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The Effect of Electricity Consumption, FDI, and Unemployment on Economic Growth in Indonesia 1990-2021

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KEYWORDS
Economic Growth;
Electricity Consumption;
FDI; Unemployment

ABSTRACT The traditional economic growth hypothesis was created by experts known as the old economist analysts, pioneered by Adam Smith, Robert Malthus, David Richardo, and John Stuart Plant. Given the traditional hypothetical assumptions, economic development is influenced by several variables, including the number of workers seen from the population, the amount of capital, geographical area, and technological development. Economic growth displays how monetary applications increase income or payments for a local area from one period to another. The economic case in Indonesia is still happening now; looking at what aspects affect economic growth, this study examined the variables of Electricity Consumption, FDI, and Unemployment. This exploration uses time series data regression, quantitative methods, and secondary data from the Ministry of Energy and Mineral Resources (MEMR), Central Bureau of Statistics (BPS), and World Development Indicator data from 1990-2021. The data is examined using Eviews 12 software. The experimental results show that the variables of electricity consumption and FDI affect economic growth in Indonesia positively and significantly, while unemployment affects economic growth in Indonesia negatively and significantly for the period 1990-2021.

1. INTRODUCTION

Economic growth as an indicator or the best proportion of the application of economic achievement, the fluctuation of economic growth in macroeconomics that is protracted from one period to the next, is based on the ability of a country to produce labor and products that continue to grow. Neoclassical economists, for example (Solow, 1956), or endogenous development market analysts, for example, the Ak model (Sergio Rebelo, 1991), suggest that the capacity to expand labor and products is driven by variables such as population, employment, attention to the amount of capital, encouragement of innovation and technology used are expected to be the drivers of economic development.

According to Todaro et al. (2006), there are three main parts in the economic development of each country, namely: (1) capital accumulation, which

includes all structures or new types of speculation that put energy resources into the land; actual equipment, and capital or human resources (2) population development, which increases the number of workers, and (3) machine progress. Sukirno (2006) Economic growth is characterized by increased labor and products created due to increased economic activity pursued by citizens. Experts have put forward various hypotheses analyzing economic growth. The traditional (classical) economic growth hypothesis was one of the initial speculations.

The traditional economic growth hypothesis was created by experts known as the old economist analysts, pioneered by Adam Smith, Robert Malthus, David Richardo, and John Stuart Plant. Given the traditional hypothetical assumptions, economic development is influenced by several variables, including the number of workers seen from the population, the amount of capital, geographical area, and technological development. Economic growth displays how monetary applications increase income or payments for a local area from one period to another (Sukirno, 2006).

Significant economic development is not just an indicator of the achievement of regional development, but more than that, a large economy is expected to be one of the clues in estimating the results of a region's growth. Not only the aspect of economic development but the success of regional development is not entirely determined by the region's ability to reduce the unemployment rate and poverty, and the gap between communities decreases. In other words, a sizeable monetary development cannot guarantee that everyone will have the same impact. (M.

P. Todaro, Smith, et al., 2006) accept three significant parts in monetary development: (1) capital accumulation occurs when someone gets a wage, part of which is saved and contributed to expanding future results and payments. Such investments can take the form of land, equipment, and human resources in welfare, learning, and work skills. (2) The development of population, labor force, and unemployment levels, when the population continues to grow, has a positive effect on increasing economic development, considering that indirectly, the labor force is said to continue to increase, with this increase believed to be able to increase the market dimension in the country, (3) suppressing the unemployment rate so that it affects economic growth.

Based on the economic growth information (constant) released by the world development indicator from 1900 to 2021, there has always been an increase, but in the period 1998 and 2020, there was a shrinkage. At that time, the economy gradually displayed a positive direction, although obstacles still showed the ups and downs of economic growth figures in Indonesia. The achievement of economic growth in Indonesia, so that in 2021, it reached the figure of $1,065,710 000 000 USD. Mankiw (2007) argues that economic growth must be estimated from the turnover of the total national output of a country's gross domestic product (GDP) by measuring a period. Gross domestic product is found in 2 methods: all the income of each person in the economy and the full use of the results of labor and products in the economy. Stern (2003) accepts that energy utilization is one of the efforts to encourage the industrialization of the economy as well as an effort to mobilize all capital in carrying out development, both complementary and substitute, in improving the economy. It is well-accepted that energy is an input force capable of stimulating economic growth.

