) Exchange Rate (EXR)

The value of one currency in respect to another currency is known as the exchange rate and it affects GDP growth by influencing international trade and investment (Tan, Xu & Gashaw, 2021). While a poor exchange rate can make exports cheaper and imports more expensive, increasing economic activity, a strong exchange rate can make exports more expensive and imports cheaper, slowing down economic activity (Chaudhry, Nazar, Ali, Meo & Faheem, 2022).

v) Money Supply (M2)

It is the total amount of money in circulation in an economy, including cash, bank deposits, and other liquid assets (Malikova & Rakhmonov, 2023). The broad money to total reserves ratio is an indicator of how much money is in circulation in relation to the number of bank reserves. Money supply affects GDP growth by influencing the availability of credit and the level of economic activity (Odumusor, 2019).

vi) Total Reserves (RESERVE)

This study is using the total reserves, including gold which are the assets held by a country's central bank to support its currency and maintain financial stability. Total reserves affect GDP growth by influencing availability of credit and the level of economic activity (Arestis & Sawyer, 2002).

3.2. Data Type and Sources

Quantitative data, or data quantified on a numerical scale by secondary data, are the type of data employed in this study. The term "secondary data collection" describes information obtained from earlier studies. The data sources in this research were obtained from World Bank publications in the form of annual data from 1986 to 2021 (Time-series data).

3.3. Error Correction Model (ECM) Framework

In a time series analysis, the Error Correction Model (ECM) framework effectively reflects the short-run dynamics and long-run equilibrium relationship between variables. It is particularly useful when studying the relationship between economic variables that are expected to have a long-run equilibrium but may deviate from it in the short run (Okeowo, 2022).

In order to develop strong, robust and reliable models that capture the relationship between monetary policy variables and economic growth, the research work adopts the econometric techniques of the Error Correction Term (ECT) as the estimation technique. This method is extensively used in regression analysis primarily because it is initiatively appealing and mathematically much simpler than any other econometric technique (Gujarati, 2004).

In the study of Fasanya, Onakoya & Agboluaje (2013), the ECM framework has been extensively employed to analyze various economic phenomena, including the impact of monetary policy on economic growth, inflation dynamics, exchange rate determination, and the relationship between financial variables (Baghebo & Stephen, 2014).

3.4. Analysis Method

The objective of this study is to investigate how monetary policy affects economic growth while using the OLS methodology. The research's basic equation model is as follows:

$$GDP = \beta_0 + \beta_1 IR + \beta_2 INF + \beta_3 EXR + \beta_4 M2 + \beta_5 RESERVE + \varepsilon$$

where, GDP= Gross Domestic Product Growth (%); IR= Interest Rate (%); INF= Inflation Rate (%); EXR= Exchange Rate (IDR per USD); M2= The broad money to total reserves ratio; RESERVE= Total Reserve (including gold); β_1–β_3= Independent Variable; and ε= Random Error.

3.4.1. Augmented-Dickey Fuller (ADF) Test

The Augmented Dickey-Fuller (ADF) test is a statistical test used to determine whether a time series is stationary or non-stationary. Many time series models depend heavily on the concept of stationarity, which guarantees that the series' statistical characteristics do not vary over time.

The ADF test is an extension of the Dickey-Fuller test, which tests for the presence of a unit root in a time series (Gujarati, 2004). A unit root indicates that the data set has a stochastic trend and is non-stationary (Meade and Maier, 2003). The ADF test builds upon this by including lagged differences of the series in the regression equation, allowing for more complex dynamics and trends in the data.

3.4.2. Philllip-Perron (PP) Test

The Phillip-Perron test and the Augmented Dickey-Fuller (ADF) test are both statistical tests used to determine the presence of a unit root in a time series, which indicates whether the series is stationary or non-stationary. The Phillip Perron test, proposed by Perron & Phillips (1988), is an extension of the ADF test that addresses some of its limitations. It incorporates a more general form of deterministic trend in the regression equation, allowing for linear and nonlinear trends.

Similar to the ADF test, the Phillip Perron test evaluates the null hypothesis of a unit root against the alternative hypothesis of stationarity. If the test's p-value is less than a set criterion for significance (e.g., 0.05), it indicates that the null hypothesis may be rejected, and the data set is stationary (Gujarati, 2004). The ADF test and the Phillip Perron test are valuable tools for unit root analysis and stationarity testing.

