



# Determinants of Indonesia's Long-Term Economic Structure Panel Data Approach Using Logistic Multinomial Regression

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## ABSTRACT

*The pattern and structure of the economy in Indonesia are experiencing a contraction in line with economic development. This study aims to analyze changes in economic structure and causative factors. The analysis was conducted in panel data on 33 provinces from 2007-2021. Using Multinomial Logistic Regression to analyze the determinants of the economic position of provinces in Indonesia. The results showed that economic growth, poverty rate, unemployment rate, and investment had a significant effect on increasing the tendency of provinces that are in the classification of underdeveloped areas to become fast-growing regions. The expansion of employment opportunities coupled with inclusive economic growth is an effort to achieve a better economy.*

**Keywords:** Economic Growth, Poverty rate, Unemployment, investment, Multinomial Logistic Regression.

## 1. INTRODUCTION

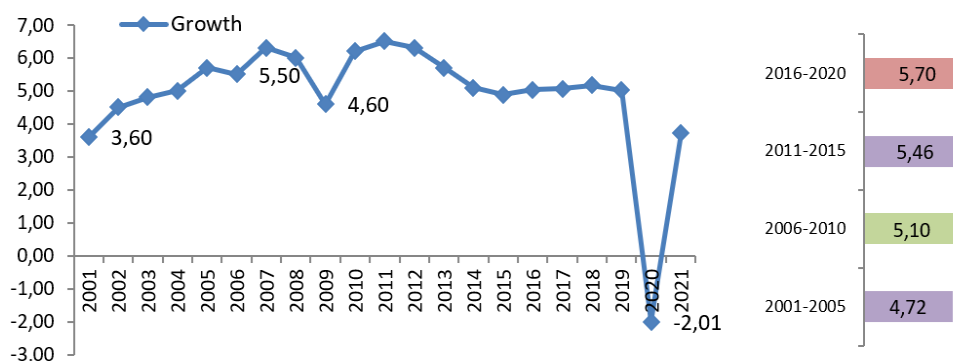
Attention to long-term economic growth has been carried out, but the role of several macroeconomic variables on economic growth is still a concern to be examined (Ammannati Francesco & Guido, 2017); (Tamura et al., 2019); (Suresh Babu et al., 2016). Economic growth is a process of increasing the production of goods and services in the economic activities of the community. Economic growth is also an indicator of successful development. The economy becomes advanced because there is economic growth, one of which comes from the national output (Farah Diffa Hanum et al., 2022). As (Yunianto, 2021) suggests that economic growth is a condition in which a country's economy changes towards a better state than before. Indonesia's economic growth showed an improving trend from 2001 to 2021.

From 2001-2005 Indonesia's average economic growth was 4.72 per cent and increased by 5.70 per cent in the last five years. Although Indonesia's five-year average economic growth has increased, annual economic growth fluctuates. Indonesia's economic growth contracted in 2020 at -2.01 per cent. In addition to economic growth,

the success of economic development can also be seen in the growth of per capita income. Indonesia's per capita income in 2001 -2021 showed a positive direction with an average increase of 3.61 per cent. The highest increase in per capita income growth in 2007 and 2010 was 4.9 per cent. Indonesia's per capita income growth in 2001-2005 has a positive trend. Although fluctuating until 2014, it showed an increase again in 2015. Per capita, income growth contracted in 2020 by -3.03 per cent. The increase in economic growth of a country cannot be separated from the determinants of economic growth. Indonesia's gross domestic income in terms of expenditure components consists of household consumption, final consumption of household non-profit institutions (LNPR), government final consumption, gross fixed capital formation (PMTB), inventory changes, exports and imports of goods and services. (Amri & Aimon, 2017) One way to increase economic growth is through capital formation. Capital formation can be interpreted as the process of accumulating assets or increasing wealth that is used for welfare in the future (Ugochukwu & Chinyere, 2013).

