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Macroeconomic Determinants of Indonesia's Economic Growth: Error Correction Model Approach Period 1986-2022

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A B S T R A C T

This study analyzes the impact of exports, inflation, investment, and exchange rates on Indonesia's Gross Domestic Product (GDP) from 1986 to 2022 using the Error Correction Model (ECM). This method examines both long-term and short-term effects. The results show that exports have a positive but insignificant impact on long-term economic growth, while in the short term, the impact is negative and insignificant. Inflation has a significantly negative effect on economic growth in both the short and long terms. Investment has a positive and significant effect on growth in both periods. Exchange rates have a significant negative effect on long-term economic growth, while in the short term, they have a significant negative impact at the 10% significance level. The contribution of this study lies in expanding the understanding of Indonesia's macroeconomic dynamics through a comprehensive analysis over a 36-year period. It provides valuable insights for economic policymakers, recommending stabilizing inflation, increasing investment, and maintaining exchange rate stability. The empirical findings of this study are expected to help formulate more effective economic policies to promote growth in Indonesia. A limitation of this research is the lack of variables addressing external factors, including global fiscal and monetary policies.

Keywords: *ECM, Economic Growth, Macro, Investment, Export, Inflation, Exchange Rate*
JEL Classification Code: *C01, B22, E22, E31, F41, F43*

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INTRODUCTION

Indonesia is a developing country, the Indonesian state has an obligation to pursue balanced and sustainable development in order to encourage strong economic growth, with the ultimate goal of improving the welfare of its citizens.(Nofitasari et al., 2017). Economic development can be defined as the ability of an economy, initially in a less favorable and static condition, to initiate and maintain an increase in Gross Domestic Product (GDP) over a long period.(Fitria, 2022). Economic development and economic growth are interrelated, because Economic development involves not only economic growth but also broader elements such as changes in savings, investment and economic structure. The increase in GDP is measured based on constant prices from one year to the next, serving as an indicator of a country's economic progress.(Herbowo et al., 2023).

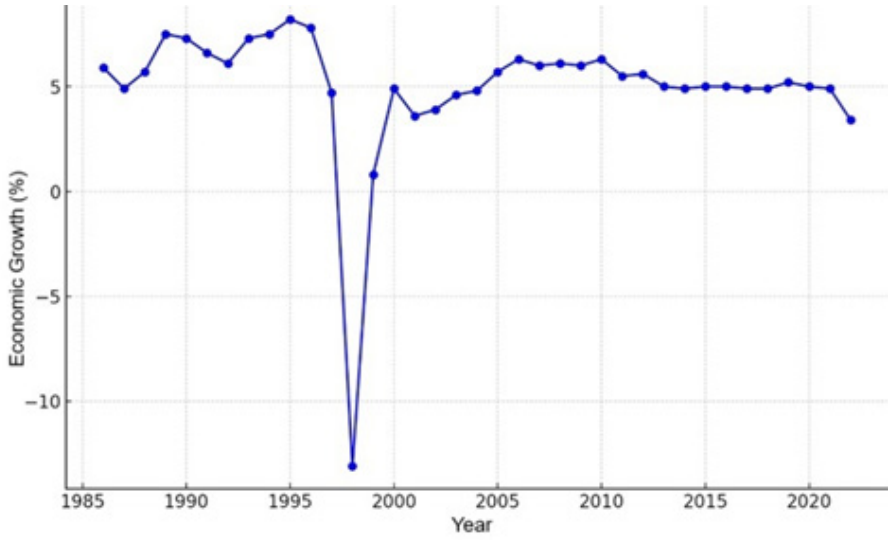
Economic growth can be said to be one of the indicators used as a benchmark to see the good or bad position of the economy in a country. Economic growth is defined as the success of a country to increase its long-term ability to provide goods and services during a certain period, which aims to stimulate the economic activity of the community. In accordance with its definition, Gross Domestic Product (GDP) is often used as an indicator to measure economic growth because GDP is closely related to the products and services produced by a country(Sedyaningrum et al., 2016).

The classical theory of economic growth put forward by Adam Smith explains that long-term economic growth is systematically made easier to understand the core of the economic growth process by highlighting the main aspects of total output growth and population growth.(Day & Zhang, 1996). Meanwhile, according to Keynes, aggregate demand is more important as the main factor influencing economic dynamics, especially when facing weakening economic conditions.(Kurniawan et al., 2023). Government policies can be implemented to stimulate demand on a macro scale to overcome unemployment and inflation problems. Increasing government spending will increase the amount of money circulating in the community and encourage people to make purchases, ultimately increasing aggregate demand. (Ballestra, 2024).

Economic growth has several theories that explain the factors that influence it. First, the classical theory by Adam Smith and David Ricardo emphasizes population growth as an influence on economic growth. Second, the Neoclassical theory (Solow-Swan) by Robert Solow and TW Swan states that economic growth is influenced by three factors, namely capital, labor, and technological development. Furthermore, the Neokeynesian theory by Roy F Harrod and Evsey D. Domar argues that capital, demand, and investment play an important role in increasing a country's national production which will have an impact on economic growth. Then, there is a new economic theory by Robert Lucas and Paul Romer which states that human resources are the main capital in increasing national production and the economy. (Yunita & Indrawati, 2022).

The rate of economic growth every year always experiences fluctuations that are controlled by economic activity. Economic growth is considered positive when the rate of economic growth of a region is high enough to reflect economic development in the region. Indonesia's economic growth averages around 5-7%, with the presence of covid-19 has caused a significant decline in economic growth. In graph 1, you can see the development of Indonesia's economic growth rate from 1986 to 2022.

