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ANALYSIS OF THE INFLUENCE OF UNEMPLOYMENT VARIABLES ON ECONOMIC GROWTH IN CENTRAL KALIMANTAN USING THE ERROR CORRECTION MODEL (ECM) APPROACH

Rima Harati
Univesitas Palangkaraya
Email: rimahrti74@gmail.com

Abstract
The objective of this study is to examine the impact of unemployment variables on Gross Regional Domestic Product (GRDP) by employing the Error Correction Model methodology. This research is conducted in Central Kalimantan from 2012 to 2023. According to the cointegration testing findings using the ECM approach, the probability of the unemployment variable is 0.3788, which is greater than the significance level of 0.05. There is a lack of cointegration or long-term balance relationship between the variables, which means that testing cannot be conducted over an extended period of time. The ECM test findings indicate that there is no significant short-term impact of the unemployment variable on GRDP in Central Kalimantan. This is supported by the probability value of the unemployment variable, which is 0.2660, above the threshold of 0.05. According to the classical assumption test, there are no signs of autocorrelation in the research model. Additionally, the Jarque Berra probability value of 0.764092 is greater than 0.05, indicating that there are no signs of heteroscedasticity. Therefore, the research model can be considered normally distributed.

Keywords*:* Unemployment, economic growth, central kalimantan

Abstrak
Penelitian ini untuk menganalisis pengaruh variabel pengangguran terhadap PDRB dengan menggunakan pendekatan Error Correction Model. Adapun lokasi penelitian ini berada di Kalimantan Tengah dengan periode tahun 2012-2023. Berdasarkan hasil pengujian kointegrasi menggunakan metode ECM menunjukkan probability dari variabel pengangguran yaitu 0,3788 > 0,05. Menjelaskan bahwa tidak terdapat kointegrasi atau hubungan keseimbangan jangka panjang antar variabel sehingga tidak dapat dilakukan pengujian dalam jangka panjang. Hasil uji ECM menunjukkan bahwa dalam pengujian tidak ada pengaruh dalam jangka pendek variabel pengangguran terhadap PDRB di Kalimantan Tengah yang ditunjukkan dengan probability variabel pengangguran adalah 0.2660 artinya lebih besar daripada alpha 0,05. Sedangkan berdasarkan uji asumsi klasik dijelaskan bahwa tidak terjadi gejala autokorelasi, berdasarkan model penelitian menunjukkan tidak terjadi gejala heteroskedastisitas dan dilihat dari nilai probability Jarque berra sebesar 0,764092> 0,05, artinya model penelitian ini terdistribusi secara normal.

***Kata kunci**: Pengangguran, pertumbuhan ekonomi. kalimantan tengah*

Introduction

Unemployment poses a significant challenge to the economic development of a region and hinders the well-being of the community. Higher levels of unemployment in a given location have a detrimental impact on the economic growth of that region. Unemployment does not necessarily

directly lead to hindered economic growth. Frequently, there is a persistent rise in economic growth despite the annual increase in unemployment rates within a country. This phenomenon can be attributed to a multitude of elements that contribute to the maintenance and augmentation of economic growth. Unemployment can lead to a rise in poverty rates and a decrease in individuals' ability to afford products or services. Persistent unemployment has a detrimental impact on economic growth as it leads to a drop in output, hence impeding economic progress (Bonokeling et al., 2022; Hlongwane et al., 2021).

Unemployment is a multifaceted issue as it both affects and is affected by numerous interconnected elements. High unemployment rates have a significant impact on the economy, leading to a decrease in people's purchasing power. This is because unemployed individuals lack income to engage in economic activities, resulting in a decline in demand for goods and services. Consequently, this decrease in demand negatively affects the Gross Domestic Product (GDP) due to reduced economic activity. One specific element, specifically consumption (C), also had a decline (Leasiwal, 2013; Maulana et al., 2023; Pandusetya et al., 2021). According to Adam Smith's seminal idea, quick and substantial economic expansion in a region might lead to a decrease in unemployment (Muttaqin et al., 2023; Siswantoro, 2022; Solarin & Shahbaz, 2015). It might be stated that there exists an inverse link between economic growth and unemployment. When there is an increase in economic growth in a region, it indicates a corresponding increase in production activity. According to Silvia et al. (2023), this will lead to a rise in labour demand and a decrease in the unemployment rate. According to data from Central Kalimantan Statistics, the open unemployment rate in Central Kalimantan was 4.82% in 2016, 4.58% in 2020, and decreased to 4.1% in 2023. This indicates a decline in the unemployment rate in Central Kalimantan in recent years.