3.4.3. Cointegration Test

A key concept in time series analysis is co-integration, which enables researchers to simulate the long-term dynamics of variables even when they diverge from one another in the short term. The co-integration test is typically performed using the Johansen cointegration test, which is based on the eigenvalues and eigenvectors of the data matrix, to identify the presence of long-run equilibrium relationships among the variables (Tripathi & Kumar, 2014).

If the test's p-value is less than a set criterion for significance (e.g., 0.05), it indicates that the null hypothesis may be rejected, and there is evidence of co-integration between the variables (Gujarati, 2004). The number of co-integrating vectors indicates the number of long-run equilibrium relationships among the variables.

3.4.4. Optimum Lag Test

The best number of lags to include in a time series model is determined by the Optimum Lag Test, sometimes referred to as the Lag Length Selection Test, in econometrics (Jones, 1989). It helps to determine the appropriate lag length that captures the dynamics and relationships among variables in the data. There are various methods that can be used to do this optimal latency test, including Akaike Information Criterion (AIC), Schwarz Information Criterion (SIC), and Hannan-Quinn Information Criterion (HQ) (Zuhroh, 2021 and Suidarma, 2019). The lowest AIC, SC, and HQ values from the first lag to the greatest lag show these outcomes (Rosadi, 2012).

3.4.5. Parsimonious Error Correction Test

The parsimonious test is particularly useful when dealing with a large number of potential explanatory variables, as it allows researchers to identify the most relevant variables for the model while avoiding overfitting and improving the accuracy of their predictions (Chen, O'Leary & Evans, 2019). It is used to determine the optimal number of variables to include in a regression model while maintaining the explanatory power of its model (Nunez & Steyerberg, 2011).

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4. RESULT AND DISCUSSION

Table 1 below provides an overview of the statistics used in this empirical study. The table shows that the mean value of M2 is 1.801.284, the lowest possible value, and the mean value of total reserves is 5.59E+10, the highest possible value. In contrast, the mean values of GDP, IR, INF, and exchange rate are 4.832.287, 6.265.262, 8.626.478, and 7.843.149, respectively.

Table 1. Summary Statistics of the variables used in the regression analysis.

	GDP	IR	INF	EXR	M2	RESERVE
Mean	4.832.287	6.265.262	8.626.478	7.843.149	1.801.284	5.59E+10
Median	5.337.622	7.271.154	6.414.026	9.115.717	1.517.864	3.55E+10
Maximum	8.220.007	1.870.734	5.845.104	14582.20	6.276.287	1.45E+11
Minimum	-1.312.673	-2.460.017	1.560.130	1.282.560	4.757.902	5.26E+09
Std. Dev.	3.598.555	7.335.717	9.274.969	4.569.074	1.137.922	4.72E+10
Skewness	-3.751.774	-2.008.217	4.496.342	-0.208535	2.129.196	0.567178
Kurtosis	1.874.781	9.889.700	2.459.125	1.664.914	8.416.087	1.712.280
Observation	36	36	36	36	36	36

Source: Computed by the Author, 2023

The summary statistics of Indonesia's GDP growth from 1986 to 2021 provide valuable insights into the distribution and characteristics of this key economic indicator. The mean GDP growth rate is approximately 4.832.287, indicating the average annual increase in the country's economic output over the period. The median growth rate of 5.337.622 suggests that half of the observed growth rates fall above this value, reflecting moderate economic expansion. However, it is important to note that the maximum growth rate observed is 8.220.007, indicating periods of strong economic growth.

Examining the standard deviation of 3.598.555, observed a considerable dispersion in GDP growth rates, suggesting fluctuations and volatility in Indonesia's economic performance. The negative skewness value of -3.751 indicates an asymmetric distribution, with a longer tail on the left, implying a higher frequency of negative growth rates compared to positive growth rates. Additionally, the positive kurtosis value of 1.874 indicates a distribution with fatter tails and a higher likelihood of extreme values, potentially indicating periods of economic booms and recessions.

Overall, the descriptive summary of Indonesia's GDP growth from 1986 to 2021 suggests a mixed picture of economic performance. While the mean and median growth rates indicate overall positive expansion, the high volatility and negative skewness suggest periods of economic downturns and challenges. The presence of extreme values in the kurtosis indicates the occurrence of both rapid economic growth and significant contractions.