Figure 1. shows thatIndonesia's economic growth dataduring the period 1986-2022 showed significant dynamics, influenced by various domestic and global



Source : (World Bank) Open Data, processed 2023v

Table 1.

Figure 1. Economic Growth in Indonesia 1986-2022

factors. In the late 1980s to early 1990s, Indonesia experienced strong economic growth, with figures reaching above 7% per year (Prasetyo & Purnomo, 2021). The main factors behind this growth were the economic deregulation policies and structural reforms implemented by the government, which opened up important sectors such as trade and foreign investment. However, the Asian economic crisis in 1997-1998 hit the Indonesian economy hard, causing a deep economic contraction, reaching -13.1% in 1998. This crisis was triggered by massive capital flight and a sharp decline in the rupiah exchange rate, which forced Indonesia to accept assistance from the IMF (Wijaya & Kusumawardani, 2020).

After the crisis, the Indonesian economy slowly recovered, albeit with more moderate growth. Political stability and more prudent economic policies were key factors in this recovery (Sari & Widodo, 2019). In the 2000s, Indonesia's economic growth returned to above 5%, supported by commodity exports and strong domestic consumption. However, new challenges emerged in 2020 with the COVID-19 pandemic, which caused an economic contraction of -2.1%. The pandemic resulted in a decline in global and domestic economic activity, disruption of supply chains, and a sharp decline in export demand (Gunawan & Sari, 2022).

Export is an effort to sell commodities that we have to other countries or foreign nations in accordance with government regulations with the expectation of payment in foreign currency.(Pertiwi et al., 2023). Increased exports will cause instability in the financial market, the export value will be achieved in the form of foreign exchange, this will automatically produce foreign exchange that can encourage economic growth.(BR Silitonga et al., 2019). This is in line with the post-Neoclassical theory which states that international trade, both exports and imports, has a positive influence on production and economic growth. In addition, in the context of macroeconomic theory, the relationship between exports and the level of economic growth or national income is considered an identity equation because exports are part of national income.(Hodijah, 2021).

According to the classical investment theory put forward by Hasan et al. (2020), explains that every company has an investment demand curve with a negative slope. In this context, there is a trade-off between the interest rate and the investment rate. Lower interest rates will encourage investors to be more inclined to invest their capital in the production sector rather than saving it in the form of savings. Harrod Domar's theory considers capital formation as an expenditure that can increase effective demand in society as a whole. This concept reflects a reality that is often overlooked in Keynesian analysis, namely that capital formation in a certain period can have a positive impact on the economy's ability to produce goods in the following period.

Investment can be interpreted as a critical identity in economic growth. The definition of investment includes capital expenditures made by companies to obtain capital goods and production equipment, aimed at increasing the production capacity of goods and services in an economy. (Mifrahi & Rahmat, 2022). The amount of investment in economic activity is influenced by factors such as interest rates, income, technological progress, projections of future economic conditions, and other elements.(Sri Saraswati, 2021).

Investment in Indonesia from 1986 to 2022 shows a fluctuating growth trend with an upward trend in the long term. Early economic liberalization encouraged foreign investment in the manufacturing and natural resource sectors, but the 1997-1998 Asian financial crisis briefly reduced investment (Nasution & Siregar, 2021). The post-crisis economic recovery was followed by strong investment growth until the mid-2010s, driven by high domestic consumption, infrastructure improvements, and policy reforms. Despite the disruption of the COVID-19 pandemic in 2020, investment began to recover with the support of pro-investment policies and economic diversification (Wibowo & Chen, 2023).

Inflation is a condition where the price of goods and services increases simultaneously and continuously. Not all inflation has a negative impact on the economy. Even mild inflation where inflation is only around 10 percent will encourage economic growth. Based on Keynes' theory, inflation can occur due to excessive desire of a group of people who want to use more goods or services available.(Slamet & Hidayah, 2022). Because of this desire, demand will increase but on the other hand supply will remain the same, so what happens is the price of goods and services will increase, usually the government will print money to buy these goods and services.

Keynesian theory describes the correlation between inflation and economic growth. Specifically, in the short-run, the aggregate supply curve (AS) shows a positive value, indicating that prices and output increase together. On the other hand, there is a long-run correlation between inflation and economic growth, where inflation increases but economic growth decreases.

The exchange rate of a currency can be defined as the relative price of a currency against the currency of another country. The movement of the exchange rate in the market can be influenced by fundamental and non-fundamental factors. Fundamental factors are reflected in macroeconomic variables, such as economic growth, inflation, export and import developments.(Susanto, 2018). Exchange rates are created through pure market mechanisms, just like the prices of any commodity in a perfectly competitive international market. In market mechanisms, exchange rates are formed through the meeting of the parameters driving supply and demand in the market. The equilibrium exchange rate is created at the point of intersection between the demand curve and the aggregate supply curve of a country against various foreign currencies.(Lastri & Anis, 2020).

The Consumer Price Index (CPI) is one of the indicators used to measure the level of inflation. Because it reflects changes in the price movements of packages of goods and services consumed by the community, the Consumer Price Index (CPI) is the focus of research, as indicated by Bank Indonesia (BI). Changes over time in the Consumer Price Index (CPI) reflect the level of inflation or deflation of goods and services(BR Silitonga et al., 2019).

Research conducted by(Chirwa & Odhiambo, 2016)on macroeconomic factors that influence economic growth reveals differences in determinants between developing and developed countries. In developing countries, economic growth is mainly influenced by investment, trade activities, fiscal and monetary policies, human and natural resources, demographic factors, reforms, geographical and regional aspects, and political and financial conditions.