According to data from the Ministry of Energy and Mineral Resources (KESDM), the utilization of electricity per capita in Indonesia since 1971 began at 14.3 kWh / capita. It continued to grow with the turn of the year, but in 2020, there was a decline, at 1073.4 kWh / capita, whereas this year, there were many monetary cases worldwide. Then, due to this turmoil, the government took various monetary strategy programs that had significant consequences, so there was an increase. In 2020, the electricity consumption rate was at 1,173 kWh / capita. As per the research (Sadiq et al., 2023), electricity utilization is expanded due to the monetary changes made, which can increase energy utilization. Thus, energy utilization increases twice in line with economic expansion. (Raihan & Tuspekova, 2022), Given the inevitable expansion of power utilization and its relationship with economic development, it is essential to identify and use energy effectively and efficiently to meet energy demand sustainably and safely. (Yoo, 2005), dissected the relationship between electricity utilization and economic growth in South Korea from 1970 to 2002. Various studies

have tried to measure the bond between energy utilization and economic development, and the results found (Yoo, 2005) that electricity utilization has a causal bond (2-way) with monetary development. This shows that a significant level of power utilization can push economic development, and conversely, a significant economic development is expected to increase the level of power utilization. Comparative matters, however small the agreed comparison (Yoo & Lee, 2010), except that the bond between power utilization and economic development is significant and builds a transformed inverted U-curve. This implies that as the economy grows, so will the increase in electricity utilization. However, as a country's economy advances, the dominant industrial sector will shift from heavy industry to assembly industry and light administration, which is believed to reduce electricity utilization. (Jay Squalli, 2007), shows that electric energy utilization and monetary growth have a long-term bond. Attention to electric power continues to grow.

However, the increasing world crude oil price due to the expansion of war conflicts implies that the foreign direct investment cycle is not running perfectly. The Foreign Direct Investment (FDI) data shows instability in the development of direct investment flows in Indonesia from 1990 to 2021. If we look at the year 2000, there was an extreme depreciation of -2.75%. However, the Indonesian government could advance the atmosphere despite the erratic investment cycle. So, in 2021, according to the data, Foreign Direct Investment is 1.78%. According to (Kuncoro, 2010), economic growth depends on investment figures, which are thought to affect economic movement. Until the existence of these assumptions, it is hoped that an extensive investment process will be established to move the economy quickly. Research conducted by (Sitompul & Linda, 2008); (Rustiono, 2008); (Luntungan, 2008); and (Sodik & Nuryadin, 2005) states that the value of investment drives regional economic development. This assumes that investment can increase economic development and is expected to increase employment and reduce unemployment, which impacts increasing the population's income. Welfare will also increase, so the final result of the interaction will be economic development.

According to (M. P. Todaro et al., 2006), various investments in the industrial sector are persuasive towards employment, which positively affects economic development and lowers unemployment. Considering that the unemployment data informed by the World Development Indicator shows fluctuations in the unemployment rate every year, but in the long term, the unemployment rate for the last ten years has shrunk so that in 2021, the figure is 3.83% which is better than in 2010 at 5.61%, this situation is quite favorable so that it is expected to be one of the elements that encourage economic development in Indonesia. (P. M. Todaro, 2000) accepts that investment plays a significant role in driving the economy because considerable capital development is expected to increase the value of production, so it is believed to have resulted in increasing public income and forming a labor market. In this atmosphere, the government wants to reduce the unemployment rate so that the expected output can support economic growth in Indonesia.

Based on the explanation of economic growth, electricity consumption, FDI, and unemployment in Indonesia, the author is interested in concentrating research to see the significance of the variables that influence economic growth in Indonesia from 1990 to 2021.

The framework in this study is as follows;

