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Research Article

Analysis of the Influence of Interest Rate Effectiveness, Inflation, and Exchange Rates in Stimulating Economic Growth in Indonesia

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Abstract: This study investigates the impact of interest rate effectiveness, inflation, and exchange rates on economic growth in Indonesia between 2014 and 2023. Using a simultaneous equation model and the Two-Stage Least Squares (TSLS) estimation technique, the research analyzes the interrelationships among key macroeconomic indicators. The results show that exports and investment significantly influence GDP, whereas the exchange rate and money supply have no notable effect. Furthermore, GDP growth is identified as a significant determinant of investment, while interest rates and inflation are found to be statistically insignificant. The diagnostic tests confirm that the regression model satisfies the classical assumptions of normality and absence of autocorrelation. These findings highlight the importance of promoting exports and enhancing investment to support Indonesia's sustainable economic development. Policymakers are encouraged to focus on trade performance and investment climate, as these factors have a stronger direct impact on growth compared to inflation and interest rates during the observed period.

Keywords: Economic Growth, Exchange Rate, Inflation, Interest Rate, Investment.

1. Introduction

Economic growth serves as a vital indicator of a nation's progress. Each country experiences different levels of growth, depending on the stability and effectiveness of its economic policies. Countries with stable and robust economic structures tend to exhibit sustained and positive growth (Mahroji & Nurkhasanah, 2019).

Two key indicators often used to measure a country's economic development are economic growth and investment. These two aspects are highly influenced by macroeconomic variables such as inflation, interest rates, exchange rates, as well as fiscal and monetary policies. The successful management of these variables plays a crucial role in driving national development (Hafidz Meiditambua Saefulloh et al., 2023).

In Indonesia, balancing fiscal and monetary policies remains a key challenge in supporting long-term economic growth. Based on Bank Indonesia's 2023 report, the national economy grew by 5.3% in 2022, primarily driven by domestic consumption and investment. However, global inflationary pressures and rising interest rates in the United States (The Fed) have influenced capital flows to emerging markets, including Indonesia.

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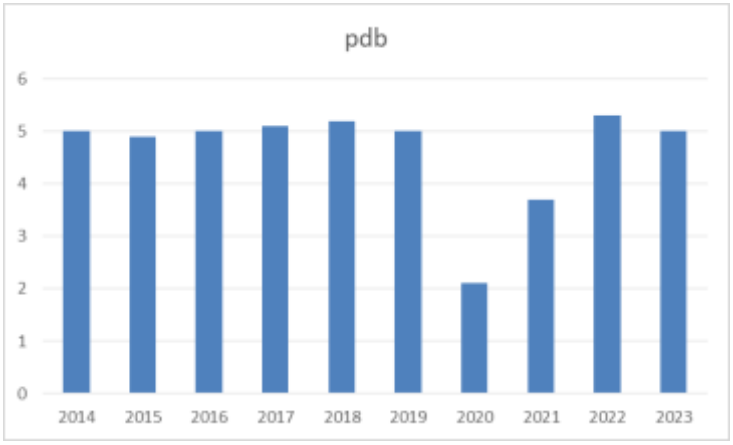

Figure 1

World Bank data indicates that from 2014 to 2023, Indonesia's economic growth experienced significant fluctuations. In 2018 and 2019, growth was recorded at over 5%. However, the COVID-19 pandemic caused a severe contraction in 2020, with a negative growth rate of 2.1%. The economy rebounded in 2021 with a 3.7% increase and reached 5.3% in 2022, maintaining a stable rate of 5.0% in 2023.

The economic downturn in 2020 was mainly due to the pandemic's impact, which disrupted various sectors. During this period, the role of interest rates became increasingly important. As a monetary policy tool, changes in interest rates influence people's decisions to save or spend, thereby affecting the money supply. To maintain a stable economy, governments must ensure a balanced interaction among inflation, interest rates, and circulating money.

As a developing country with one of the world's largest populations, Indonesia offers considerable potential for foreign investment (Trisna & Pasaribu, 2017). Encouraging investment is essential for sustaining economic growth (Ardya & Yudhistira, 2023). When managed effectively, investment not only boosts economic development but also brings direct benefits to the country and its citizens, in line with constitutional mandates (Radifan & Saputra, 2022).

