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THE EFFECT OF INTEREST RATES AND INFLATION ON ECONOMIC GROWTH IN ASEAN-5 COUNTRIES

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ABSTRACT

This study aims to empirically test the effect of interest rates and inflation on economic growth, with gross capital formation as a control variable. This research uses panel data from 5 ASEAN countries, namely Indonesia, Malaysia, the Philippines, Singapore, and Thailand in 2004 – 2021 and was tested using the Random Effect Model (REM) analysis technique. The results of this study explain that interest rates and inflation have a simultaneous effect on economic growth. Another finding from this study is that interest rates have a significantly negative effect on economic growth and inflation has a significant positive effect on economic growth. However, this study is subject to several limitations. First, it solely focuses on ASEAN-5 countries, thus limiting the generalizability of the findings to other developed and developing nations. Second, the study's reliance on annual data from 2004 to 2021 excludes more recent data, potentially overlooking current economic trends. Third, the static panel method utilized with the REM analysis only provides a broad overview of the relationships between interest rates, inflation, and economic growth, lacking deeper insights into long-term and short-term dynamics. Fourth, while the study covers the period including the COVID-19 pandemic, it fails to thoroughly explore its impact and provide detailed explanations. Thus, future research should consider expanding the scope beyond ASEAN-5, incorporating more recent data, employing dynamic panel methods, and thoroughly investigating the implications of significant events such as the COVID-19 pandemic on the examined relationships.

Keywords: *Interest Rates, Inflation, Economic Growth, ASEAN-5, Random Effect Model*

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Introduction

The global economy is prone to upheavals due to emerging global problems and phenomena, the occurrence of which can have a great impact on the macroeconomic variables of a country. An example of an ongoing issue that has a significant impact on the global economy has emerged since February 2022: the war between Russia and Ukraine. Khudaykulova et al. (2022) note that the war has the potential to trigger persistent inflation

due to rising commodity prices and put the global economy at risk of deflation, which will lead the world into a global recession predicted by economists. This can be predicted by gradual increases in interest rates by the Federal Reserve. This increase will encourage the possibility of devaluation of other foreign currencies against the dollar, which will then lead to domestic inflation and a decline in economic growth. The emergence of various economic issues and phenomena has led to predictions of a global recession by economists. Numerous countries will face challenges due to the pressure and unrest in the economy. For each nation to maintain economic growth, this calls for extra care and the adoption of sensible policies. Since it is the primary metric used to assess a nation's economic accomplishments, economic growth is a crucial variable in all nations. Another way to measure a nation's success in developing is by looking at its rate of economic growth. An increasing country's development success index corresponds with its rate of economic growth.

Many countries will face difficulties because of economic pressure and turmoil. This issue requires special attention, as does the need for competent policymaking to sustain economic growth in each country. Economic growth is an essential factor in all countries because it is the primary measure used to assess a country's economic success. Gross Domestic Product (GDP) is the most essential variable in analyzing economic growth (Henderson et al., 2012). There are three approaches to calculating GDP: the production approach, the income approach, and the expenditure approach (Landefeld et al., 2008).

The government will determine and implement economic policies that support economic growth and optimization in the country, to achieve certain target values for GDP and strive for optimal economic growth. For example, the economic policies that each country has include macroeconomic stabilization policy and trade policy (Plosila, 2004). Economic policymaking cannot also be done haphazardly. The government needs to make a lot of considerations because all aspects of government can play an important role in the economy. Apart from being influenced by economic policy, several macroeconomic variables also play an important role in economic growth. The macroeconomic variables referred to here are inflation and interest rates (Elangbam & Bakshi, 2022) which themselves are closely related to economic growth (Indriyani, 2016).

Based on the preceding explanation, the author's research seeks to determine the impact of interest rates and inflation on economic growth. The data included in this study range from 2004 to 2021. This study aims to answer the following research question:

1. How do interest rates affect economic growth in ASEAN-5 countries?
2. How does inflation affect economic growth in ASEAN-5 countries?
3. How does gross capital formation influence economic growth in ASEAN-5 countries?

This research is expected to contribute as a source of knowledge for readers who are interested in the monetary, business and investment fields as additional literature because the results of research on the influence of interest rates and inflation on economic growth are very relevant and useful for readers in everyday life, especially in investment and business activities. Furthermore, this research is also expected to make an important contribution to policymakers, namely the government and central banks, in determining more effective and sustainable economic and monetary policies, as well as making better decisions and taking more effective actions to increase economic growth.