Gross fixed capital formation is an indicator to see the amount of investment that occurs in a country. Todaro (2015) states that in the Harrod-Domar theory, it is said that if more investment is made, faster the economic growth. PMTB growth has a fluctuating trend with an average growth of 6.68 per cent in the 2001-2019

period. However, PMTB growth contracted by -4.90 per cent in 2020 due to the economic downturn due to the pandemic. Isnowati (2012) (Fitri, 2015) concluded that Regional Private Investment exerts a positive and significant influence on economic growth both in the short and long term.



Source: Data processed by author, 2023

**Figure 1. Indonesian Economic growth in 2001-2021**

Indonesia's economic growth during 2001-2021 fluctuated due to many factors that affect economic growth such as per capita income, investment, human resources and the level of population dependence. Based on the description above, a question arises whether these factors have a significant effect on economic growth in Indonesia. The specific purpose of this study is to analyze Indonesia's long-term economic growth model based on determinants such as per capita income growth, unemployment rate, poverty rate, and investment.

The study in this study is urgent because by knowing the long-term economic growth model, it can be known whether Indonesia can continue its accelerated growth path or not. Furthermore, this study will identify determinants of shifting economic patterns or structures that are important to maintain to obtain better economic conditions.

A literature study that The Neoclassical model of economic growth was first introduced by (Solow, 1956) dan Swan (1956) which emphasizes the importance of capital accumulation. In this model, it is shown how economic policies can increase economic growth through increasing public savings. The theory of Sollow and Swan (1956) states that technological progress is an exogenous variable in economic growth. The study of long-term economic growth models has attracted the attention of many researchers both on a global and national scale. (Vedia-jerez & Chasco, 2016) conducted a study to look at the determinants of long-term economic growth in South America from 1960 to 2008. The review found that economic growth is driven most strongly by physical and human capital accumulation, as well as by sectoral exports. In addition, institutions and policies have a strong and substantial influence on economic

growth and investment. Daniel also elaborated that trade openness is positively correlated with foreign investment, suggesting that relatively closed countries benefit most from the opening up of their economies.

In line with the results of Daniel's study, research (Matthew & Johnson, 2013) also shows Foreign Direct Investment (FDI) has a significant impact on Economic Growth in Nigeria. Although the relationship between FDI and economic growth was found to be not statistically significant, there was still a positive relationship. The government should strive to create a conducive environment for foreign direct investment in Nigeria through appropriate general fiscal, monetary and economic policies and a stable political environment. Empirical findings show that FDI, Foreign Aid, Government Spending and Trade Openness have a positive and significant influence on GDP in the long run (Verma et al., 2021).

(Almfraji & Almsafir, 2014) He also found things no different from others, according to him, several factors affect economic growth such as adequate levels of human capital, well-developed financial markets, complementarity between domestic and foreign investment and open trade regimes. In Indonesia, research on economic growth is widely conducted. Attention to growth issues is still quite high, this indicates that the role of a country's economic growth is very important Prasetyo (2008) Wahyuni, Hamzah, & Syahnur, (2013) (Kurniawan & Hayati, 2015) (Farah Diffa Hanum et al., 2022). Findings (Lucya & Anis, 2019) that the level of education and technology has a positive effect on Indonesia's economic growth.

Human capital, technology, population growth, capital growth, and depreciation have a significant effect on the

neoclassical approach or the new growth approach (Haryono et al., 2021). (Wahyoedi S, 2014) using a sample of 10 countries with the highest version of competitiveness of the world economy and ASEAN countries. Wahyoedi found a positive relationship between a country's competitiveness and per capita income; a positive relationship between education and competitiveness of a country; a Positive relationship between education and innovation, between education and per capita income, and between research income per capita.

Meanwhile, (Zhou & Luo, 2018) look at how the relationship between higher education, technological innovation, and economic growth in China from 1997-2015. The results of Zhou's (2018) research show that higher education and technological innovation are two important factors affecting economic growth. Higher education is an important source and driving force of technological innovation that drives economic growth.

**2. RESEARCH METHOD**

This study uses secondary data. Research data collection is carried out by documentation techniques. The data used in this study are secondary data obtained from CPC and BPS. This research data consists of data on economic growth, GDP per capita growth, investment growth, open unemployment rate and poverty in Indonesia.