4.1.Augmented-Dickey Fuller (ADF) Test

The Augmented-Dickey Fuller (ADF) test result below shows that the GDP growth, interest rate, inflation rate, and money supply variables are stationary at level and exchange rate and total reserve are stationary at the first difference. This means all the variables are integrated in order 0 and 1.

Table 1. Augmented-Dickey Fuller (ADF) Test

Variables	ADF Values	Mackinnon Critical Values	Order of Integration	Note
GDP*	-4.239.896	-3.632.900	Level	Stationer
IR*	-6.022.246	-3.632.900	Level	Stationer
INF*	-4.599.918	-3.632.900	Level	Stationer
EXR*	-7.000.927	-3.639.407	1st Difference	Stationer
M2*	-3.671.379	-3.632.900	Level	Stationer
RESERVE*	-5.488.084	-3.639.407	1st Difference	Stationer

Source: Computed by the Author, 2023

Note: *, **, *** denotes rejection of null hypothesis at 1%, 5% and10% significant level respectively

4.2.Phillips-Perron (PP) Test

According to the results of the Phillips-Perron test, the variables for GDP growth, interest rates, inflation rates, and money supply are stationary at their current levels, while the variables for the exchange rate and total reserves are stationary at the first difference. This means all the variables are integrated in order 0 & 1.

Table 2. Philip-Perron (PP) Test

Variables	PP Values	Mackinnon Critical Values	Order of Integration	Note
GDP*	-4.220.959	-3.632.900	Level	Stationer
IR*	-6.019.304	-3.632.900	Level	Stationer
INF*	-4.611.129	-3.632.900	Level	Stationer
EXR*	-7.026.165	-3.639.407	1st Difference	Stationer
M2*	-3.752.323	-3.632.900	Level	Stationer
RESERVE*	-5.477.869	-3.639.407	1st Difference	Stationer

Source: Computed by the Author, 2023

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4.3.Optimum Lag Test

Based on the results of the Lag Length Criteria in Table 3 below, the optimal lag suggested by the FPE, AIC, SC and HQ criteria is lag four.

Table 3. Optimum Lag Test

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-1.490.857	NA	1.72e+33	9.355.358	9.382.841	9.364.468
1	-1.373.287	1.837.030	1.10e+31	8.845.546	9.037.924	8.909.314
2	-1.329.794	51.64800*	8.85e+30	8.798.715	9.155.988	8.917.140
3	-1.284.895	3.648.072	1.10e+31	8.743.094	9.265.262	8.916.178
4	-1.174.483	4.830.524	8.90e+29*	82.78019*	89.65082*	85.05761*

Source: Computed by the Author, 2023

4.4.Johansen-Juselius Cointegration Test

The next pre-estimation test is a cointegration test to see the long-term relationship using Johansen's test. Based on Table 4 below, economic growth, interest rate, inflation, and exchange rate correlate in the long run.

Table 4. Johansen-Juselius Cointegration Test Result

Hypothesized No. of CE(s)	Eigen value	Max-Eigen value	Critical value	Prob.***	Trace statistics	Critical value	Prob.***
			0.05			0.05	
None*	0.843716	5.753.843	4.007.757	0.0002	1.707.651	9.575.366	0.0000
At most 1*	0.794125	4.899.500	3.387.687	0.0004	1.132.267	6.981.889	0.0000
At most 2*	0.683889	3.570.152	2.758.434	0.0037	6.423.168	4.785.613	0.0007
At most 3**	0.469408	1.964.665	2.113.162	0.0796	2.853.015	2.979.707	0.0694
At most 4	0.244119	8.676.001	1.426.460	0.3141	8.883.506	1.549.471	0.3763
At most 5	0.006671	0.207505	3.841.465	0.6487	0.207505	3.841.465	0.6487

Source: Computed by the Author, 2023
Trace test indicates 3 cointegrating eqn(s) at the 0.01 level and 1 at the 0.10 level.
*denotes rejection of the hypothesis at the 0.01 level
**denotes rejection of the hypothesis at the 0.10 level
***MacKinnon-Haug-Michelis (1999) p-values

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The Johansen-Juselius Cointegration Test result above, provides insights into the presence of long-term relationships among the variables in the analysis, specifically in the context of Indonesia's GDP growth perspective from 1986 to 2021. The test examines different hypotheses regarding the number of cointegrating equations (CEs) and compares the eigenvalues and trace statistics against critical values at a significance level of 0.05.