However, Indonesia's slow pace of national development can be attributed to low investment levels and high domestic consumption. While high consumption reflects strong demand, it often overshadows investment needs. Additionally, Indonesia's relatively low labor costs make it attractive to foreign investors seeking to reduce production expenses and expand their markets. In return, Indonesia benefits from increased job opportunities, enhanced government revenue through taxation, technology transfer, and improved labor skills due to training programs (Y. Putri et al., 2015).

According to development economics theory, investment and economic growth share a mutually reinforcing relationship. Higher economic growth typically leads to greater savings, which in turn boosts investment. Conversely, increased investment generates higher economic growth (Yonathan, 2003). In Indonesia's context, foreign direct investment plays a significant role in financing development, particularly given the limited availability of domestic capital. Compared to foreign debt, FDI is considered more beneficial as it does not impose repayment obligations (Indah & Didit, 2005).

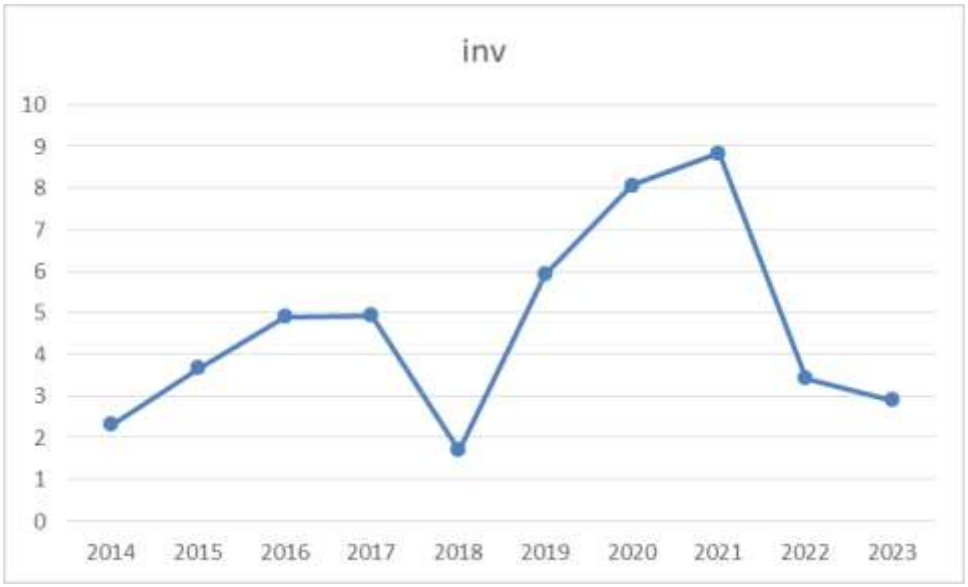

Figure 2 Investment Trends

Based on the Indonesian investment graph data for the period 2014 to 2023, there are quite significant fluctuations. At the beginning of the period, namely 2014 to 2017, investment showed a stable growth trend, reflecting relatively conducive economic conditions and policy support that encouraged investment. However, in 2018 there was a sharp decline, which was likely caused by economic uncertainty, both from domestic and global factors. Recovery occurred in 2019, and continued until it peaked in 2021, indicating an acceleration in investment despite the COVID-19 pandemic. The increase can be attributed to fiscal stimulus and structural reforms carried out by the government.

However, in 2022 and 2023, investment experienced a significant decline again. This phenomenon was likely influenced by global inflationary pressures, rising interest rates, and post-pandemic covid 19 economic uncertainty which caused investors to be more cautious. Overall, this pattern reflects that investment is highly influenced by macroeconomic dynamics and the stability of policies implemented by the government.

The aim of this study is to examine how macroeconomic variables influence both economic growth and investment in Indonesia. By understanding the interactions among these key variables, this research seeks to provide policy recommendations that could support the development of more effective and sustainable economic strategies.

2. Literature Review

2.1. Interest Rate

The interest rate serves as a critical benchmark for a nation's economic activity. It plays a significant role in influencing the flow of banking sector funds, inflation rates, investment levels, and currency movements. Therefore, any decision to raise or lower interest rates should ideally prioritize the economic well-being of the domestic population (Kurniasari, 2011).

2.2. Inflation

According to the quantity theory of money, inflation may occur when there is an excessive increase in the amount of money circulating in the economy, including both cash and demand deposits. On the other hand, temporary price hikes resulting from events such as crop failures or supply disruptions are not considered long-term inflationary pressures.

2.3. Economic Growth

Gross Domestic Product (GDP) reflects the total value of final goods and services produced within a country across various sectors of the economy. It is commonly used as a primary indicator for assessing economic growth (Suparmoko, 1998). Economic growth can be understood as a sustained increase in a country's overall economic activity over time.