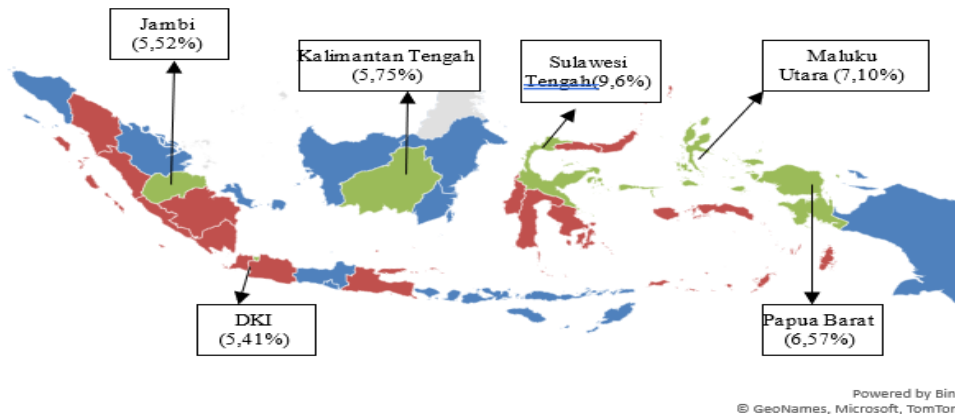
**4. RESULT AND DISCUSSION**

Economic growth in Indonesia was highest in 1995 with a figure of 8.22 per cent, but in 1998 the condition of the Indonesian economy which experienced a monetary crisis had an impact on worsening the economy where economic growth contracted by -13.13 per cent. The economic recovery process had a positive impact marked by Indonesia's economic growth which improved again in 2001 by 3.60 per cent and continued to increase until

To see changes in economic growth patterns, Klassen typology analysis is used. Furthermore, a multinomial logit regression analysis will be carried out to see the determinants of changes in the pattern or structure of the Indonesian economy in 2007-2021. The multinomial logistic regression model used has four categories of dependent variables according to the classification based on the Klassen Typology. Of the four categories, classification (4) or relatively disadvantaged areas are treated as reference categories. The multinomial logistic regression model used in this study is as follows:

1.  $Ln\left(\frac{\pi_1}{\pi_4}\right) = \beta_1 + \beta_{11}Growth_{it} + \beta_{12}Pov_{it} + \beta_{13}Unemp_{it} + \beta_{14}gpercapita_{it} + \beta_{15}Invest_{it}$
  2.  $Ln\left(\frac{\pi_2}{\pi_4}\right) = \beta_2 + \beta_{21}Growth_{it} + \beta_{22}Pov_{it} + \beta_{23}Unemp_{it} + \beta_{24}gpercapita_{it} + \beta_{25}Invest_{it}$
  3.  $Ln\left(\frac{\pi_3}{\pi_4}\right) = \beta_3 + \beta_{31}Growth_{it} + \beta_{32}Pov_{it} + \beta_{33}Unemp_{it} + \beta_{34}gpercapita_{it} + \beta_{35}Invest_{it}$
- Growth is Economic Growth  
 Pov is Poverty Level  
 Unemp is the Unemployment Rate  
 Gpercapita is the growth of per capita income  
 Invest in Investment