The test results indicate that at the "None" hypothesis (indicating no cointegrating equations), the maximum eigenvalue is 5.753.843, exceeding the critical value of 4.007.757 at a very low probability level of 0.0002. The trace statistics of 1.707.651 also exceed the critical value of 9.575.366 at a probability level of 0.0000. This finding implies that the variables show signs of cointegration, which denotes the existence of long-term linkages.

Further analysis considers the number of cointegrating equations. At most 1 and at most 2 cointegrating equations also reject the null hypothesis with probabilities of 0.0004 and 0.0037, respectively. However, when considering at most 3 cointegrating equations, the eigenvalue (1.964.665) and trace statistics (2.853.015) are below their respective critical values at probabilities of 0.0796 and 0.0694. This suggests that there might be at most 2 cointegrating equations, indicating the existence of two long-term relationships among the variables.

4.5.Parsimonious Error Correction Test

The Parsimonious Error Correction Estimates in Table 5 below, provides insights into the relationship between Indonesia's GDP growth and the various explanatory variables over the period from 1986 to 2021. The coefficients and corresponding statistical measures shed light on the significance and impact of each variable on GDP growth.

Table 5. Parsimonious Error Correction Estimates

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.559224	1.563.931	-0.357576	0.7246
D(GDP(-1))*	1.917.961	0.831708	2.306.050	0.0325
D(GDP(-2))	0.684828	1.022.920	0.669483	0.5112
D(IR(-1))	0.106074	0.222109	0.477577	0.6384
D(IR(-2))	0.028576	0.171048	0.167065	0.8691
D(INF(-1))*	0.615306	0.304210	2.022.636	0.0574
D(INF(-2))	0.369194	0.334996	1.102.085	0.2842
D(EXR(-1))**	0.002161	0.001176	1.837.415	0.0818
D(EXR(-2))	-0.000516	0.001498	-0.344191	0.7345
D(M2(-1))	0.042042	0.128810	0.326390	0.7477
D(M2(-2))	0.011214	0.118705	0.094467	0.9257
D(LOG(RESERVE(-1)))*	1.308.505	6.192.471	2.113.058	0.0481
D(LOG(RESERVE(-2)))	-4.092.357	7.940.195	-0.515398	0.6122
ECM(-1)*	-2.154.392	0.942904	-2.284.847	0.0340
R-squared	0.518557			

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Adjusted R-squared	0.189148
Durbin-Watson stat	1.831.555

Source: Computed by the Author, 2023

The coefficient for lagged GDP growth (D(GDP(-1))) is 1.917.961 with a t-statistic of 2.306.050 and a probability value of 0.0325. This suggests a favorable and strong correlation between the GDP growth of the previous year and the GDP growth of the current year. Similarly, the coefficient for the error correction term (ECM(-1)) is -2.154.392, suggesting that there is a mechanism to correct deviations from the long-term equilibrium relationship, with a significant impact on GDP growth.

Other variables, such as lagged inflation (D(INF(-1))), lagged log of reserves (D(LOG(RESERVE(-1)))), and lagged exchange rate (D(EXR(-1))), show positive coefficients and relatively lower probability values, implying their potential influence on GDP growth, although they are not statistically significant at conventional significance levels.

Overall, the R-squared value of 0.518557 indicates that the included variables in the model can explain approximately 52% of the variation in GDP growth. But the adjusted R-squared value of 0.189148 suggests that the model may not be capturing the full complexity of the relationship, and some variables may not be contributing significantly to explain the GDP growth of Indonesia.

In short, the Parsimonious Error Correction Estimates provide evidence of the significant impact of lagged GDP growth and the error correction term on Indonesia's GDP growth from 1986 to 2021. Other variables, such as lagged inflation, lagged reserves, and lagged exchange rate, also show potential influences but may require further investigation. The results highlight the importance of considering lagged economic indicators and long-term equilibrium relationships when analyzing and predicting Indonesia's GDP growth.

5. POLICY RECOMMENDATION

Indonesia's economic growth and stability can be further enhanced through a set of well-designed policy recommendations. It is critical that the central bank closely monitor interest rates in order to make sure they are in line with the current state of the economy when it comes to monetary policy. By making appropriate adjustments to interest rates, the central bank can stimulate investment and consumption, thus supporting GDP growth. Additionally, implementing an effective inflation targeting framework will help anchor inflation expectations and maintain price stability, contributing to sustainable economic growth.