This process involves a continuous transformation of economic conditions, which is often accompanied by indicators such as rising national income, increasing per capita income, decreasing unemployment rates, and a reduction in poverty levels. In essence, economic growth refers to the expansion of the quantity and value of goods and services produced by a nation during a specific period.

Economic growth is considered an ongoing process of improving a country's economic situation. A nation's economy is regarded as growing when its citizens' productive activities generate more goods and services. The theory of economic growth explores the key drivers of long-term economic expansion, including how different variables interact and influence one another (Yohana Christy Kunthi, 2023).

3. Proposed Method

3.1. Simultaneous Regression

The analytical model adopted in this study is a system of simultaneous equations, formulated as follows:

LOG(PDB)=C(10)+C(11)*LOG(KURS)+C(12)*LOG(JUB)+C(13)*LOG(EKS)+C(14)*LOG(INV)

LOG(INV)=C(20)+C(21)*LOG(SB)+C(22)*LOG(INF)+C(23)*LOG(PDB)

Where:

- GDP = Gross Domestic Product
- EXCH = Exchange Rate
- MS = Money Supply
- EXP = Exports
- INV = Investment
- C(10)–C(14) = Coefficients
- ε_1 = Error term

The second structural equation is specified as:

Equation:

LOG(PDB)=C(10)+C(11)*LOG(KURS)+C(12)*LOG(JUB)+C(13)*LOG(EKS)+C(14)*LOG(INV)

Equation:

LOG(INV)=C(20)+C(21)*LOG(SB)+C(22)*LOG(INF)+C(23)*LOG(PDB)

Where:

- INV = Investment
- IR = Interest Rate
- INF = Inflation
- GDP = Economic Growth
- C(20)–C(23) = Coefficients
- ε_2 = Error term

This modeling approach assumes that the explanatory variables on the right-hand side are not correlated with the disturbance terms. If this assumption is violated, estimators derived from Ordinary Least Squares (OLS) or Weighted Least Squares (WLS) may become biased and inconsistent. Several conditions may lead to this issue, including:

1. The presence of endogenous variables among the independent variables (i.e., variables that are simultaneously determined within the system).
2. Measurement errors in the right-hand-side variables.

In brief, a variable is considered endogenous if it is correlated with the residuals, while a variable that does not exhibit such correlation is classified as exogenous or predetermined.

4. Results

System: SIMULTAN
Estimation Method: Two-Stage Least Squares
Date: 06/30/25 Time: 18:25
Sample: 2014 2023
Included observations: 10
Total system (balanced) observations 20

	Coefficient	Std. Error	t-Statistic	Prob.
C(10)	-1.062915	6.409985	-0.165822	0.0013
C(11)	-1.248248	1.202354	-1.038171	0.3215
C(12)	-0.856115	0.606486	-1.411599	0.1857
C(13)	1.524049	0.653316	2.332788	0.0397
C(14)	0.567712	0.233787	-2.428329	0.0335
C(20)	1.177315	1.678860	0.701258	0.0077
C(21)	0.445925	0.397077	1.123021	0.0453
C(22)	-0.051899	0.614059	-0.084518	0.0342
C(23)	-0.325540	0.829768	-0.392327	0.0123
Determinant residual covariance		0.002272		

Equation: LOG(PDB)=C(10)+C(11)*LOG(KURS)+C(12)*LOG(JUB)+C(13)
*LOG(EKS)+C (14)*LOG(INV)
Instruments: SB INF KURS JUB EKS C
Observations: 10

R-squared	0.759244	Mean dependent var	1.502286
Adjusted R-squared	0.566640	S.D. dependent var	0.285607
S.E. of regression	0.188015	Sum squared resid	0.176749
Durbin-Watson stat	2.721564		

Equation: LOG(INV)=C(20)+C(21)*LOG(SB)+C(22)*LOG(INF)+C(23)
*LOG(PDB)
Instruments: SB INF KURS JUB EKS C
Observations: 10

R-squared	0.340344	Mean dependent var	1.418008
Adjusted R-squared	0.010517	S.D. dependent var	0.529644
S.E. of regression	0.526852	Sum squared resid	1.665437
Durbin-Watson stat	2.121706		

The simultaneous equation system was estimated using the Two-Stage Least Squares (TSLS) method. Two equations were analyzed in this model. The first equation uses **LOG(GDP)** as the dependent variable, while the second equation employs **LOG(INV)** as the dependent variable.