Despite the differences, investment emerged as a consistent key factor in driving economic growth in both groups of countries. This is supported by various economic theories and previous research findings, which generally confirm the important role of investment as a catalyst for economic growth. These findings highlight the importance of appropriate investment strategies in efforts to boost economic growth, both in developing and developed countries.(Rifai et al., 2021).

Long-term trends show a shift in investment focus from the primary sector to manufacturing, services, and the digital economy. Government policies such as deregulation, fiscal incentives, and infrastructure improvements have helped, although challenges such as bureaucracy, legal uncertainty, and uneven infrastructure remain. Improvements in the quality of infrastructure, especially transportation and telecommunications, have had a positive impact on foreign investment (Tambunan, 2020).

Indonesia remains an attractive investment destination in Southeast Asia thanks to its large domestic market, political stability, and economic growth potential. To maintain its attractiveness, Indonesia needs to continue structural reforms, improve the quality of human resources, and accelerate the digital transformation of its economy (Kurniawan & Managi, 2022).

The relationship between exports and economic growth shows the important role of exports in economic activity, because it is the main component that drives the development process of a region.(Asbiantari et al., 2018). Along with the implementation of regional autonomy, increasing exports of high value-added products is crucial to increasing total regional output. The increase in export value is expected to be a driver of economic recovery and stimulate regional economic growth. This statement is supported by the results of research conducted bySlamet & Hidayah (2022)explains the concept of export variables contributing positively to economic growth in Indonesia. This means that the level of economic growth is influenced by the level of exports.(Pangestin et al., 2021).

Several studies have been conducted to evaluate the impact of exports on economic growth. Exports have a positive and significant impact on Indonesia's economic growth from 1980-2009.(ramayani, 2015). other research conducted byFitria (2022),Pertiwi et al., (2023), also shows that the export variable has a positive and significant influence on Gross Domestic Product (GDP).

Research conducted by(Hodijah, 2021)regarding the impact of exports and imports on economic growth during the period 1999-2020 shows that, based on the ECM analysis, both exports and imports have a significant influence on economic growth in the long term. However, in the short term, only exports have a significant influence.

Strengthening empirical findings from several studies on inflation and economic growth which indicate that high inflation contributes to declining economic growth. Research conducted by Ramayani (2015), Ardiansyah (2017), Wasingah (2018), Simanungkalit (2020) and Fadilla & purnamasari (2021) concluded that inflation has a significant negative impact on economic growth.

Research conducted by Astuti (2018), Purba (2020) andChirwa & Odhiambo (2016)concluded that the investment variable has a positive and significant impact on economic growth. This finding is in line with the research results explained byNizar et al (2013),Magazzino & Mele (2022), AndThe Secret Service (2023)also shows that investment has a positive and significant influence on economic growth.

One of the important indicators that affects GDP is inflation. Inflation is one of the main problems in the economy and the effects of this inflation result in slowing economic growth.(Simanungkalit, 2020). The government always tries to ensure that the inflation rate is always in a stable position, because a high inflation rate can cause a decrease in the level of economic activity, an increase in the unemployment rate, a decrease in exports.(Idayanti, 2003).

The relationship between inflation and economic growth has great significance, considering that inflation is an important indicator in economic analysis, along with economic growth, exports, imports and exchange rates.(Hordofa, 2023). Inflation is a serious problem in a country's economy and is always a concern in the monetary realm, because policies to address inflation can have a double impact on global economic growth.The Greatest Showman (2015). This statement is reinforced by the results of research conducted bySyarun (2016)which confirms that inflation has a significant influence on economic growth. However, previous research conducted byLastri & Anis (2020)states that low inflation may not have a significant impact on economic growth, economic theory shows that inflation has an effect on economic growth.

The fluctuating rupiah exchange rate can affect Indonesia's import-export activities, which in turn impacts economic growth. Changes in the real exchange rate reflect shifts in competitiveness between Indonesia and its trading partners.(Puspaningtyas et al., 2023). When the real exchange rate increases, it will increase the impetus for exports and other factors, but at the same time, it can harm Indonesia's economic growth. The findings of the study conducted bySedyaningrum et al., (2016) explains that economic growth has a positive impact on the rupiah exchange rate because the exchange rate position is greatly influenced by export goods. However, the results of research conducted byFitria (2022)shows that the exchange rate has a negative impact on Indonesia's growth. This condition shows that there is a negative relationship between the exchange rate and economic growth, meaning that if the exchange rate increases, economic growth will decrease.

Changes in exchange rates in a free market depend on a number of factors that affect the demand and supply of foreign currency. The high or low exchange rate of a country is determined by the demand and supply of foreign currency.(Amdan & Sanjani, 2023). Some researchers, such asSeptiawan et al., (2016),The Last Supper (2017),Arifin (2018),Erdal & Pinar (2019),Hassan et al., (2020) The Charitable (2023), have conducted research on the impact of exchange rates on economic growth. Their findings show that exchange rates have a positive and significant impact on economic growth.

Based on the description of the research background above, the formulation of a central problem that is controversial and encourages researchers' interest in analyzing the relationship between ex-

ports, inflation, investment and the rupiah exchange rate on Indonesia's economic growth in the period 1986-2022. This study aims to analyze the influence of exports, inflation, investment, and exchange rates and their implications on the Indonesian economy to provide in-depth insights that can be used as a basis for formulating more effective economic policies to encourage sustainable economic growth in Indonesia.