To promote financial stability, strengthening the supervision of the banking sector is imperative. This can be achieved through enhanced regulatory oversight and improved risk management practices. Indonesia can create a robust financial system that can withstand economic shocks by ensuring the stability and soundness of the banking sector. Furthermore, effective liquidity management measures should be put in place to address the impact of money supply and reserves on GDP growth. The central bank should adopt robust liquidity management

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tools and practices to maintain a balanced supply of funds in the economy, supporting economic activities while preserving financial stability.

6. CONCLUSION

The analysis of Indonesia's GDP growth perspective from 1986 to 2021 has provided valuable insights and policy recommendations. The descriptive analysis of summary statistics highlighted the key characteristics and trends of the variables, shedding light on the country's economic performance. The Johansen-Juselius Cointegration Test result indicated the presence of long-term relationships among the variables, suggesting the importance of considering their interdependencies in economic modeling. Furthermore, the Parsimonious Error Correction Estimates identified the significant variables and their coefficients in explaining GDP growth fluctuations. In order to encourage Indonesia's sustainable economic growth, a number of policy proposals have been made in light of this finding.

The recommendations mentioned above encompass monetary policy measures such as interest rate management, inflation targeting, and liquidity management. It is essential to prioritize financial stability through enhanced banking supervision and risk management practices. Structural reforms focusing on reducing bureaucracy, enhancing transparency, and facilitating ease of doing business are also vital for creating a favorable investment climate.

Furthermore, future research could explore the dynamic relationships and causalities among the variables identified in the study. Advanced econometric methods, such as vector autoregression (VAR) models, Granger causality tests, and panel data analysis, can be used to find short- and long-term interactions between GDP growth, interest rates, inflation rates, exchange rates, the size of the money supply, and total reserves. This would provide more nuanced insights into the transmission mechanisms and policy implications for Indonesia's economy.

REFERENCES

1. Abdullah, A. K. (2013). Debt and Economic Activity. Islam and Civilisational Renewal, 274(1706), 1-16.
2. Alkhareif, R. M., Barnett, W. A., & Alsadoun, N. (2017). Estimating the output gap for Saudi Arabia.
3. Akpan, E. O., & Atan, J. A. (2011). Effects of exchange rate movements on economic growth in Nigeria. CBN Journal of Applied Statistics, 2(2), 1-14.
4. Araujo, T. (2017). Does Lowering the Interest Rate Stimulate Economic Growth? An Analysis of Current Macroeconomic Policy.
5. Arestis, P., & Sawyer, M. C. (2002). Can monetary policy affect the real economy?
6. Baghebo, M., & Stephen, E. T. (2014). Monetary policy and economic growth in Nigeria (1980-2011). Asian Economic and Financial Review, 4(1), 20-32.
7. Chaudhry, I. S., Nazar, R., Ali, S., Meo, M. S., & Faheem, M. (2022). Impact of environmental quality, real exchange rate and institutional performance on tourism receipts in East-Asia and Pacific region. Current Issues in Tourism, 25(4), 611-631.
8. Chen, K., O'Leary, R. A., & Evans, F. H. (2019). A simple and parsimonious generalised additive model for predicting wheat yield in a decision support tool. Agricultural Systems, 173, 140-150.
9. Chugunov, I., Pasichnyi, M., Koroviy, V., Kaneva, T., & Nikitishin, A. (2021). Fiscal and monetary policy of economic development. European Journal of Sustainable Development, 10(1), 42-42.
10. Dimitrijević, B., & Lovre, I. (2013). Essay on monetary policy and economic growth. Journal of Central Banking Theory and Practice, 1(3), 111-138.
11. Epstein, G., & Yeldan, E. (2008). Inflation targeting, employment creation and economic development: assessing the impacts and policy alternatives. International Review of Applied Economics, 22(2), 131-144.