Various issues, such as poverty, unemployment, and restricted resources, contribute to the hindered economic growth, preventing it from reaching its optimal level. Economic growth is primarily linked to the expansion of economic sectors capable of generating sufficient goods and services to satisfy the demands of a certain region or area. Economic growth is the process by which a society experiences an increase in its overall economic activity and conditions within a specific period. This growth leads to wealth and well-being for the society as a whole. As a consequence of this economic activity, individuals will see an increase in their income, which will positively affect their ability to afford a higher standard of living (Angelina & Nugraha, 2020; Oseni & Oyelade, 2023; Runtunuwu & Karim, 2023).

Economic growth refers to the sustained increase in per capita output over an extended period of time (Wau, 2022). Regional economic growth refers to the increase in regional output measured by per capita income. This growth stimulates more economic activity, leading to the creation of more employment and business prospects in the long run. Regions with high levels of economic growth are

anticipated to significantly contribute to regional development (Buthelezi, 2023; Pambayun, 2021; Tanaya & Suyanto, 2023). The statistical data from Central Kalimantan indicates that there has been a rise in economic growth for the period of 2012-2023. Based on the Gross Regional Domestic Product (GRDP) at current prices, the economic growth in Central Kalimantan was 31.52% in 2012, 57.15% in 2018, and 75.13% in 2023. Central Kalimantan has had substantial economic growth in recent years, indicating an improvement in the community's economic conditions. The following table displays the open unemployment rate and GDP at current prices in Central Kalimantan from 2012 to 2023:

Table 1. Open Unemployment Rate and GRDP at current prices In Central Kalimantan 2012-2023 (percent)

YEAR	OPEN UNEMPLOYMENT RATE (X)	GRDP AT CURRENT PRICE (Y))
2012	3,14	31.52
2013	3,00	34.37
2014	3,24	36.84
2015	4,54	40.11
2016	4,82	43.91
2017	4,23	48.29
2018	3,91	52.11
2019	4,04	56.63
2020	4,58	57.15
2021	4,53	62.79
2022	4,26	72.89
2023	4,10	75.13

Source: BPS Central Kalimantan, BPS Indonesia.

From the problems above, the author wants to research in more depth the influence of unemployment variables on GRDP in Central Kalimantan.

Methods

According to Jaya, (2020) secondary data is an indirect source which provides data for researchers, the data is obtained from sources that can provide research support such as from literature and documentation. Researchers obtain secondary data from previous research, articles, journals and books, internet sites, and other information related to research. The type of data used in this research is secondary data in the form of numbers and literature. This secondary data was obtained from agencies related to this research. Purwanza, (2022) provides a definition for quantitative research as a research approach that uses numbers, starting from the stages of data collection, data estimation, and presentation of results. Creswell (2012), explains that quantitative research requires a researcher to explain how one variable influences other variables (Winarni, 2021).

The variables examined in this research are unemployment and economic growth variables in Central Kalimantan in 2012-2023 using the ECM method.

The statistical test stages are as follows:

1. Stationarity Test

Prior to utilizing the ECM, it is necessary to conduct a stationary test and a cointegration test to determine the suitability of the ECM model. The unit root test is employed as the approach to assess stationarity in this study. The Dickey-Fuller unit root test, also referred to as the Dicker Fuller (DF) test, was created by Dickey-Fuller. This stationary test is conducted until all the variables being tested reach a state of stationarity at the same level. If the findings of the Augmented Dickey-Fuller test (ADF Test) indicate:

a. The ADF statistical probability value < α 0.05, then it is stationary

b. The ADF statistical probability value is > α 0.05, so it is not stationary.