In the first equation, two independent variables show statistically significant effects on GDP:

- **LOG(EXP)** (C13) has a probability value of **0.0397**, and
- **LOG(INV)** (C14) has a probability value of **0.0335**,

Both values are below the significance threshold of 0.05, indicating a meaningful impact on GDP. On the other hand, variables such as **LOG(EXCH)** (exchange rate) and **LOG(MS)** (money supply) are not statistically significant, as their probability values exceed 0.05.

The **R-squared** value of this model is **0.7592**, meaning that approximately **75.92% of the variation in GDP** can be explained by the independent variables in the equation.

In the second equation, where investment (**LOG(INV)**) is the dependent variable, only **LOG(GDP)** (C20) shows a statistically significant influence with a p-value of **0.0077**. Other variables such as **LOG(IR)** (interest rate), **LOG(INF)** (inflation), and the constant term are not statistically significant.

The **R-squared** value of the second model is **0.3403**, suggesting that **34.03% of the variability in investment** can be accounted for by the independent variables. This indicates that the predictive strength of the first equation is higher than that of the second..

4.1. Uji Normalitas

System Residual Normality Tests
Orthogonalization: Cholesky (Lutkepohl)
Null Hypothesis: residuals are multivariate normal
Date: 06/30/25 Time: 18:27
Sample: 2014 2023
Included observations: 10

Component	Skewness	Chi-sq	df	Prob.
1	-0.188301	0.059096	1	0.8079
2	-1.133278	2.140533	1	0.1435
Joint		2.199628	2	0.3329

Component	Kurtosis	Chi-sq	df	Prob.
1	2.105260	0.333567	1	0.5636
2	2.918142	0.002792	1	0.9579
Joint		0.336359	2	0.8452

Component	Jarque-Bera	df	Prob.
1	0.392663	2	0.8217
2	2.143325	2	0.3424
Joint	2.535987	4	0.6382

The residual normality test, using the CholeskyOrthogonalization method, demonstrates that the residuals are normally distributed. The **p-values** from the **Skewness**, **Kurtosis**, and **Jarque-Bera** tests for each component, as well as the joint tests, are all above the 0.05 significance level:

- Joint Skewness: 0.3329
- Joint Kurtosis: 0.8452

- Joint Jarque-Bera: 0.6382

These results confirm that the residuals fulfill the assumption of normality, and therefore, the regression models used are valid in terms of distribution assumptions.

Autocorrelation Test

The System Residual Portmanteau Test was conducted to evaluate residual autocorrelation over a lag period from 1 to 12, covering the years 2014 to 2023 (10 observations).

For each lag, the Q-Stat and Adjusted Q-Stat p-values remain consistently above the 0.05 significance threshold, indicating the absence of significant autocorrelation in the residuals. This implies that the model satisfies the assumption of residual independence, and the null hypothesis of no autocorrelation is accepted.

4.2. Uji Autokorelasi

System Residual Portmanteau Tests for Autocorrelations
Null Hypothesis: no residual autocorrelations up to lag h
Date: 06/30/25 Time: 18:29
Sample: 2014 2023
Included observations: 10

Lags	Q-Stat	Prob.	Adj Q-Stat	Prob.	df
1	1.723803	0.7864	1.915336	0.7513	4
2	3.395693	0.9071	4.005200	0.8567	8
3	9.114825	0.6931	12.17539	0.4317	12
4	12.46741	0.7112	17.76303	0.3380	16
5	14.40257	0.8095	21.63336	0.3607	20
6	16.37233	0.8742	26.55774	0.3255	24
7	17.31598	0.9421	29.70326	0.3775	28
8	17.67997	0.9809	31.52320	0.4906	32
9	17.79086	0.9953	32.63204	0.6296	36
10	17.79086	0.9991	NA	NA	40
11	17.79086	0.9999	NA	NA	44
12	17.79086	1.0000	NA	NA	48

*The test is valid only for lags larger than the System lag order.
df is degrees of freedom for (approximate) chi-square distribution

The **System Residual Portmanteau Test** was employed to detect the presence of autocorrelation in the residuals from the simultaneous equation system, using data covering the period from **2014 to 2023** with **10 observations**.