12. Fasanya, I. O., Onakoya, A. B., & Agboluaje, M. A. (2013). Does monetary policy influence economic growth in Nigeria?. Asian Economic and Financial Review, 3(5), 635-646.
13. Fu, M., Ye, X., Tian, L., & Wan, B. (2023). Green Low-Carbon Extraction Behavior and Realization of Carbon Rebalancing Evolution. Sustainability, 15(6), 5073.
14. Goeltom, M. S. (2008, January). The transmission mechanisms of monetary policy in Indonesia. In Participants in the meeting (p. 309).
15. Gujarati, D. N. (2004). Basic econometrics.: Student solutions manual for use with Basic econometrics.
16. Hassan, M. K., Sanchez, B., & Yu, J. S. (2011). Financial development and economic growth: New evidence from panel data. *The Quarterly Review of economics and finance*, *51*(1), 88-104.
17. Idris, M. (2019). Monetary policy and economic growth in developing countries: evaluating the policy nexus in Nigeria. Journal of Business and Economics Research, 8(5), 290-300.
18. Jebai, H. (2021). Effect of US Interest Rate Shocks on Rentier Economies and Advanced Economies (Doctoral dissertation, HEC Montréal).
19. Jones, J. D. (1989). A comparison of lag–length selection techniques in tests of Granger causality between money growth and inflation: evidence for the US, 1959–86. Applied Economics, 21(6), 809-822.
20. Kamaan, C. K., & Nyamongo, E. M. (2014). The effect of monetary policy on economic growth in Kenya. International Journal of Business and Commerce, 3(8), 11-24.
21. Kira, A. R. (2013). The factors affecting Gross Domestic Product (GDP) in developing countries: The case of Tanzania.
22. Lavoie, M. (2012). Financialization, neo-liberalism, and securitization. Journal of Post Keynesian Economics, 35(2), 215-233.
23. Lee, K. S., & Werner, R. A. (2018). Reconsidering monetary policy: An empirical examination of the relationship between interest rates and nominal GDP growth in the US, UK, Germany and Japan. Ecological Economics, 146, 26-34.
24. Malikova, D., & Rakhmonov, N. (2023). MONETARY AGGREGATES AND THEIR IMPORTANCE IN THE ECONOMY.
25. Masoud, N., & Hardaker, G. (2012). The impact of financial development on economic growth: Empirical analysis of emerging market countries. Studies in economics and finance.
26. Mawar, M. Y., Ismail, M. A., & Muhamad, S. H. (2016). Determinant Factors of Korean Economic Growth: Faktor Penentu kepada Pertumbuhan Ekonomi Korea. Journal of Management and Muamalah, 6(1), 65-72.
27. Meade, N., & Maier, M. R. (2003). Evidence of long memory in short‐term interest rates. Journal of Forecasting, 22(8), 553-568.
28. Mouabbi, S., & Sahuc, J. G. (2019). Evaluating the macroeconomic effects of the ECB's unconventional monetary policies. Journal of Money, Credit and Banking, 51(4), 831-858.
29. Nunez, E., Steyerberg, E. W., & Nunez, J. (2011). Regression modeling strategies. Revista Española de Cardiología (English Edition), 64(6), 501-507.
30. Obamuyi, T. M. (2009). An investigation of the relationship between interest rates and economic growth in Nigeria, 1970-2006. Journal of economics and International Finance, 1(4), 93.
31. Odumusor, C. J. (2019). Impact of money supply on the growth of the Nigerian economy. Journal of Economics and Finance, 10(1), 30-46.
32. Okeowo, A. I., (2022). Dynamics of Fiscal & Monetary Policies in Nigeria: An Econometric Approach.
33. Olusola, B. E., Chimezie, M. E., Shuuya, S. M., & Addeh, G. Y. A. (2022). The Impact of Inflation Rate on Private Consumption Expenditure and Economic Growth—Evidence from Ghana. Open Journal of Business and Management, 10(4), 1601-1646.
34. Papademos, L. (2003). The contribution of monetary policy to economic growth. Die Förderung des Wirtschaftswachstums in Europa Fostering Economic Growth, 23.
35. Phillips, P. C., & Perron, P. (1988). Testing for a unit root in time series regression. Biometrika, 75(2), 335-346.
36. Prasad, E., Rogoff, K., Wei, S. J., & Kose, M. A. (2005). Effects of financial globalization on developing countries: some empirical evidence (pp. 201-228). Palgrave Macmillan UK.
37. Rosadi, D. (2012). Econometrics & Applied Time Analysis with Eviews, Yogya: Andi Publisher
38. Sheng, A., & Cho, Y. J. (1993). Risk Management and Stable Financial.
39. Shivanda, A. R., & Obwogi, J. (2018). Effect of macroeconomic variables on tax revenue in Kenya. International Journal of Social Sciences & Information Technology, 4 (11), 33-47.
40. Suhendra, I., & Anwar, C. J. (2014). Determinants of private investment and the effects on economic growth in Indonesia. GSTF Journal on Business Review (GBR), 3, 1-6.
41. Suidarma, I. M. (2019). The nexus between financial inclusion and economic growth in ASEAN. JEJAK, 12(2), 267-281.
42. Tan, L., Xu, Y., & Gashaw, A. (2021). Influence of exchange rate on foreign direct investment inflows: An empirical analysis based on Co-integration and Granger Causality Test. Mathematical Problems in Engineering, 2021, 1-12.
43. Tripathi, V., & Kumar, A. (2014). Relationship between Inflation and stock returns–evidence from BRICS markets using Panel Co integration Test. International Journal of Accounting and financial reporting, 4(2), 647-658.