2. Cointegration Test

The Cointegration Test is conducted following the completion of the unit roots test and the degree of integration test. In order to conduct a cointegration test, it is necessary for the data utilized in the research to be integrated to the same extent (Purwanza, 2022). The cointegration technique was initially introduced by Endel and Granger in 1987 and further advanced by Johansen in 1988. Research utilizing ECM necessitates the presence of a cointegration relationship among variables. The cointegration test is a follow-up to the unit root test. Prior to conducting the cointegration test, it is necessary to successfully complete the unit root test. The cointegration test is conducted to ascertain the presence of a durable association between the dependent variable and the independent variable. The cointegration test examines whether the residuals of the regression exhibit stationarity. If the variables exhibit cointegration, it indicates the presence of a stable long-term link. Conversely, if the variables do not exhibit cointegration, it suggests the absence of a long-term association.

The purpose of the cointegration test is to ascertain if all the data for stationary variables is cointegrated or not. In addition, cointegration tests are conducted to assess the presence of long-term consistency. This study conducted a cointegration test utilizing a residual-based test, where the data is considered cointegrated if the residual value is cointegrated at either level level or I (0). ECT undergoes testing for a unit root and is determined to be stationary at level level or I (0). In the individual unit root test, the variables Yt and Xt exhibit unit roots at I (0) and are stationary at I (2). Nevertheless, the linear combination of these two variables remains constant at I (0). Therefore, it can be inferred that the linear combination of all variables exhibits a long-term or cointegrated connection impact. In the field of economics, the phrase "cointegration" refers to the situation where two or more variables exhibit a long-term link or balance effect. The equation mentioned is commonly

referred to as cointegrating regression, and the slope parameter β2 is specifically known as the cointegrating parameter (Winarni, 2021).

In order to proceed to the next step of the ECM, it is necessary for the residual or ECT to remain stationary at a consistent level. Perform this test by initially constructing a regression equation and subsequently calculating the residual. The residual estimation findings provide the ADF statistical value, which is subsequently compared to the crucial value. When the probability value is less than 0.05, it indicates that the observed variables are cointegrated or have a long-term relationship. Conversely, if the probability value is above 0.05, it suggests that the observed variables are not cointegrated (Jaya, 2020).

3. Estimation of the ECM Model in the Short Term,

Short-term estimating models can be studied when the presence of cointegration between variables is accurately determined. The distinction between long-term and short-term estimates can lead to different outcomes. In the short term, the relationship between variables may be out of balance, while in the long term, the relationship tends to be in equilibrium. To address this disparity, the Error Correction Model (ECM) introduces an adjustment mechanism known as Error Correction (ECt). The ECt value is utilized to discern the disparity between short-term and long-term coefficients.

The ECt value is obtained from a short-term model, which allows it to offer insights about potential modifications to the short-term anticipated balance. Decision making can be determined by comparing the probability value to the significant level or critical limit. If the probability value is less than the significant level, it indicates a relationship between variables, specifically a short-term balance. Conversely, if the probability value is greater than the significant level, there is no meaningful relationship. If the probability value exceeds the significant level or critical limit, it indicates an absence of equilibrium between the variables in the near term.

4. Estimation of the ECM Model in the Long Term.

The purpose of testing in this model is to analyze the influence between variables in the long term. If the variables in a study are cointegrated in the long term, then these variables experience long-term balance. Decision making can be made if the probability value is < significant level/critical limit, then there is an influence between variables, in other words, long-term balance occurs and vice versa if the probability value is > significant level/critical limit, then there is no balance between variables in the long term.

5. Classic Assumption Test includes:

a. Autocorrelation Test.

To detect whether there is autocorrelation or not, do:

a. Run Test. Run tests are part of non-parametric statistics that can be used to test whether there is a high correlation between residuals. If there is no correlation between the residuals, it can be said that the residuals are random.
b. Durbin – Watson test, making decisions about whether there is autocorrelation or not using the DW table criteria with a significance level of 5%, namely as follows:
    a) A D-W value below -2 means there is positive autocorrelation.
    b) The D-W value is between -2 to +2, meaning there is no autocorrelation.
    c) A D-W value above +2 means there is negative autocorrelation.
    d) Breusch-Godfrey Serial Correlation LM Test.