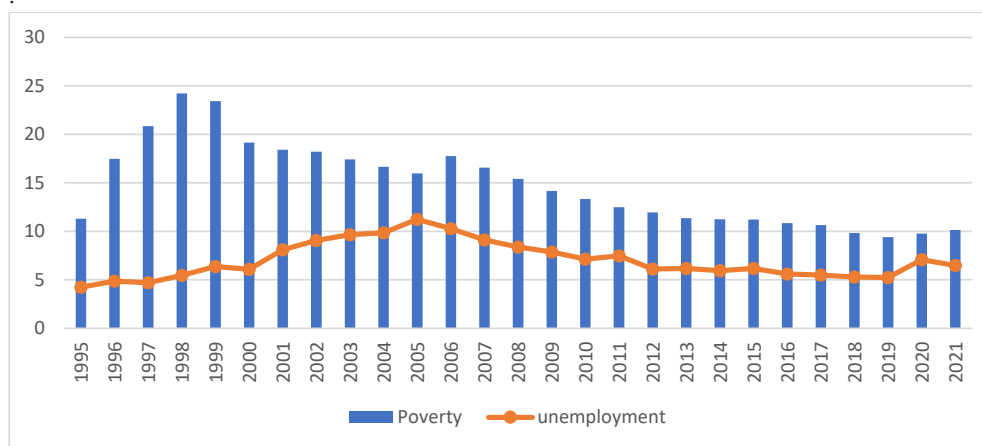
2008. In 2009 Indonesia's economic growth experienced a decline as a result of the global crisis that occurred at that time. Economic growth has increased until 2019 by 5.02 per cent. The good performance of Indonesia's economic growth contracted again a year later by -2.07 per cent, most likely due to the outbreak that hit the world. Indonesia's economy bounced back in 2021 with growth of 3.70 per cent and 5.31 per cent in 2022.



Source: Data processed by author, 2023  
**Figure 2. Economic growth in province in Indonesia**

Indonesia's average economic growth in the 2015-2021 period was 4.29 per cent. The province with the lowest average economic growth is Aceh Province at 1.26 per cent, while the province with the highest average economic growth is Central Sulawesi Province at 9.6 per cent. On the island of Sumatra, the province that has the highest average economic growth is Jambi province

(5.52%) while Aceh and Riau provinces have an average growth below the national economic growth average. As for Java, DKI province has the highest average economic growth (5.41%). In addition, the provinces of North Maluku and West Papua are provinces with the highest economic growth on each island



Source: Data processed by author, 2022

**Figure 3. Poverty rate and Unemployment rate in Indonesia**

The poor population in Indonesia in 1995 amounted to 11.3 percent, increased and peaked in 1998 with a figure of 24.23 percent. The percentage of poor people in Indonesia in 1998 was the worst and along with the highest economic growth contraction in Indonesian history. The government continues to make efforts to reduce the percentage of poor people in Indonesia. In 2005 Indonesia's poverty rate was already quite low at 15.97 percent, but had not reached the previous low target in 1995. In 2006 the percentage of poor people in Indonesia rose again at 17.75 percent. In 2019, the percentage of poor people was at its lowest level in 27 years with a poverty rate of 9.41 percent. Due to the COVID-19 pandemic that occurred in 2021, it increased by 10.14 percent again. The lowest open unemployment rate in Indonesia for the last 27 years was highest in 2005 at 10.75 percent. In 1995 open unemployment in Indonesia was 4.62 percent, and increased to show a spike in 1999. Indonesia's open unemployment rate decreased in 200 by 6.08 percent. The government is

considered successful in overcoming the unemployment problem that occurs. This is marked by improving employment conditions where the percentage of open unemployment is declining even in 2019 at the lowest point (5.11%).

Multinomial logistic regression in this study is a regression model with dependent variables on a nominal scale of four categories used for the category of result variables coded Y = 1 Developed and fast-growing regions, Y = 2 developed but depressed regions, and Y = 3 fast developing regions, and Y = 4 relatively lagging areas. Based on the value of the  $\beta$  parameter coefficient in Table 4.5, three functions are obtained for the logit multinomial model, of which variable Y is the Klassen typology and the explanatory variable X1 is economic growth, X2 is the poverty rate, X3 is open unemployment, X4 is per capita growth, and X5 is an investment