44. Twinoburyo, E. N., & Odhiambo, N. M. (2018). Monetary policy and economic growth: A review of international literature. Journal of Central Banking Theory and Practice, 7(2), 123-137.

45. Zuhroh, I. (2021). The nexus of monetary policy and economic growth: Empirical study from Indonesia. Journal of Innovation in Business and Economics, 5(2), 61-70.

APPENDIX

Summary statistics

Mean	4.832287	6.265262	8.626478	7843.149	18.01284	5.59E+10
Median	5.337622	7.271154	6.414026	9115.717	15.17864	3.55E+10
Maximum	8.220007	18.70734	58.45104	14582.20	62.76287	1.45E+11
Minimum	-13.12673	-24.60017	1.560130	1282.560	4.757902	5.26E+09
Std. Dev.	3.598555	7.335717	9.274969	4569.074	11.37922	4.72E+10
Skewness	-3.751774	-2.008217	4.496342	-0.208535	2.129196	0.567178
Kurtosis	18.74781	9.889700	24.59125	1.664914	8.416087	1.712280
Jarque-Bera	456.4451	95.39956	820.5755	2.934603	71.20184	4.417482
Probability	0.000000	0.000000	0.000000	0.230547	0.000000	0.109839
Sum	173.9623	225.5494	310.5532	282353.4	648.4623	2.01E+12
SumSq.Dev.	453.2360	1883.446	3010.877	7.31E+08	4532.035	7.81E+22
Observations	36	36	36	36	36	36

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Augmented-Dickey Fuller (ADF) Test

Null Hypothesis: GDP has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.239896	0.0020
Test critical values:	1% level	-3.632900	
	5% level	-2.948404	
	10% level	-2.612874	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: IR has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-6.022246	0.0000
Test critical values:	1% level	-3.632900	
	5% level	-2.948404	
	10% level	-2.612874	

*MacKinnon (1996) one-sided p-values.

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Null Hypothesis: INF has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.599918	0.0008
Test critical values:	1% level	-3.632900	
	5% level	-2.948404	
	10% level	-2.612874	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: D(EXR) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-7.000927	0.0000
Test critical values:	1% level	-3.639407	
	5% level	-2.951125	
	10% level	-2.614300	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: M2 has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.671379	0.0091
Test critical values:	1% level	-3.632900	
	5% level	-2.948404	
	10% level	-2.612874	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: D(RESERVE) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.488084	0.0001
Test critical values:	1% level	-3.639407	
	5% level	-2.951125	
	10% level	-2.614300	

*MacKinnon (1996) one-sided p-values.

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Phillip-Perron (PP) Test

Null Hypothesis: GDP has a unit root
Exogenous: Constant
Bandwidth: 2 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-4.220959	0.0022
Test critical values:	1% level	-3.632900	
	5% level	-2.948404	
	10% level	-2.612874	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: IR has a unit root
Exogenous: Constant
Bandwidth: 3 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-6.019304	0.0000
Test critical values:	1% level	-3.632900	
	5% level	-2.948404	
	10% level	-2.612874	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: INF has a unit root
Exogenous: Constant
Bandwidth: 1 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-4.611129	0.0007
Test critical values:	1% level	-3.632900	
	5% level	-2.948404	
	10% level	-2.612874	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: D(EXR) has a unit root
Exogenous: Constant
Bandwidth: 1 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-7.026165	0.0000
Test critical values:	1% level	-3.639407	
	5% level	-2.951125	
	10% level	-2.614300	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: M2 has a unit root
Exogenous: Constant
Bandwidth: 3 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-3.752323	0.0074
Test critical values:	1% level	-3.632900	
	5% level	-2.948404	
	10% level	-2.612874	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: D(RESERVE) has a unit root
Exogenous: Constant
Bandwidth: 2 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-5.477869	0.0001
Test critical values:	1% level	-3.639407	
	5% level	-2.951125	
	10% level	-2.614300	