The basis for making this test decision is based on the p-value, namely:

If the Breusch-Godfrey Serial Correlation LM Test has a significance > 0.05 then the regression model does not have an autocorrelation problem. b) If the results of the Breusch-Godfrey Serial Correlation LM Test have a significance <0.05, then the regression model still has an autocorrelation problem.

b. Heteroscedasticity Test

The heteroscedasticity test is carried out with the aim of testing whether there are differences in variance or residuals from one observation to another. The heteroscedasticity test is carried out to find out whether in a regression model there is an imbalance between the variance of the residuals in one observation compared to other observations. Usually cross-section data contains heteroscedasticity situations because this data collects data representing various small, medium and large sizes (Winarni, 2021).

Residual is the difference between the observed value and the predicted value; and absolute is an absolute value. If the residual variation from one observation to another is constant, then this is called homoscedasticity. Meanwhile, if the residual variations are different, it is called heteroscedasticity. To detect the presence or absence of heteroscedasticity in a multiple linear regression model, this is done by looking at the scatterplot graph or the predicted value of the dependent variable called SRESID with the residual error ZPRED.

Heteroscedasticity testing can be done using:

- Scatterplot graph or from the predicted value of the dependent variable, namely SRESID with residual error, namely ZPRED.

The basis for decision making is as follows:

a. If there is a certain pattern, such as the points forming a certain regular pattern (wavy, widening then narrowing), then this indicates that heteroscedasticity is occurring.

b. If there is no clear pattern, or points spread above and below the number 0 on the y-axis, then heteroscedasticity does not occur. If there are no points that form a certain regular pattern, and the points in the scatterplot above are spread randomly above or below the number 0 on the y-axis. This means that there is no heteroscedasticity problem. If there is no particular pattern and it does not spread above or below zero on the y-axis, then it can be concluded that heteroscedasticity does not occur. A good research model is one that does not contain heteroscedasticity (Purwanza, 2022).

The solution if the model violates the heteroscedasticity assumption is to transform it into logarithmic form, which can only be done if all the data is positive. Or it can also be done by dividing all variables by variables that experience heteroscedasticity disorders.

a. Breusch-Pagan test. The decision making criteria from the Breusch-Pagan test are as follows:
    1) If the significance value is > 0.05, then heteroscedasticity does not occur
    2) If the significance value is <0.05, then heteroscedasticity occurs
b. Chi Square of Obs*R-Squared is 0.1493 so it is greater than the alpha value (0.05), namely (0.1493 > 0.05). If it exceeds the alpha value (0.05), it can be interpreted that the data is free from heteroscedasticity problems.
c. Glejser test. The Glejser test is carried out by regressing the independent variables on their absolute residual values (Gujarati, 2004).
d. ARCH test with basic decision making:
    1) If the significant value of the independent variable is <0.05 then Heteroscedasticity occurs.
    2) If the significant value of the independent variable is > 0.05 then heteroscedasticity does not occur.

c. Normality test.

Ghozali and Ratmono (2017) state that the purpose of the normality test is to determine if the residual variables in a regression model follow a normal distribution. The t and F statistical tests presuppose that residual values conform to a normal distribution. If this assumption is not satisfied, the statistical test results will be deemed invalid. An effective regression model exhibits a data distribution that is either normal or closely approximates normality. One can conduct a normalcy test by employing graphic analysis and statistical tests.

This study employs statistical testing through the utilization of the Jarque-Bera (JB) test. The JB test is a statistical test used to assess the normality of large samples, specifically those that follow an asymptotic distribution. The JB statistic value conforms to a Chi-square distribution with 2 degrees

of freedom (df). The JB value subsequently computes the significance value, which is determined to be 0.05. The foundation for making decisions is:

1. If the probability value is <0.05 then H0 is rejected, meaning the residual data is not normally distributed

2. If the probability value is > 0.05 then H0 is accepted, meaning the residual data is normally distributed.

This test is carried out by making a hypothesis:

H0: Residual data is normally distributed

Ha: Residual data is not normally distributed.

Result and Discussion

Below the variables of economic growth and open unemployment rate in Central Kalimantan in 2012-2023 will be tested using the first step of the Error Correction Model (ECM), namely the unit root test.