The gaps in this research are:is a methodological gap because there are differences in the analysis methods used, namely the use of ECM which is more sophisticated than previous studies. This study aims to obtain more accurate results by using the ECM method to analyze the relationship between variables dynamically in the short and long term.

This study updates previous analyses by incorporating more recent data (up to 2022), and using a more sophisticated ECM approach to identify the dynamic effects of these variables on economic growth. The update also lies in the use of broader data, including periods before and after the economic crisis, as well as the COVID-19 pandemic period. This provides a more comprehensive picture of how macroeconomic variables affect Indonesia's economic growth under various global and domestic economic conditions.

This study contributes by providing new insights into the short- and long-term impacts of exports, inflation, investment, and exchange rates on economic growth. It offers policy recommendations based on empirical findings, such as the need for inflation stabilization, investment strengthening, and controlling exchange rate fluctuations. The use of the Error Correction Model (ECM) method allows this study to provide a more accurate view of the relationship between macroeconomic variables in the short and long term, which is very important for the formulation of more appropriate economic policies.

This study will analyze the influence of exports, inflation, investment and exchange rates on Indonesia's economic growth. Using more recent data and using analytical methods with an approach-Error Correction Model (ECM). ECM can analyze the factors that influence Indonesia's economic growth in both the long and short term. This study attempts to conduct further studies on the influenceexports, inflation, investment and exchange rates on Indonesia's economic growth.

METHODOLOGY

This study aims to assess the impact of exports, inflation, investment, and the rupiah exchange rate on Indonesia's economic growth. Through this paper, it is hoped that it can be understood how these variables and factors influence economic growth in both the short and long term. It is important to seek an understanding of the reciprocal relationship between variables in annual time series data over the period 1986-2022 in Indonesia. The secondary data used were obtained from the World Bank(Lastri & Anis, 2020).

This study uses secondary data in the form of annual panel data with a focus on the Indonesian economy. The time series data analyzed covers the observation period from 1986 to 2022. The main data source comes from the World Development Indicator published by the World Bank, as well as official publications from Bank Indonesia. The use of reliable data sources and a long time span aims to provide a comprehensive and robust analysis of Indonesia's macroeconomic dynamics for more than three decades.

There are two variables in this study, namely Dependent Variable and Independent Variable. The Dependent Variable used in this study is Gross Domestic Product (GDP). The Independent Variable used in this study is export (EKS) which is the process of trading goods or commodities abroad which is measured from the

export of goods and services. Inflation is the inflation rate measured from the Customers Price Index (CPI) or Consumer Price Index (CPI). Investment is capital investment measured from Foreign Direct Investment (FDI) or Foreign Direct Investment. The exchange rate or exchange rate is a value that shows the amount of domestic currency needed to obtain a unit of foreign currency. The data presented is annual data on the rupiah exchange rate against the US dollar.

The data analysis method applied in this study is multiple linear regression analysis. The use of multiple linear regression analysis aims to predict future demand by referring to historical data, with the aim of understanding the impact of one or more independent variables on the dependent variable.(Son, 2022). This study uses the Error Correction Model (ECM) analysis tool. ECM as an autoregressive model by including lag considerations in its analysis. So it is suitable for application in research with time series data(Lastri & Anis, 2020). The Error Correction Model method is designed to analyze the factors that influence Indonesia's economic growth in both the long and short term.

The advantage of ECM lies in its dynamic approach, which makes it a relevant analytical tool for economics.(Hodijah, 2021). In relation to economics, the dependence between dependent variables and independent variables rarely occurs instantly, but requires a time delay or time lag.(Hordofa, 2023)Error correction models can include various variables in analyzing long-term economic phenomena and assessing the consistency of empirical models with economic theory.(Yuliadi, 2007). The use of ECM allows theoretical and empirical analysis of the consistency of the resulting model with theory. Data processing in this study was carried out using the Eviewa 12 program. The initial stage before conducting the ECM test, the following tests need to be carried out:

Stationarity Test

Dinkey-Fuller (DF) testestimate three different forms of equations, with different H_0 as well. The three forms of equations are (Gujarati, 2003):

1. Y_t is pure random walk

$$\Delta Y_t = \delta Y_{t-1} + u_t \quad (1)$$

2. Y_t is a pure random walk with drift (with intercept)

$$\Delta Y_t = \beta 1 + \delta Y_{t-1} + u_t \quad (2)$$

3. Y_t is a pure random walk with drift and trend (with intercept and trend)

$$\Delta Y_t = \beta_1 + \beta_2 + \delta Y_{t-1} + u_t \quad (3)$$

where t is the variable trend. The hypothesis used is

H_0: = 0, (there is a unit root- non-stationary time series)δ

H_1: < 0, (no unit root- stationary time series)δ

ADF test equation

$$\Delta Y_t = \beta_1 + \beta_2 T + \delta Y_{t-i} + \alpha_{i\, i=1m\Delta}\ Y_{-t-i} + \varepsilon_t \quad (4)$$

where: is a pure white noise error term and = (-),ε_t ΔY_{t-1} Y_{t-1} Y_{t-2}

ΔY_{t-2}= (-), and so on, m = time-lag length based on I = 1.2….mY_{t-2} Y_{t-3}

Stationarity test is a test used in testing time series data. In testing this stationary, the unit root test is used, described by the Augmented Dinkey-Fuller (ADF) test. In the comparison of the absolute numbers of the calculated ADF and the ADF table, the critical points of 1%, 5%, and 10% of the Mc-Kinnon critical value are used. H0 is accepted if the t-statistic value is smaller than the Mc-Kinnon critical value or the data is not stationary. While H0 is rejected if the t-statistic value is greater than the Mc-Kinnon critical value or the data is stationary. The test aims to check whether the time series data series does not experience systematic changes over time or has a constant average and variance. If the

time series data is not stationary at level (0), then the data stationarity test can be carried out at the next level.