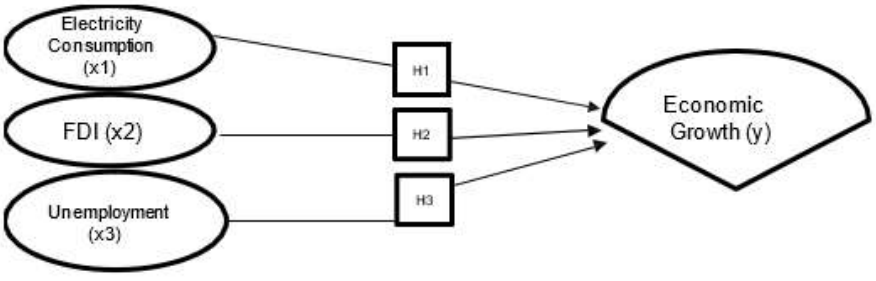


Figure 1. The research framework

2. LITERATURE REVIEW

According to Sukirno (1995), economic development is the result of economic activity that causes the creation of labor and products in the region to increase and the welfare of citizens to increase. This increase is caused by aspects of creation that continue to increase in quantity and quality. Mankiw (2007) reported that the indicator in estimating monetary growth is the growth of the GDP (Gross Domestic Product) of a country compared to the previous period. Gross domestic product is expected to come from 2 perspectives: the income of the people in the economy and the absolute use of labor and economic products. The high achievement of economic growth is caused by the amount of production produced by a country. Therefore, public results are a characteristic of a reasonable allocation of relics. Rahardja and Manurung (2008) commented on how much national output produced by an economy in a certain period reflects how efficiently resources are used, which can also create labor and the progress of a country.

Opinion (Yusgiantoro, 2000), Input and output, and the impact of electricity consumption have an enormous role in the economy. Not only government income, income from shipping, and balancing installments, but another small component that greatly influences economic development is the use of electric power. Therefore, based on a survey of the preparation of references that the author learned from various research, data on electricity consumption, and results in the economy that have different points of view, this is interesting because it will be a refinement in taking policy strategies so that the following results can be a driver of economic development. Some of the research results are as follows;

Assessment of a country's monetary performance and achievements also considers the utilization of energy consumption. Monetary expansion is one of the measures that can increase energy demand. (Sadorsky, 2010), underlines that expecting a positive bond between production and energy consumption utilization, a unidirectional causal relationship, or the impartiality of Gross Domestic Product towards energy consumption implies that energy-saving systems can be implemented without disrupting economic development conditions. Research conducted by (Ozturk et al., 2010) shows that in low-wage countries, long-term GDP is causally related to electricity consumption, whereas in medium-wage countries, the relationship is bidirectional.

Costantini & C. Matini (2010) showed that energy prices in the short run affect GDP and energy consumption. Drawing on research by (Shahbaz et al., 2012), there is a 2- way Granger causal link between economic growth and electricity consumption. (Ali et al., 2016), economic growth and energy consumption have a one-way positive causal relationship. In addition, viewing the causal bond between CO2 emissions, economic growth, and power utilization facts is 2-way. (D. M. Nachane et al., 1988) observed a two-way causal relationship between electricity utilization in Brazil, Colombia, and Venezuela and a one-way relationship with GDP per capita in Argentina and Chile. Additionally, (D. Murry, 1994) observed a unidirectional relationship between Colombia's native gross domestic product and electricity consumption.

The availability of energy, precisely sufficient and sustainable electric power, is a pressing matter in industrial areas because one of the crucial methods in the industrial sector's business actions is ensuring accessibility to electricity. Consequently, investment in energy availability must be focused on because, among 10 ASEAN member countries, Indonesia is the country that needs an injection of funds (Yoo & Kim, 2005).

3. RESEARCH METHODOLOGY

This research uses quantitative methods, time series data relapse investigations, supporting data belonging to the Ministry of Energy and Mineral Resources (MEMR) 1990-2021, Central Bureau of Statistics (BPS) data, and World Development Indicator data. This exploratory study includes an evaluation of the significance of the independent variables (Electricity Consumption, FDI, Unemployment) on economic growth as the dependent variable using T-statistics and probability measures. The significance level ascertains the bond's strength and linkage between the dependent aspects and variables.

Table 1.2. Variables and data sources

Variables	Description	Unit	Source
KL	Electricity Consumption	Kwh/Capita	MEMR
FDI	Investment (% ofDGP)	%	WDI
Unemployment	Unemployment	%	WDI