Table 2. Unit Root Test Results

UJI AKAR UNIT (ROOT TEST)

Variabel	Level		First Difference	
	ADF	Prob	ADF	Prob
PDRB (Y)	1.820233	0.9984	-3.745819	0.0252
OPEN UNEMPLOYMENT RATE (X)	-3.859893	0.0190	-	-
SOURCE : EVIEWS 10 (PROCESSED)				

Based on the results of the unit root test (root test) above, using a real level of 5% it is known that the economic growth variable in Central Kalimantan at level level is not stationary where the prob 0.9984 is greater than 0.05 and at first difference the prob 0.0252 is smaller than 0 .05 so it can be explained that the economic growth variable in Central Kalimantan is stationary at the first difference level. Meanwhile, the open unemployment rate variable is stationary at the level where the prob of 0.0190 is smaller than

Table 3. Cointegration Test Results

Variabel	Trace statistic	0,05 critical value	Prob.**
TPT (X)	0.774567	3.841466	0.3788

The cointegration test is carried out to determine whether there is a long-term relationship between the independent and dependent variables. The results of the Johansen cointegration test in Table 3 show that the Prob.** of variable x is 0.3788 greater than 0.05. Therefore, it can be concluded that there is no cointegration or long-term balance relationship between the

independent variables and the dependent variable. So in this research there is only a short-term relationship that can be analyzed and there is no long-term balance between the unemployment variable and economic growth in Central Kalimantan.

Cointegration testing can be carried out using the Engle-Granger cointegration test, Durbin Watson cointegration test, or Johansen cointegration test. Two variables are said to be cointegrated if the two variables have a long-term relationship or equilibrium (Gujarati, 2004). Thus, it can be concluded that if a number of variables have a balance in the long term and are integrated with each other in the same order then these variables are said to be cointegrated with each other.

Table 4. Short Term Estimation Results

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	4.117758	0.734083	5.609394	0.0003
D(X)	-1.755562	1.480163	-1.186060	0.2660
R-squared	0.135176	Mean dependent var		3.964545
Adjusted R-squared	0.039084	S.D. dependent var		2.444939
S.E. of regression	2.396684	Akaike info criterion		4.749015
Sum squared resid	51.69684	Schwarz criterion		4.821359
Log likelihood	-24.11958	Hannan-Quinn criter.		4.703412
F-statistic	1.406738	Durbin-Watson stat		2.218599
Prob(F-statistic)	0.265965			

Source: Eviews 10 (processed)

From the short-term regression results above, we can see that the probability value of the unemployment variable is 0.2660, meaning it is greater than alpha 0.05. So it can be concluded that the unemployment that occurred during 2012-2023 has no short-term influence on the economic growth variable in Central Kalimantan. This could be caused by other, more dominant factors that influence economic growth in Central Kalimantan, including natural resources which have comparative advantages, modern technological developments which replace available labor or can be said to be capital intensive rather than labor intensive, high levels of poverty. decreased every year and the number of workers increased every year in Central Kalimantan during the research year.

Classic assumption test

Table 5. Autocorrelation Test

Breusch-Godfrey Serial Correlation LM Test:				
F-statistic	6.768902	Prob. F(2,8)		0.0190
Obs*R-squared	7.542721	Prob. Chi-Square(2)		0.0230
Test Equation:				
Dependent Variable: RESID				
Method: Least Squares				
Date: 03/29/24 Time: 23:09				
Sample: 2012 2023				
Included observations: 12				
Presample missing value lagged residuals set to zero.				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
X	0.840096	4.447277	0.188901	0.8549
C	-2.611748	18.30134	-0.142708	0.8900
RESID(-1)	1.147636	0.343247	3.343469	0.0102
RESID(-2)	-0.411387	0.455360	-0.903432	0.3927
R-squared	0.628560	Mean dependent var		-9.47E-15
Adjusted R-squared	0.489270	S.D. dependent var		12.38004
S.E. of regression	8.847442	Akaike info criterion		7.459335
Sum squared resid	626.2178	Schwarz criterion		7.620971
Log likelihood	-40.75601	Hannan-Quinn criter.		7.399492
F-statistic	4.512602	Durbin-Watson stat		1.688591
Prob(F-statistic)	0.039237			

Source: Eviews 10 (processed)

The autocorrelation test is a correlation that occurs between the residuals in one observation and other observations in the regression model. Autocorrelation can be determined through the Breusch-Godfrey Test, where if the prob value is <0.05 then autocorrelation symptoms occur, whereas if the prob value is >0.05 then autocorrelation symptoms do not occur. This is a test used to test the presence or absence of serial correlation in the regression model or to find out whether in the model used there is autocorrelation between the observed variables. From the results of the autocorrelation test above, it can be seen that the probability is 0.0230 <0.05, so it can be concluded that autocorrelation symptoms occur in the research model.