Cointegration Test

The cointegration test was developed based on the understanding that although time series data are not individually stationary, a linear combination of two or more of these data can be stationary. To test this condition, the Engle-Granger method is used with the Augmented Dickey-Fuller (ADF) Test approach. This test is known as the cointegration test. If the variables in the model show cointegration, then it can be concluded that the combination of two or more variables in the regression is stationary (Gujarati, 2003).
The equation used for the Engle-Granger test is:

$$\Delta\hat{\mu} = \rho\hat{\mu}_{t-1} + \sum_1^{\rho} \alpha_i \Delta\hat{\mu}_{t-1} + e_t \quad (5)$$

The hypothesis for testing is:
H_0 : ρ=0, (variables in the model are not cointegrated)
H_1 : ρ≠0, (variables in the cointegrated model)

Error Correction Model (ECM) Test

The Error Correction Model (ECM) approach or model has been widely used in econometric analysis for time-dependent data since the 1960s. ECM is used to assess the extent to which empirical models are consistent with economic theory, as well as to overcome the problem of non-stationary time series variables and regression or correlation in econometric analysis. ECM also corrects short-term imbalances towards long-term equilibrium and is able to explain the relationship between independent variables and dependent variables both at present and in the past.(Slamet & Hidayah, 2022). The characteristic of ECM is the presence of residuals from the long-term equation called Error Correction Tern (ECT) which plays a role in the short-term equation. If the ECT coefficient is statistically significant, it can be concluded that the model specifications used in the study are considered valid.(Gujarati, 2003).

The analysis tool model used is the Error Correction Model (ECM). Non-stationary data at the level can be estimated to have a long-term relationship. The model equation is as follows:

$$\mathrm{PDB}_t = \mathrm{f}\,(\mathrm{EKS}_t, \mathrm{INF}_t, \mathrm{NTU}_t\, \mathrm{INV}_t) \quad (6)$$

Equation (1) can be translated into a long-term model:

$$\mathrm{PDB}_t = \beta_0 + \beta_1 \boldsymbol{EKS}_t + \beta_2 \boldsymbol{INF}_t + \beta_3\, \mathrm{NTU}_t + \beta_4\, \mathrm{INV}_t + \boldsymbol{ECT} + \boldsymbol{\epsilon}_t \quad (7)$$

After that, continue by estimating the equation 7 into the ECM given by Eq 8

General ECM models:

$$\Delta\mathrm{PDB}_t = \boldsymbol{\alpha}_0 + \boldsymbol{\alpha}_1\, \Delta\mathrm{X}_t - 1 + \boldsymbol{\alpha}_2 \boldsymbol{ECT}_{t-1} + \boldsymbol{\epsilon}_t \quad (8)$$

The model above can be interpreted for the short term:

$$\Delta\mathrm{PDB}_t = \boldsymbol{\alpha}_0 + \boldsymbol{\alpha}_1\, \Delta\boldsymbol{EKS}_t + \boldsymbol{\alpha}_2\, \Delta\boldsymbol{INF}_t + \boldsymbol{\alpha}_3\, \Delta\mathrm{NTU}_t + \boldsymbol{\alpha}_4\, \Delta\mathrm{INV}_t + \boldsymbol{ECT}_t - 1 + \boldsymbol{\epsilon}_t \quad (9)$$

Where PDB is economic growth (dependent variable), β_0 is intercept is a constant number from the long term β_1, $\boldsymbol{\alpha}_0$ is intercept is a constant number from the short term, $\boldsymbol{\alpha}_1$ is The i-th regression coefficient, where i is 1, 2, 3, $\boldsymbol{EKS}_t$ is export (independent variable 1). $\boldsymbol{INF}_t$ is inflation (independent variable 2), INV_t is investment (independent variable 3), NTU_t is exchange rate (independent variable 4), $\boldsymbol{ECT}$ is error correction term, t is Time, $\boldsymbol{\epsilon}_t$ is error term and Δ is change / difference

Classical Assumption Test

This test is intended to assess the suitability of the data that has been estimated by the regression model in equa-

tions 2 and 3. The aim is to ensure that the data meets the assumptions required to achieve optimal Ordinary Least Squares (OLS) results.(Yunita & Indrawati, 2022). After conducting the classical assumption test, the next step is to assess the extent to which the independent variables affect the dependent variables and how significant the impact is, with a significance level of 5% (α=5%). In other words, in this study, the tolerance limit for errors in the hypothesis results is 5%(Yuliadi, 2007).