The test was conducted across **lags 1 to 12**, and the results show that for each lag, the **p-values** for both the **Q-Statistic** and the **Adjusted Q-Statistic** exceed the 0.05 significance level. Specifically:

- At lag 1: Q-Stat = 1.7238 (p = 0.7864), Adjusted Q-Stat = 1.9153 (p = 0.7513)
- At lag 5: Q-Stat = 14.4026 (p = 0.8095), Adjusted Q-Stat = 21.6334 (p = 0.3607)
- At lag 10: Q-Stat = 17.7909 (p = 0.9991)

These consistently high p-values indicate that **no statistically significant residual autocorrelations** are detected across all tested lag orders.

Thus, it can be concluded that the model does not exhibit residual autocorrelation. This finding implies that the model fulfills the classical assumption of **independent residuals**—that is, the residuals from one period do not correlate with those from another. As a result, the null hypothesis stating "no residual autocorrelation" is **accepted**, confirming that the model is well-specified in terms of error independence.

5. Discussions

The empirical analysis carried out through the Two-Stage Least Squares (TSLS) method reveals several significant relationships among macroeconomic variables and economic growth in Indonesia. In the first equation, the results show that exports (LOG(EXP)) and investment (LOG(INV)) have a statistically significant and positive impact on gross domestic product (GDP). This aligns with classical economic theory, which posits that both exports and investment are vital drivers of national income. The significance of exports underscores the importance of international trade in stimulating domestic production and creating multiplier effects across various sectors. Likewise, the positive effect of investment confirms its essential role in enhancing capital formation and productive capacity, which are fundamental to long-term economic expansion.

Conversely, exchange rate (LOG(EXCH)) and money supply (LOG(MS)) did not exhibit statistically significant effects on GDP. This suggests that, within the observed period, fluctuations in currency value and liquidity in the economy were not primary contributors to Indonesia's economic output. These results may reflect the country's relatively strong resilience in managing exchange rate volatility and implementing monetary controls during global uncertainty, particularly during the COVID-19 recovery phase.

The second equation, which explores the determinants of investment (LOG(INV)), shows that only economic growth (LOG(GDP)) has a significant influence. This indicates a strong feedback mechanism—economic expansion tends to increase investor confidence and attract more capital inflow. In contrast, interest rate (LOG(IR)) and inflation (LOG(INF)) do not show significant effects on investment. This may imply that during the studied period, businesses and investors were more responsive to actual growth performance than to monetary indicators. In other words, macroeconomic stability and output expansion likely played a greater role than borrowing costs or price level fluctuations in shaping investment decisions.

The R-squared values of both equations also offer insight into the model's explanatory power. The first model, with an R^2 of approximately 75.92%, indicates a strong relationship between the chosen independent variables and GDP. The second model, with an R^2 of 34.03%, demonstrates a moderate ability to explain changes in investment, suggesting that other external or sectoral factors not included in the model might also influence investment behavior in Indonesia.

The normality test results affirm that the residuals follow a normal distribution, fulfilling one of the key assumptions in regression analysis. Similarly, the autocorrelation test confirms the absence of serial correlation among residuals, supporting the reliability of the regression estimates and the robustness of the model.

In conclusion, these findings suggest that to stimulate economic growth, policymakers should focus on strategies that boost exports and encourage investment inflow. While inflation and interest rates are traditionally important, during the examined period they played a less direct role compared to output performance and trade expansion. Sustaining macroeconomic stability, promoting export competitiveness, and creating a favorable investment climate remain essential for achieving sustainable and inclusive economic growth in Indonesia.

6. Conclusions

This research investigated the influence of key macroeconomic variables—interest rates, inflation, exchange rates, exports, and investment—on Indonesia's economic growth from 2014 to 2023 using a simultaneous equation model with TSLS estimation.

The findings confirm that exports and investment significantly and positively impact GDP, underlining their role as primary drivers of economic expansion. Meanwhile, exchange rate and money supply do not exhibit significant effects on growth. On the investment side,

only GDP growth was found to influence investment decisions, while interest rates and inflation showed no statistically significant relationship.

These results suggest that Indonesia's economic performance during the observed period was more influenced by real sector activity, particularly trade and capital formation, rather than by monetary indicators. Furthermore, residual diagnostic tests confirm the model's reliability, fulfilling both normality and autocorrelation assumptions. In conclusion, to enhance sustainable growth, policy should focus on strengthening exports, improving investment climates, and ensuring macroeconomic stability. Though interest rates and inflation remain important, their indirect role may be less impactful compared to tangible economic output and external trade performance during this period.

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