**Table 1.** The results of multinomial logistics data processing.

	Classification	$\beta$	Std.Error	Sig.	Exp( $\beta$ )
1	Growth	0,724	0,204	0,000*	2,062667
	Pov	-0,076	0,303	0,013*	0,926816
	Unem	0,213	0,069	0,002*	1,237385
	per capita	-0,198	0,187	0,288	0,82037
	Invest	0,086	0,026	0,001*	1,089806
	Constanta	-7,161	1,341	0,000	0,000776
2	Growth	0,678	0,152	0,000*	1,969934
	Pov	-0,052	0,017	0,002*	0,949329
	Unem	0,059	0,058	0,303	1,060775
	per capita	-0,186	0,095	0,050**	0,830274
	Invest	0,053	0,019	0,005*	1,05443
	Constanta	-3,475	0,939	0,000	0,030962
3	Growth	0,043	0,081	0,593	1,043938
	Pov	-0,094	0,033	0,005*	0,910283
	Unem	0,269	0,075	0,000*	1,308655
	per capita	-0,102	0,075	0,174	0,90303
	Invest	0,098	0,037	0,008*	1,102963
	Constanta	1,277	1,208	0,291	3,585866

Source: Data processing using Stata, 2023.

Remarks : \* Significant at alpha 5%, \*\* Significant at alpha 10%

Based on the results of data processing in Table 1, three models of multinomial logistic regression

equations can be formed for the Klassen typology of regions in Indonesia as follows:

$$\ln\left(\frac{\pi_1}{\pi_4}\right) = -7,160 + 0,72\text{Growth} - 0,08\text{Pov} + 0,21\text{Unem} - 0,19\text{gpercapita} + 0,09\text{Invest} \dots \dots (1)$$

$$\ln\left(\frac{\pi_2}{\pi_4}\right) = -3,48 + 0,68\text{Growth} - 0,05\text{Pov} + 0,06\text{Unem} - 0,18\text{gpercapita} - 0,53\text{Invest} \dots \dots (2)$$

$$\ln\left(\frac{\pi_3}{\pi_4}\right) = 1,27 + 0,04\text{Growth} - 0,09\text{Pov} + 0,26\text{Unem} - 0,10\text{gpercapita} - 0,09\text{Invest} \dots \dots (3)$$

The first equation explains the regression model of the tendency of a province from a classification of relatively underdeveloped areas to developed and fast-growing provinces. Of the five variables, four variables have a significant effect. Variables that significantly influenced the classification shift were economic growth, poverty, unemployment, and investment. An increase of one per cent in economic growth will result in the tendency of relatively lagging classified provinces to become developed provinces and quickly grow by 2.06 times. An increase of one per cent in poverty will result in the tendency of relatively lagging classification provinces to become developed provinces and quickly grow by 0.92 times. An increase of one per cent in the open unemployment rate will result in the tendency of relatively lagging classification provinces to become developed and fast-

growing provinces by 1.23 times, and an increase of one per cent in the investment rate will result in the tendency of relatively lagging classification provinces to become developed and fast-growing provinces by 1.09 times.

The second equation explains the regression model of the tendency of a province from a classification of relatively disadvantaged areas to rapidly developing provinces. Variables that significantly influence the classification shift are economic growth, poverty, per capita income growth, and investment. An increase of one per cent in economic growth will result in the tendency of relatively lagging provinces to become rapidly developing provinces by 1.97 times. A one per cent increase in poverty will result in the tendency of relatively lagging classification provinces to become rapidly growing provinces by 0.95 times. A one per

cent increase in the per capita income growth rate will result in a tendency for relatively lagging classification provinces to become rapidly developing provinces by 0.83 times, and an increase of one per cent in investment levels will result in a tendency for relatively lagging classification provinces to become rapidly developing provinces by 1.05 times.

The third equation explains the regression model of the tendency of a province from a classification of relatively underdeveloped areas to developed but depressed regions. Three variables influence the shift in classification, namely poverty, unemployment, and investment. A one per cent increase in poverty will result in a tendency for relatively lagging classification provinces to become developed but depressed provinces by 0.91 times. An increase of one per cent in the open unemployment rate will result in a tendency for relatively lagging classification provinces to become developed but depressed provinces by 1.31 times, and an increase of one per cent in the investment rate will result in a tendency for relatively lagging classification provinces to become developed but depressed provinces by 0.91 times.