The model used in this study is as follows:

$$PKt = \alpha + \beta 1\ KLt + \beta 2\ FDIt + \beta 3\ UNMt + \varepsilon t$$

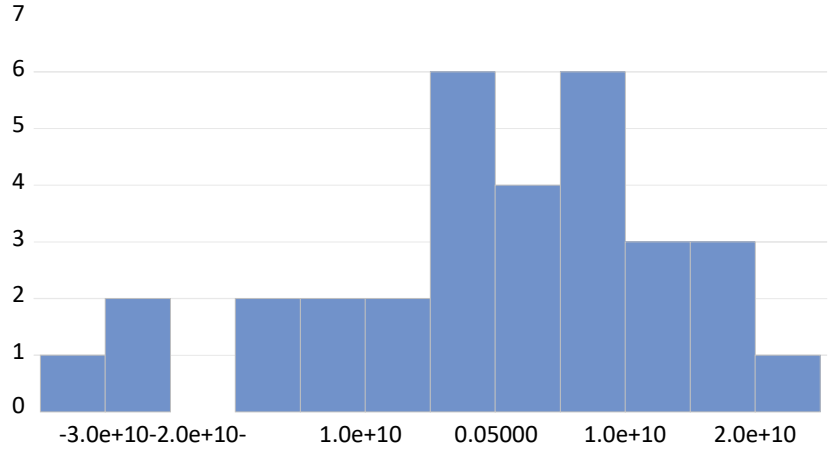
Description:

PE : Economic Growth in Indonesia
ε : error
KL : Electricity Consumption in Indonesia
t : time series
FDI : Foreign Direct Investment (FDI) in Indonesia
UNM : Unemployment in Indonesia

4. RESULT AND DISCUSSION

The results of this research are obtained from secondary data and time series data in Indonesia from 1990 to 2021. The regression results using the Eviews 12 test instrument show that the variables of Electricity Consumption and foreign Direct Investment (FDI) affect economic growth positively and significantly, and the unemployment variable affects economic growth negatively and significantly.

Classical Assumption ResultsNormality



Series:	Residuals
Sample	1990 2021
Observations	32
Mean	4.00e-05
Median	2.66e+09
Maximum	2.32e+10
Minimum	-3.43e+10
Std. Dev.	1.39e+10
Skewness	-0.670378
Kurtosis	2.899953
Jarque-Bera	2.410183
Probability	0.299665

Normality Test Description: Normal data because Probability > 0.05

Autocorrelation

Breusch-Godfrey Serial Correlation LM Test:
Null hypothesis: No serial correlation at up to 2 lags

F-statistic	1.794456	Prob. F(2,26)	0.1862
Obs*R-squared	3.881359	Prob. Chi-Square(2)	0.1436

Test Equation:
Dependent Variable: RESID
Method: Least Squares
Date: 05/25/24 Time: 11:56
Sample: 1990 2021
Included observations: 32
The sample missing value lagged residuals to zero.

Variables	Coefficient	Std. Error	t-Statistic	Prob.
C	-71634025	1.08E+10	-0.006659	0.9947
ELECTRICITY CONSUMPTION	1402129.	9008069.	0.155653	0.8775
FDI	-5.04E+08	2.09E+09	-0.241237	0.8113
UNEMPLOYMENT	5307076.	1.69E+09	0.003144	0.9975
RESID(-1)	0.346824	0.199151	1.741517	0.0934
RESID(-2)	0.020852	0.197726	0.105460	0.9168

R-squared	0.121292	Mean dependent var	4.00E-05
Adjusted R-squared	-0.047690	S.D. dependent var	1.39E+10
S.E. of regression	1.42E+10	Akaike info criterion	49.76392
Sum squared resid	5.27E+21	Schwarz criterion	50.03875
Log likelihood	-790.2228	Hannan-Quinn criter.	49.85502
F-statistic	0.717783	Durbin-Watson stat	1.903184
Prob(F-statistic)	0.615892		

Autocorrelation Test Description: Sourced from LM test results of Prob value 0.05 until this data has ended evaluation.

Multicollinearity

	ELECTRICITY CONSUMPTION	FDI	UNEMPLOYMENT
CONSUMPTION _LIGHT	1	0.3419766954678855	-0.09279537774635719
FDI	0.3419766954678855	1	-0.2582984414786979
RULING	-0.09279537774635719	-0.2582984414786979	1

Description: Has passed the evaluation because the number of ties between aspectslies below 0.8.