Normality Test

The main purpose of this normality test is to test whether the residual variables in the regression model have normal qualifications or not. The normality test is carried out using the Jargue-Bera analysis technique. The results of the normality test in Jargue-Bera are considered to show a normal distribution if the probability value is greater than the significance level α (5%). This means that if the probability value is greater than 5%, it can be concluded that the data is stated normally, in accordance with previous research.(Febriana & Yulianto, 2017). In the context of testing this hypothesis, the hypothesis statement can be formulated as follows:

H0: Residuals are normally distributed

Ha: Residuals are not normally distributed

Autocorrelation Test

Autocorrelation refers to the correlation or relationship that appears between elements of a series of observations arranged in time series data. A common test applied to detect the presence of autocorrelation is the Breusch-Godfrey serial correlation LM test.(Febriana & Yulianto, 2017). In conducting testing of this classical assumption, the following hypothesis test is used:

H_0: There is no serial correlation in the residuals

H_1: There is a correlation in the residuals

Multicollinearity Test

Multicollinearity test is used to determine whether there is a linear dependence between independent variables. The existence of a strong linear relationship between independent variables can indicate a multicollinearity problem.(Pertiwi et al., 2023). If multicollinearity is detected, then the standard error value of the coefficient becomes invalid, so that the results of the coefficient significance test with the t-test become unreliable. Multicollinearity occurs in a regression model when there is a perfect linear function on some or all of the independent variables in the model. Signs of multicollinearity can be observed by looking at the Variance Inflation Factor (VIF) and Tolerance values. If the VIF value is less than 10 and Tolerance is more than 0.1, it can be concluded that multicollinearity does not occur(Febriana & Yulianto, 2017). The multicollinearity test can be stated with the following hypothesis:

H0: There is no multicollinearity in the model.

Ha: Multicollinearity occurs in the model.

Heteroscedasticity Test

Heteroscedasticity occurs when there is a non-uniform variation in the residuals for each observation in a regression model. The Glejser test can be used to test for heteroscedasticity by regressing the independent variable against the absolute value of the residual. The residual is the difference between the value of the Y variable and the predicted value of the Y variable, while the absolute value is the absolute value of the residual (positive value for all observations). If the significance value between the independent variable and the absolute value of the residual is greater than 0.05, it can be concluded that heteroscedasticity does not occur.(Febriana & Yulianto, 2017).The hypothesis for testing heteroscedasticity can be formulated as follows:

H_0: The assumption of homoscedasticity is

met
H_1: The assumption of homoscedasticity is not met.

RESULTS AND DISCUSSION

Stationarity Test

Before conducting the Error Correction Model (ECM) model, the initial stage before analyzing the data involves a stationarity test on all variables. The stationarity test is carried out using the Augmented Dickey-Fuller method. The unit root test is considered as an assessment of the stationarity or stability of data, because basically this test wants to determine whether the data coefficient of the estimated autoregressive model has a value of one or not. If the results of the unit root test indicate stationarity, it can be continued directly to the cointegration stage. However, if the variables are not stationary, a test of the degree of integration is required. The results of the stationarity test in table 1 show that all variables, including economic growth, exports, inflation, investment and exchange rates have successfully reached the first level of integration through the first differentiation process.

Cointegration Test

Based on the cointegration test output listed in table 2 below, it can be concluded that the regression model used has experienced cointegration. This is indicated by the stationary nature of the residuals of the long-term regression results (ECT) at the level. In other words, the estimation equation shows the existence of long-term equilibrium, so that the data is analyzed using a long-term model.

The classical assumption test is used to assess the suitability of the data that has been estimated by the regression model in equations 2 and 3. The aim is to ensure that the data meets the assumptions needed to achieve Ordinary Least Squares (OLS) results that are in accordance with the BLUE (Best Linear Unbiased Estimator) principle.

Normality Test

Based on Figure 4, it can be concluded that the results of the normality test using the Jarque-Bera method show a probability value of 0.738565, which is higher than the 5% significance level. Therefore, it can be concluded that the data follows a normal distribution.

Autocorrelation Test

The next test step is the autocorrelation test, which aims to identify the correlation between data in variables. In table 3, the results of the autocorrelation test show a Chi-Square (2) probability value of 0.1086, which exceeds the 5% signifi cance

Table 1.
Stationary Test Results

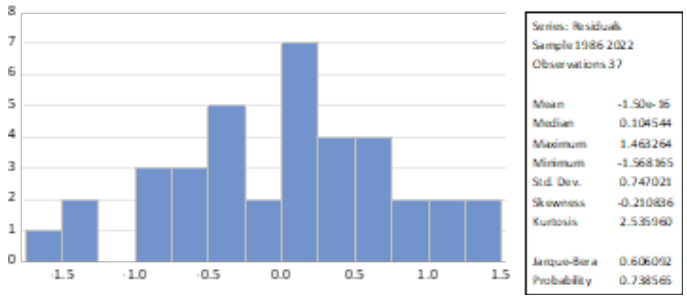
variable	Degree of Integration	Prob. (ADF Test)	Conclusion
GDP	*Level*	0.0013	I(0)
EXP	*first difference*	0.0000	I(1)
INF	*Level*	0.0006	I(0)
INV	*first difference*	0.0000	I(1)
EXCHANGE RATE	*first difference*	0.0000	I(1)

Source : Data Processing Results with Eviews

Table 2.
Cointegration Test Results

Variables	Degree of Integration	Prob. (ADF Test)	Conclusion
ECT	*Level*	0.0003	I (0)

Source : Data Processing Results with Eviews



Source : Data Processing Results with Eviews

Figure 2.
Normality Test Results

Table 3.
Breusch-Godfrey Serial Correlation Autocorrelation Test Results LM Test

F-statistic	1.969908	Prob. F (2,28)	0.1583
Obs*R-squared	4.440644	Prob.Chi-Square (2)	0.1086

Source : Data Processing Results with Eviews

Table 4.
Multicollinearity Test Results

Variable	Coefficient Variance	Uncentered VIF	Centered VIF
D(EXPORT)	0.007626	3.736942	3.735517
D(INFLATION)	0.001696	3.380711	3.380660
D(INVESTMENT)	0.086648	1.189346	1.187627
D(CURRENCIES)	244E-08	1.206697	1.143297
ECT(-1)	0.036724	1.139312	1.137902
C	0.071133	1.082159	NA

Source : Data Processing Results with Eviews

level. This indicates that there is no autocorrelation or it can be concluded that the disturbance factors from the observations are not directly related to each other.