Theoretical Literature

Economic Growth Theory

Economic growth is one measure of the success of development in a country and demonstrates how the country's state has changed from the past to the present. Economic growth refers to output-producing economic activity as measured by Gross Domestic Product (GDP). GDP is the total market value of all final goods and services generated in a country's economy during a certain period.

Endogenous economic growth is one of the economic growth theories underlying this research. This economic model enables investment and human capital efficiency through policy and institutional arrangements and strengthens the assumption that economic policy has long-term effects on economic growth (Bassanini et al., 2001). Endogenous economic growth theory has similarities with the neoclassical model, but there are differences in basic assumptions which cause different conclusions to be drawn. Todaro (2003) explains that, in the theory of endogenous economic growth, investment influences the level of economic growth. The effect of this investment can be explained through the following Romer model equation:

$$Y = AK^{\alpha+\beta}L^{1-\alpha} \quad (1)$$

Where:

Y = aggregate output

A = *total factor productivity*

K = *Capital*

L = *Labor*

α = capital output elasticity

β = elasticity of labor output

In endogenous growth theory, Keynes (1936) also suggested that fiscal and monetary components can impact economic growth. If it is tied to Romer's model of endogenous economic growth, which includes investment, it is obvious that it is related to monetary components such as interest rates and inflation. A decrease in interest rates will encourage an increase in investment levels, because capital and borrowing costs are low, allowing investors to generate more profits (Smith & Zoega, 2009). Low interest rates will cause an increase in the money supply and an excess money supply will cause domestic inflation (Friedman, 1976). This can be explained in that when the money supply increases by a certain percentage, the price level will also increase by a certain percentage, without increasing output (Friedman, 1976). An increase in the inflation rate will reduce the rate of return and reduce capital accumulation and subsequently result in a decrease in economic growth (Chirwa & Odhiambo, 2018). Thus, the theory of endogenous economic growth becomes the grand theory in this research.

IS-LM Theory

IS-LM theory is a macroeconomic theory that describes the relationship between two important markets in the economy, namely the goods and services market (IS) and the money market (LM). This theory describes the balance between demand and supply in the two markets. Keynes (1936) developed the IS-LM model to show what determines income at various price levels (Mankiw, 2009). The two equations in the IS-LM model are written as follows:

$$IS = Y = C(Y-T) + I_{(r)} + G \quad (2)$$

$$LM = \frac{M}{P} = L(r,Y) \quad (3)$$

In the IS equation, aggregate expenditure is influenced by the interest rate (r) through investment (I). When interest rates increase, investment will decrease which will then reduce output (Y). LM equation states the relationship between interest rates and the amount of money available in the economy. This equation shows the interest rate resulting from the balance between the demand and supply of money in the market.

The classic idea regarding the relationship between interest rates and output arises because money is an investment fund, where investment activities can increase productivity and subsequently increase output (Keynes, 1936). Meanwhile, in Keynes's ideas, money is emphasized as a liquid asset to gain profits in financial markets.

Fisher Effect Theory

The relationship between interest rates and inflation was first explained by Fisher (cited in Cooray, 2003), who stated that the real interest rate is equal to the nominal interest rate minus the expected inflation rate. In this theory, Fisher considers that the demand for money can be written in the following equation:

$$M_d = f(y,i) \quad (4)$$

Where:

M_d = real money demand

y = real income

i = nominal interest rates

Cooray (2003) also explains that real interest rates and inflation have a close relationship because the real interest rate is the result of the nominal interest rate minus the inflation rate. Real interest rates reflect the returns expected by investors after considering the effects of inflation. Real interest rates are influenced by real factors, such as capital productivity, time preferences, risk preferences and can be considered constant (Chen, 2015). The Fisher effect is also explained by that every increase in the inflation rate will increase interest rates by the same amount. When the inflation rate increases, the real returns expected by investors will fall, so the real interest rate will fall. Conversely, if the inflation rate falls, the real returns expected by investors will increase, so that the real interest rate will increase (Smith & Zoega, 2009). This gives rise to evidence and conclusions that interest rates are closely related to investment and inflation rates.

Empirical Literature

Interest Rates and Economic Growth

Interest rates are considered to be one of the macroeconomic instruments that influence economic growth. They play a role in influencing and controlling the inflation rate and money supply, which in turn will have an effect on increasing economic growth. This is supported by previous research conducted by Mushtaq & Siddiqui (2016), Jaya et al. (2021) and Elangbam & Bakshi (2022). Each of the studies found that interest rates have a significant positive effect on economic growth.