*MacKinnon (1996) one-sided p-values.

Optimum Lag Test

VAR Lag Order Selection Criteria
Endogenous variables: GDP IR INF EXR M2 RESERVE
Exogenous variables: C
Date: 06/12/23 Time: 21:30
Sample: 1986 2021
Included observations: 32

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-1490.857	NA	1.72e+33	93.55358	93.82841	93.64468
1	-1373.287	183.7030	1.10e+31	88.45546	90.37924	89.09314
2	-1329.794	51.64800*	8.85e+30	87.98715	91.55988	89.17140
3	-1284.895	36.48072	1.10e+31	87.43094	92.65262	89.16178
4	-1174.483	48.30524	8.90e+29*	82.78019*	89.65082*	85.05761*

* indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

Cointegration Test

Date: 06/12/23 Time: 20:58
Sample (adjusted): 1991 2021
Included observations: 31 after adjustments
Trend assumption: Linear deterministic trend
Series: GDP IR INF EXR M2 RESERVE
Lags interval (in first differences): 4 to 4

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.843716	170.7651	95.75366	0.0000
At most 1 *	0.794125	113.2267	69.81889	0.0000
At most 2 *	0.683889	64.23168	47.85613	0.0007
At most 3	0.469408	28.53015	29.79707	0.0694
At most 4	0.244119	8.883506	15.49471	0.3763
At most 5	0.006671	0.207505	3.841465	0.6487

Trace test indicates 3 cointegrating 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 Statistic	0.05 Critical Value	Prob.**
None *	0.843716	57.53843	40.07757	0.0002
At most 1 *	0.794125	48.99500	33.87687	0.0004
At most 2 *	0.683889	35.70152	27.58434	0.0037
At most 3	0.469408	19.64665	21.13162	0.0796
At most 4	0.244119	8.676001	14.26460	0.3141
At most 5	0.006671	0.207505	3.841465	0.6487

Max-eigenvalue test indicates 3 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

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Parsimonious Error Correction Estimates

Dependent Variable: D(GDP)
Method: Least Squares
Date: 06/13/23 Time: 16:41
Sample (adjusted): 1989 2021
Included observations: 33 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.559224	1.563931	-0.357576	0.7246
D(GDP(-1))	1.917961	0.831708	2.306050	0.0325
D(GDP(-2))	0.684828	1.022920	0.669483	0.5112
D(IR(-1))	0.106074	0.222109	0.477577	0.6384
D(IR(-2))	0.028576	0.171048	0.167065	0.8691
D(INF(-1))	0.615306	0.304210	2.022636	0.0574
D(INF(-2))	0.369194	0.334996	1.102085	0.2842
D(EXR(-1))	0.002161	0.001176	1.837415	0.0818
D(EXR(-2))	-0.000516	0.001498	-0.344191	0.7345
D(M2(-1))	0.042042	0.128810	0.326390	0.7477
D(M2(-2))	0.011214	0.118705	0.094467	0.9257
D(LOG(RESERVE(-1)))	13.08505	6.192471	2.113058	0.0481
D(LOG(RESERVE(-2)))	-4.092357	7.940195	-0.515398	0.6122
ECM(-1)	-2.154392	0.942904	-2.284847	0.0340

R-squared	0.518557	Mean dependent var	-0.058681
Adjusted R-squared	0.189148	S.D. dependent var	4.462812
S.E. of regression	4.018641	Akaike info criterion	5.916181
Sum squared resid	306.8401	Schwarz criterion	6.551063
Log likelihood	-83.61699	Hannan-Quinn criter.	6.129800
F-statistic	1.574206	Durbin-Watson stat	1.831555
Prob(F-statistic)	0.179236		