Multicollinearity Test

To find out whether the independent variables are correlated or not, a multicollinearity test is carried out. The data in table 4 shows that there are no signs of multicollinearity between the independent variables (exports, inflation, investment and exchange rates) because the centered VIF value of each independent variable does not exceed 10 and Tolerance is more than 0.1, thus, it can be concluded that there is no indication of multicollinearity

Heteroscedasticity Test

Table 5 heteroscedasticity testing using the Bruesch Pagan Godfrey model, as recorded shows that the Obs*R-squared value exceeds 0.05. The hypothesis of this heteroscedasticity test can be done through the Chi-Square (5) probability value of 0.9794 and Prob.F (5.30), which shows that the value is greater than 0.05 or a significance level of 5%. Therefore, it can be concluded that H0 is accepted, indicating that there is no heteroscedasticity problem or the data is homoscedastic.

Error Correction Model (ECM)

Table 6 panel B shows the ECT value of -0.87 with an absolute value of less than 1 which is significant at the 1% sig-

nificance level. This finding indicates the validity of the estimation carried out using ECM. The classical assumption test also concludes that the analysis can be continued using ECM.

The results of the ECM test on the export variable in table 6 indicate that in the long term (panel A), the coefficient value is 0.037632 with a probability value of 0.6381, which means that the export variable has a positive but insignificant influence on economic growth. This finding is in line with previous research byThe Last Supper (2016)AndPangestin et al., (2021) which also found a positive but insignificant influence on economic growth. Meanwhile, in the short term (panel B) the coefficient value of -0.058241 with a probability value of 0.5099 indicates that the export variable has a negative but insignificant influence on economic growth. This finding is also supported by previous findings byAsbiantari et al., (2018), which explains that the negative and insignificant influence of export variables on economic growth is normal in developing countries.(Pangestin et al., 2021).

Table 5.
Results of the Heteroscedasticity Test: White

F-statistic	0.129628	Prob. F (5,30)	0.9844
Obs*R-squared	0.761323	Chi-Square Prob. (5)	0.9794
Scaled explained SS	3.652216	Chi-Square Prob. (5)	0.6005

Source : Data Processing Results with Eviews

Table 6.
Long-Term ECM Estimation Results

Var	Coeff.	Std.Error	t-Stat	Prob
EX	0.037632	0.079254	0.474827	0.6381
INF	-0.358593	0.045693	-7.847922	0.0000
INV	0.719995	0.257415	2.797026	0.0087
EXCHANGE RATE	-0.000227	5.44E-05	-4.169555	0.0002
C	5.625296	2.214794	2.539873	0.0161

Source : Data Processing Results with Eviews

Table 7.
Short-Term ECM Estimation Results

Var	Coeff.	Std.Error	t-Stat	Prob
D(EX)	-0.058241	0.087324	-0.666951	0.5099
D(INF)	-0.323833	0.041179	-7.864101	0.0000
D(INV)	0.688295	0.294360	2.338278	0.0262
D(CURRENCIES)	-0.000270	0.000156	-1727220	0.0944
ECT (-1)	-0.876832	0.191635	-4.575528	0.0001
C	0.061235	0.266707	0.229598	0.8200

Source : Data Processing Results with Eviews

This condition is triggered by the dependence of developing countries on imports of raw materials from abroad. The findings of this study show differences with the post-neoclassical theory, where increasing exports apparently do not contribute positively to a country's economic growth. The difference in results can be caused by factors such as the research period, research location and other factors used in the study.(Iryani, 2023).

Although exports show a positive effect on economic growth in the long term, the effect is not significant. This indicates the need to increase the added value of Indonesian export products and diversify export products and markets to strengthen the contribution of exports to economic growth. The government needs to encourage industrial innovation and improve the quality of export products to be more competitive in the global market.

The results of the ECM that have been carried out (table 6) show that in the long term (panel A) that the coefficient value of the inflation variable is -0.358593 with a probability value of 0.0000. As for the short term (panel B), the coefficient value is -0.323833 with a probability value of 0.0000 which means that inflation has a negative and significant effect on economic growth. The inflation variable shows a negative and significant effect on economic growth in Indonesia. These results are the same as Keynes' theory which states that there is a negative relationship between inflation and economic growth. According to Muchtolifah (2010) the structuralization theory of the structure of developing countries, inflation will drive up production costs and workers' wages. However, the rate of inflation which is relatively mild and stable will actually increase the Company's profits and become a simulator for economic growth. So that the negative impact of inflation on economic growth only applies if the inflation rate is high and uncontrolled.

Previous research that had similar results to Keynes' theory was:Ramayana (2015),Princess (2016),The Greatest Showman (2017),Maulida et al., (2018),Sangkaen et al., (2019),The Last Supper (2020),Salim et al., (2021),Nurhidayah et al., (2022)AndIqbal et al., (2023). The effect of inflation, both in the long term and the short term, on economic growth is negative and significant. An increase in the inflation rate causes a decrease in economic growth because it indicates that price increases have occurred excessively. High prices result in a decrease in public demand for goods, so that the production of goods and services decreases. The decrease in the production of goods and services has an impact on decreasing output, which ultimately reduces economic growth. Conversely, low or stable inflation, indicating stable prices, will increase the production of goods and services. Increased production of goods and services contributes to higher economic growth.