In contrast to several results from research that have been presented, Shaukat et al. (2019) found that there is a negative relationship between interest rates and economic growth and argue that interest rates, especially real interest rates, can limit the level of economic growth from reaching higher figures. This is also supported by research by Hansen & Seshadri (2014) which states that there is a negative relationship between real interest rates and economic growth. Hansen & Seshadri (2014) stated that if interest rates are low in the long term, this will encourage economic growth and investment. Low interest rates can encourage consumption, investment loans and overall economic activity. This can contribute to increasing economic productivity in the long term.

Inflation and Economic Growth

Inflation has long been associated with economic growth, but inflation does not directly affect economic growth. There are other monetary variables that act as control variables for inflation so that they influence economic growth. Previous research conducted by Stanners (1996), Hodge (2006), Baharumshah et al. (2011), and Mandeya & Ho (2021) found that inflation in the short term has a positive relationship with economic growth. The effect of inflation on economic growth will depend on the level of inflation itself. The high and low levels of inflation can provide different statistical calculations. Apart from that, the control variables for inflation that are included in the calculation process will also provide different outputs.

The research period is also taken into account while determining the link between inflation and economic growth. Barro (2013) conducted his testing by focusing on long-term relationships. It is anticipated that the statistical calculations involve multiple associated supporting variable instruments. This is because, over time, economic growth increases the pricing of goods and services in general. This reduces people's purchasing power because their income does not rise in tandem with rising prices. Furthermore, rising inflation generates market uncertainty. Price fluctuations that are sudden and unanticipated affect company and investment planning. Because future production costs cannot be predicted, entrepreneurs and investors are unwilling to make long-term investments.

Gross Capital Formation and Economic Growth

The relationship between gross capital formation and economic growth has been widely studied. Previous research by Amri & Aimon (2017) and Salazar-Núñez & Venegas-Martínez (2018) stated that there was a positive relationship between gross capital formation and economic growth. In contrast, research by Maune & Matanda (2022) states that there is a negative relationship between the two. Furthermore, similar research was also carried out by Barcenilla-Visús et al. (2014) which showed that the formation of gross capital formation or gross domestic capital influences gross domestic product which in turn influences economic growth. Topcu et al. (2020) stated that gross capital formation is positively related to economic growth, but to find out how complex this relationship is, it is necessary to include other related variables in the research process.

Data and Research Methods

Research Design

In this study, a quantitative method was applied. Secondary data in the form of panel data from ASEAN-5 countries, namely Indonesia, Malaysia, the Philippines, Singapore, and Thailand, in the form of economic growth, interest rates, inflation, and gross capital formation, sourced from the World Bank, were used in this study from 2004 to 2021. Stata 14 software is used for data processing.

Model Specification

The estimation method used in this study is a random effect model with a generalized least squares (GLS) approach, which eliminates heteroscedasticity in the data automatically. The model applied in this research is as follows:

$$ecg_{it} = \alpha + \beta ir_{it} + \beta \inf_{it} + \beta \ln\_capital_{it} + w_{it} \quad (5)$$

Where:

ecg_{it} = economic growth (in %)

α = constant

β = coefficient

ir_{it} = interest rate i of year t (in %)

$\inf_{it}$ = inflation i of year t (in %)

$\beta \ln\_capital_{it}$ = *gross fixed capital* i of year t (in %)

w_{it} = composite error component

Result and Discussion

Table 1 displays the results of the panel data model regression, which tests the pooled least square, fixed effect model, and random effect model, followed by testing the best model selection.

Table 1: Pooled Least Square, Fixed Effect, and Random Effect Regression

Independent Variables	Model		
	PLS	FEM	REM
C	18.84607	21.63443	18.84607
ir	-0.1986876*	-0.3726794***	-0.1986876*
inf	0.4318412***	0.2067872	0.4318412***
ln_capital	-0.5896112	-0.652208	-0.5896112
R-Squared	0.1719	0.1329	0.1719
Prob (F-Stats)	0.0015	0.0007	0.0008

Level of Significance: *** p<0.01, ** p<0.05, * p<0.1

Following that, the Best Analysis Technique Selection Test is performed by running the Chow, Hausman, and Lagrange-multiplier tests.

Table 2: Chow Test

Prob > F	0.0372
H0: CEM	
H1: FEM	

Table 3: Hausman Test

Prob > F	0.2205
H0: REM	
H1: FEM	

Table 4: Lagrange-Multiplier Test

Prob > F	0.0396
H0: CEM	
H1: REM	

Based on the tests that have been carried out, it can be concluded that the random effect method is the best method to choose as a data testing method in this research. The next step is to test the classical assumptions.