Table 6. Heteroscedasticity test

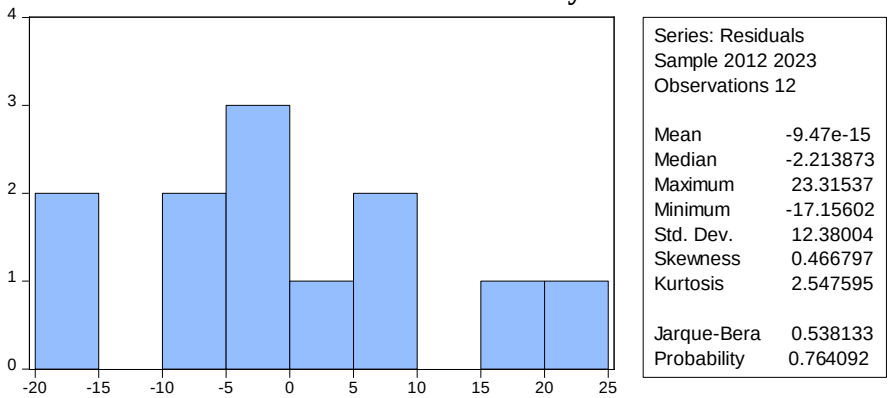
Heteroskedasticity Test: White			
F-statistic	0.663071	Prob. F(2,9)	0.5387
Obs*R-squared	1.541109	Prob. Chi-Square(2)	0.4628
Scaled explained SS	0.828129	Prob. Chi-Square(2)	0.6610

Test Equation:				
Dependent Variable: RESID^2				
Method: Least Squares				
Date: 03/29/24 Time: 23:27				
Sample: 2012 2023				
Included observations: 12				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-1140.344	2844.085	-0.400953	0.6978
X^2	-59.18106	193.8502	-0.305293	0.7671
X	561.2000	1499.654	0.374220	0.7169
R-squared	0.128426	Mean dependent var		140.4933
Adjusted R-squared	-0.065257	S.D. dependent var		182.5486
S.E. of regression	188.4108	Akaike info criterion		13.52744
Sum squared resid	319487.8	Schwarz criterion		13.64867
Log likelihood	-78.16467	Hannan-Quinn criter.		13.48256
F-statistic	0.663071	Durbin-Watson stat		0.753662
Prob(F-statistic)	0.538728			

Source: Eviews 10 (processed)

The heteroscedasticity test is used to determine whether there are deviations from classical assumptions or not. Heteroscedasticity is the unequal variance of the residuals for all observations in the regression model. The prerequisite that must be met in the regression model is the absence of symptoms of heteroscedasticity. If the prob value is <0.05 then there are symptoms of heteroscedasticity in the research model, whereas if the prob value is >0.05 then there are no symptoms of heteroscedasticity in the research model. From the results of the heteroscedasticity test above using the white method, the prob value is 0.7169 > 0.05 so it can be seen that in this research model there are no symptoms of heteroscedasticity.

Table 7. Normality Test



Source: Eviews 10 (processed)

Normality test to test whether the standardized residual values in the regression model are normally distributed or not. How to carry out a normality test can be done using a normal

probability plot graphic analysis approach. In this approach, the residual value is normally distributed if the line (dots) that depicts the actual data follows or converges to the diagonal line. From the test results above, it can be seen that the Jarque Berra probability value is 0.764092> 0.05, meaning that the residual research data is normally distributed.

Conclusion

Based on the ECM test, it was determined that there was no immediate impact of the open unemployment rate variable on the GRDP variable in Central Kalimantan. This analysis demonstrates that the unemployment rate in Central Kalimantan does not significantly affect economic growth. This is due to the presence of other more influential factors, such as abundant natural resources that contribute to the Gross Regional Domestic Product (GRDP), advancements in technology, a decline in poverty levels, and an increase in the workforce size in Central Kalimantan over the course of the study period. According to the classical assumption test, there are no signs of autocorrelation or heteroscedasticity across variables. Additionally, the normality test indicates that the residuals of the study data are distributed normally.

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