Inflation that has a significant negative impact on economic growth, both in the short and long term, indicates the need for better price stability. The government and monetary authorities must continue to control inflation through effective policies, such as disciplined fiscal policy management and controlling staple food prices. In addition, monetary policies that support inflation stability must also be strengthened to maintain people's purchasing power and encourage economic growth.

The results of the ECM test listed in table 6, the investment variable in the long term has a coefficient value of 0.719995 with a probability value of 0.0087 and the short term has a coefficient value of 0.688295 with a probability value of 0.0262 explaining that investment has a significant positive effect on economic growth in Indonesia. This finding is in line with the theory of Harrod Domar Budiono & Sukaris (2020), which states that foreign investment

(PMA) can play a role in increasing productive operational activities and ultimately can encourage the country's economic growth. Classical investment theory also notes a trade-off between interest rates and investment rates, where low interest rates encourage investors to be more interested in investing in the production sector than saving. In the context of Harrod-Domar's theory, capital formation is considered an expenditure that increases effective demand in society. This theory highlights a fact that is ignored in Keynes' analysis, namely that capital formation in a period can increase the economy's ability to produce goods in the following period.

The significant positive findings in this study are in line with the results of several previous studies.Ramayana (2015),Yasa (2017),The Greatest Showman (2018),Anur Achsanuddin (2021),The Great Wadiniati (2021)AndWau et al (2022). Previous research byMifrahi & Grace (2022),Saragih & Aslami (2022),Hordofa (2023)AndThe Last Supper (2023)The results of this study provide consistent support with existing theories. The results show that the increase in investment in Indonesia indicates an increase in capital investment or capital formation. This contributes to increased production of goods and services in the economy, which in turn has an impact on increasing economic growth in Indonesia.

The finding that investment has a positive and significant impact on economic growth shows the importance of creating a conducive investment climate. The government needs to continue to improve facilities for investors, both in terms of regulation, infrastructure, and tax incentives. Increasing the attractiveness of foreign direct investment (FDI) and facilitating domestic investment can encourage the growth of the productive sector, which ultimately contributes to increasing economic output.

The results of the ECM analysis contained in (table 6) illustrate the difference between long-term conditions (panel A) and short-term (panel B), where the exchange rate variable in the long term has a coefficient value of -0.000227 with a probability value of 0.0002, meaning that in the long term the exchange rate has a significant negative effect on Indonesia's economic growth. However, in the short term, the exchange rate coefficient value is -0.000270 with a probability value of 0.0944 significant at the 10% level, so in the short term the exchange rate has a significant negative effect at the 10% level on Indonesia's economic growth. Changes in exchange rates have an impact on a country's foreign debt level. Based on the classical / neoclassical economic view by Barsky et al (1986), increasing foreign debt to support government spending is believed to be able to increase economic growth both in the long and short term.

According to the Keynesian perspective, it is stated that the budget deficit that is overcome by borrowing from abroad will increase income and welfare, so that the increase in income will encourage increased consumption. This view is reinforced by Barro's theory known as the Ricardian theory (Barro, 1974, 1989), and also the theory of Evans (1988). Both argue that the policy of borrowing from abroad to cover the budget deficit will not have an impact on the growth of government spending financed by public debt will have to be paid by the government in the future through tax increases. Furthermore, there is a negative influence of the exchange rate on economic growth.

This finding is in line with the results of several similar studies that have been conducted previously byBato & Khoirunnisa (2021),Son (2022),Ramoni-Perazzi & Romero (2022), AndHordofa (2023),Iqbal et al., (2023)the results of the study indicate that there is a significant negative influence of the exchange rate on economic

growth. This finding indicates an inverse relationship between the exchange rate and economic growth, which means that if the exchange rate increases, economic growth will decrease. The conclusion is, if the exchange rate is higher (the rupiah weakens), this will have an impact on the increase in the price of goods, especially imported goods and raw materials for imported products for domestic products. As a result, an increase in the price of goods and a potential decrease in economic growth can be anticipated.

The negative impact of the exchange rate on economic growth, especially when the exchange rate weakens, indicates the need for policies to maintain exchange rate stability. Sharp depreciation can increase import costs and inflation, so a strategy is needed to maintain rupiah stability. In addition, policies to increase the efficiency of domestic industry and reduce dependence on raw material imports need to be strengthened to minimize the negative impact of exchange rate fluctuations.

CONCLUSIONS

Considering the impact of exports, inflation, investment and exchange rates on economic growth in Indonesia in the period 1986-2022, it can be concluded that the export variable has a positive but insignificant effect on economic growth in the long term. Meanwhile, in the short term the export variable has a negative but insignificant effect on economic growth. The inflation variable, both in the long term and the short term, shows a significant negative effect on economic growth in Indonesia of 5%. Meanwhile, the investment variable has a significant positive effect of 5% on economic growth in both the long term and the short term. On the other hand, the exchange rate variable shows a significant negative effect of 5% on Indonesia's economic growth in the long term. However, in the short term, the exchange rate has a significant negative effect at the 10% level on Indonesia's economic growth.

Based on the research results, the author recommends suggestions to improve economic growth in Indonesia, by improving macroeconomic performance, it is necessary to strengthen indicators such as increasing exports, strengthening cooperation between central banks and the government to create a stable economic environment. Encourage policies that support investment growth in both the long and short term such as tax incentives and improving the investment climate. In addition, developing policies that can reduce foreign exchange rate volatility and minimize negative impacts on economic growth.

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