According to Ekananda (2016), autocorrelation and heteroscedasticity tests do not need to be performed on panel data with a random effect model because autocorrelation tests on panel data produce multiple values in one model, causing the test results to be invalid. The heteroscedasticity test is unnecessary because the random effect model employs the generalized least squares (GLS) method, which automatically cures and eliminates heteroscedasticity.

The normality test in this study is based on the central limit theorem with samples > 30, so the data are considered normally distributed.

Table 5: Normality Test

Variable	Observation	Prob>Chi2
Economy Growth (ecg)	90	0.0000
Interest Rates (ir)	88	0.5727
Inflation (inf)	90	0.0001
Gross Capital Formation (ln_capital)	87	0.0978

The results of the normality test show that the interest rate and Gross Capital Formation variables are normally distributed, seen through probability results of more than 0.05. However, for the inflation and economic growth variables, the data are not normally distributed which can be seen through the probability results being less than α (0.05). It can also be seen that the number of observations for each variable varies, which is due to limited data availability, so there are data gaps in several years. This has no effect on the conclusions or analysis results.

The next step is to carry out a multicollinearity test, which shows Mean VIF < 10, namely 3.19. It means that this model does not exhibit any signs of multicollinearity. The results of the multicollinearity test are displayed in Table 5.

Table 6: Multicollinearity Test

Variable	VIF	1/VIF
Gross Capital Formation (ln_capital)	4.49	0.222787
Inflation (inf)	2.70	0.370034
Interest Rates (ir)	2.37	0.421690
Mean VIF	3.19	

After checking whether the model is free of classical assumption problems, statistical tests, such as the F and t tests, are performed. The F test is used to determine whether the independent variables together (simultaneously) have an influence on the dependent variable, whereas the t test is used to determine the influence of each independent variable on the dependent variable.

Table 7: F-Test

Prob>Chi2	0.0008

The F test results show a value of (Prob>Chi2) < 0.05, namely 0.0008, so H0 is rejected and H1 is accepted. This means that the independent variable has a simultaneous effect on the dependent variable.

Table 8: t-Test

Independent Variable	ecg
	P-value
ir	0.081
inf	0.003
ln_capital	0.236

The results of the t test show that for the interest rate variable (ir), the P-value is <0.05, namely 0.081, so that the interest rate variable has a significant effect at the 10% level on economic growth. In the variable amount of inflation (inf), a p-value <0.05 was found, namely 0.003, so it can be concluded that the inflation variable has a significant effect at the 1% level on economic growth. In the gross capital formation variable, a p-value > 0.05 was found, namely 0.236, so it can be concluded that no significance was found.

The Effect of Interest Rates on Economic Growth

The results of the interpretation of the regression on the interest rate variable on economic growth in ASEAN-5 countries show a probability value of 0.006 and a coefficient value of -0.306. Interpretation of this value shows that the variables of interest rates and economic growth in ASEAN-5 countries are significant at the 1% level. The relationship that occurs between the two variables is a negative or reversed relationship. A coefficient value of -0.306 means that a 1% increase in interest rates will reduce economic growth by -0.306%ceteris paribus.

This result is in accordance with the theory of endogenous economic growth and the IS-LM theory contained in Blanchard (2017) which states that an increase in interest rates causes a decrease in output. This is also confirmed by research conducted by Shaukat et al. (2019) which states that there is a negative relationship between interest rates and economic growth. Interest rates influence economic growth through investment levels. High interest rates will reduce investment levels and weaken investment itself because there is an increase in borrowing costs, which has the potential to reduce profits. The increase in interest rates also encourages people to reduce consumption, because returns from other financial products such as bonds and deposits promise a higher nominal amount, thus making people prefer to save their money. This decline in investment activity will further hamper the increase in economic growth. Thus, the results of this study support the author's hypothesis that interest rates have a significant influence on economic growth in ASEAN-5 countries, which is caused by the factors mentioned.

The Effect of Inflation on Economic Growth

The results of the interpretation of the regression carried out by the author on the inflation variable on economic growth in ASEAN-5 countries show a probability value of 0.067 and a coefficient value of 0.248. Interpretation of this value shows that the inflation and economic growth variables in ASEAN-5 countries are significant at the 10% level. The relationship that occurs between the two variables is a positive relationship. A coefficient value of 0.248 means that a 1% increase in inflation will increase economic growth by 0.248%, ceteris paribus.