Heteroskedasticity

Heteroskedasticity Test: Breusch-Pagan-Godfrey
Null hypothesis: Homoskedasticity

F-statistic	1.653805	Prob. F(3,28)	0.1995
Obs*R-squared	4.816700	Prob. Chi-Square(3)	0.1857
Scaled explained SS	3.503310	Prob. Chi-Square(3)	0.3203

Test Equation:
Dependent Variable:
RESID^2Method: Least
Squares
Date: 05/25/24 Time:
11:56Sample: 1990 2021
Included observations: 32

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-7.94E+19	1.92E+20	-0.413242	0.6826
ELECTRICITY CONSUMPTION	-4.70E+16	1.61E+17	-0.292507	0.7721
FDI	7.57E+19	3.70E+19	2.045991	0.0503
UNEMPLOYMENT	3.88E+19	3.02E+19	1.286479	0.2088

R-squared	0.150522	Mean dependent var	1.88E+20

Adjusted R-squared	0.059506	S.D. dependent var	2.63E+20
S.E. of regression	2.55E+20	Akaike info criterion	96.92727
Sum squared resid	1.82E+42	Schwarz criterion	97.11049
Log-likelihood	-1546.836	Hannan-Quinn criteria.	96.98800
F-statistic	1.653805	Durbin-Watson stat	2.233196
Prob(F-statistic)	0.199548		

Heteroskedasticity Description: Given the results of the Breusch-Agnostic Godfreytest, the Prob value is 0.05. This tends to be the reason that the data has ended evaluation.

Dependent Variable: PE_CONSTANMethod: Least Squares
Date: 05/25/24 Time: 11:51Sample: 1990 2021
Included observations: 32

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.66E+11	1.10E+10	15.03648	0.0000
ELECTRICITY CONSUMPTION	8.01E+08	9226891.	86.83568	0.0000
FDI	1.30E+10	2.13E+09	6.108832	0.0000
UNEMPLOYMENT	-8.67E+09	1.73E+09	-4.997891	0.0000

R-squared	0.996946	Mean dependent var	5.94E+11
Adjusted R-squared	0.996619	S.D. dependent var	2.52E+11
S.E. of regression	1.46E+10	Akaike info criterion	49.76823
Sum squared resid	6.00E+21	Schwarz criterion	49.95144
Log-likelihood	-792.2916	Hannan-Quinn critter.	49.82896
F-statistic	3047.010	Durbin-Watson stat	1.253228
Prob(F-statistic)	0.000000		

From the t-test statistics on electric power utilization, FDI, unemployment, Prob (f-statistics) results show 0.0000, the value is smaller than 0.05, so the partial test results influence economic development. Based on the test results, the R-squared value is 0.996946, which displays that most of the variation in the dependent variable can be understood by the economic growth variable, while factors outside this research can understand the other 1%. In checking the results of the t-statistic test above, it can be said that electricity consumption, FDI, and unemployment rate impact economic growth in Indonesia. The results of this research do not reveal multicollinearity between aspects because the number of interrelationships is below 0.8 in ensuring the independence of variables. The results of the heteroscedasticity test show that the assumption of homoscedasticity applies, after which the regression results are validated because of the effects between aspects and economic growth.

The effect of electricity consumption on economic growth

Based on the tests that have been attempted, electricity consumption displays positive and significant ties to economic development. It shows that electricity utilization can drive Indonesia's economy so that it can be a driver of economic growth. Search Prastika (2023) displays that variable electricity utilization fundamentally affects economic growth. Rezki (2011), in his search, creates the idea that the electricity demand has a bond with gross domestic product per capita. Moreover, for (Sapthu, 2023), electricity utilization entirely results in economic development. Solid electricity utilization can also trigger investment that can support economic development.

Effect of Foreign Direct Investment (FDI) on Economic Growth

The test results in this research illustrate that FDI has a positive bond and significance to economic growth. In research shown by (Az Zahran, 2020), (Huu Cung, 2020), and (Lusi Kurniawati & Sari Islami, 2022), the results show that FDI variables affect economic growth as well as research (Dewi Ernita et al. 2013), and (Prawira et al., 2017), which found that FDI which was tested partially and coincided fundamentally influenced economic growth in Indonesia.

Effect of Unemployment on economic growth

Based on the tests, it shows that the unemployment variable has a negative and significant bond to economic development in Indonesia. This exploration is reinforced by research results (Wiji Utami & Masjkuri, 2020), showing that open unemployment affects economic growth. (Nugrahani Pramesthi, 2013), Illustrates that the level of unemployment has a significant effect on monetary growth.

5. CONCLUSION

Based on the experimental results and reviews above, there is a tendency for the utilization of electricity consumption and FDI to affect economic growth in Indonesia from 1990 to 2021 positively and significantly. Meanwhile, the unemployment variable affects economic growth in Indonesia from 1990 to 2021 negatively and significantly.

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