This result is different from research by Barro (2013) which revealed that inflation and economic growth have a negative relationship, but is in line with research conducted by Stanners (1996), Hodge (2006), Baharumshah et al. (2011), and Mandeya & Ho (2021) who state that inflation and economic growth have a positive relationship. Chirwa & Odhiambo (2018) state that lower inflation can be associated with a positive impact on economic growth. Low inflation increases the function of money as a medium of exchange, store of value and unit of account, further increasing economic efficiency (Hodge, 2006)

Low and stable inflation also provides a signal that the economy is at a stable and controlled point, which will further encourage investors to invest their capital in productive businesses. Higher consumer purchasing power will occur if inflation is low and stable, allowing consumers to tend to spend their money, which will increase demand for goods and services. Lastly, low and stable inflation can encourage companies to increase efficiency and productivity in order to keep costs low, so that low and stable inflation provides a strong basis for healthy and sustainable economic growth. Thus, the results of this research are in accordance with the hypothesis formulated by the author that inflation has a significant influence on economic growth in ASEAN-5 countries, which is caused by the factors mentioned.

The Effect of Gross Capital Formation on Economic Growth

According to the estimation results in Table 7, gross capital formation has no significant impact on economic growth in the ASEAN-5 countries. From the regression output of the random effect column, the coefficient of the gross capital formation variable is -0.5896112. From these figures it can be interpreted that the relationship between gross capital formation and economic growth is negative. If gross capital formation increases by 1%, economic growth will decrease by 0.5896112%, ceteris paribus.

This negative relationship can occur due to several things. If investments are made without good planning or are inefficient, then the use of resources is not optimal (Yasmeen et al., 2021). For example, if an infrastructure project is not well-organized or managed efficiently, the resources invested will not produce the expected results. This can result in wastage of resources and hinder economic growth. Furthermore, when investment activities and additional capital are carried out without careful planning, it can give rise to regional imbalances. If investment tends to be concentrated in urban areas or developed areas, while other areas are left behind, there will be an imbalance in economic growth between these areas (Topcu et al., 2020).

The results of this research are in accordance with research by Saragih et al. (2020), Haidar & Firmansyah (2021), Yasmeen et al. (2021), and Ntamwiza & Masengesho (2022) who stated that no significance was found between the gross capital formation variable and the economic growth variable. Thus, it can be concluded that the results of this research are not in accordance with the hypothesis formulated by the author that gross capital formation has a significant influence on economic growth in ASEAN-5 countries.

Conclusion

This research aims to look at the influence of interest rates and inflation on economic growth in ASEAN-5 countries, namely Indonesia, Malaysia, Singapore, Philippines, and Thailand with the data period from 2004 to 2021 in annual form. Using the random effect model (REM) analysis technique, it was found that there is an influence between interest rates and inflation on economic growth.

The interest rate variable has a significant and negative effect at the 1% level or with a confidence level of 99% on economic growth in ASEAN-5 countries from 2004 to 2021. The results show a coefficient value of -0.306 which can be interpreted as an increase of 1% in interest rates will reduce economic growth by 0.306%. Significance also occurs in the inflation variable which was found to have a significant and positive effect at the 10% level or with a confidence level of 90% on economic growth in ASEAN-5 countries from 2004 to 2021. The results show a coefficient value of 0.248 which can be interpreted as an increase 1% of inflation will increase economic growth by 0.248%.

No significance was found between the gross capital formation variable and economic growth in ASEAN-5 countries from 2004 to 2021. This can be interpreted that any changes in gross capital formation have no effect on economic growth in ASEAN-5 countries from 2004 to 2021.

By incorporating other determinants of economic growth, such as money supply and exchange rates, into the research model, it is hoped that future research will be able to examine the components and variables that influence economic growth in greater depth. Aside from that, it is hoped that future research will broaden the scope of the study so that it is possible to see how the independent variables influence the dependent variable across a variety of countries, both developed and developing. Furthermore, it is hoped that future research will include updates to more complex analysis techniques, such as VAR/VECM panels or the use of dynamic panel analysis techniques, to learn more about the influence of variables.

Declaration

The author declared that this article was written for the purposes of obtaining a master's degree in economics at Airlangga University.

Conflict of Interest

The author declares that there are no conflicts of interest in writing this research that might influence the result of the research.

Availability of Data and Materials

All data used in this research were collected via the official World Bank website. The data can be accessed publicly, ensuring ease of access to the data and can be used by researchers as a trusted source to authenticate research findings.

Authors' Contribution

This research contributes to empirical testing and examines the influence of interest rates and inflation, with a control variable in the form of gross capital formation, on economic growth in ASEAN-5 countries.

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