The Klassen typology is used to find out a picture of the pattern and structure of the economy of a region. Regional classification refers to the Klassen typology can be seen through economic growth and per capita income divided into four quadrants. The first quadrant is the classification of developed and rapidly growing regions with criteria of high economic growth and high per capita income. The second quadrant is rapidly developing regions with criteria of high economic growth and low income. The third quadrant is developed but depressed regions with criteria of low economic growth and high income, and the fourth quadrant of relatively depressed regions with criteria of low economic growth and low income. In 2007 55.9 per cent of Indonesia's provinces were included in the class of rapidly developing regions, 14.7 per cent included developed but depressed provinces, 17.6 per cent included relatively underdeveloped provinces and 11.8 per cent included developed and fast-growing provinces.

Along with the development of the economy, there was a shift in regional classification. In 2021, the number of provinces included in the regional category was relatively lagging by 44.11 per cent, an increase where in 2019 it was 20.6 per cent. The developed but depressed region category was reduced to 20.6 per cent, rapidly developing regions to 34.2, and developed and fast-growing regions to 2.9 per cent. This shift occurred due to the economic downturn due to the COVID-19 pandemic. Changes in the classification of regions can be caused by internal and

external factors and other unforeseen determinants. This study considers macro variables such as poverty, unemployment, and investment as variables that can affect shifts in regional economic patterns/structures. Based on the test results of multinomial logistic regression analysis with regional typology categories, it is known that economic growth can affect shifts in regional economic patterns/structures. In models (1) and (2) economic growth variables have a significant effect on changing the classification of relatively underdeveloped areas into rapidly developing regions and developed and fast-growing regions where the probability value is  $0.000 \leq 0.05$ . Economic growth has a positive effect, which means that with the addition of positive economic growth, the classification of regions that can be achieved will be better. Conversely, in the model (3), economic growth does not affect the shift of the region from relatively underdeveloped to developed but depressed regions.

In addition to economic growth, the next variable that influences the shift in regional classification is the poverty rate. In models (1), (2), and (3) the variable of robust poverty has a significant negative effect on shifting regional classifications. The probability value of the poverty variable  $\leq 0.05$ . The negative influence of the poverty variable shows that if there is an increase in the poverty rate, the tendency to shift the area relatively lagging to become a better region will decrease.

The open unemployment rate has a positive influence on shifting regional classifications. In models (1) and (3) the unemployment rate variable has a significant positive effect which can be seen from the probability value of  $\leq 0.05$  (table 4.6). A positive coefficient value indicates that the open unemployment rate will be higher in regions in the fast-growing classification, and developed and fast-growing regions. This indicates that in relatively underdeveloped areas economic growth rates and low incomes tend to be based on agriculture. A shift in primary patterns/structures to the secondary and tertiary sectors will result in reduced use of labour in the agricultural sector which causes the number of unemployed to increase. Likewise, unemployment in urban areas is increasing along with the shift of this region. However, in the model (2) where there is a shift in classification from relatively underdeveloped areas to developed but depressed regions, the unemployment variable is not significant.

The amount of investment realized in a region will affect the gross domestic income of the region. In this case, investment is measured through the contribution of gross fixed capital investment to gross regional domestic income. In models (1), and (2) the

investment level variable has a significant positive effect on shifting the classification of regions where the probability value is  $\leq 0.05$ . Increased investment means that the tendency for classification shifts from relatively underdeveloped to developing regions, and developed but depressed regions will be even greater. However, in the third model, investment has a negative coefficient which implies that an increase in investment will reduce the possibility of shifting from a relatively underdeveloped area to a developed but depressed area.

## CONCLUSION

Based on the results and discussion, it can be concluded Along with the development of the economy, there was a shift in regional classification. Changes in the classification of regions can be caused by internal and external factors and other unforeseen determinants. Based on the test results of multinomial logistic regression analysis with regional typology categories, it is known that economic growth can affect shifts in regional economic patterns/structures. Poverty has a significant negative effect on shifting

regional classifications. The probability value of the poverty variable  $\leq 0.05$ . The negative influence of the poverty variable shows that if there is an increase in the poverty rate, the tendency to shift the area relatively lagging to become a better region will decrease. The open unemployment rate has a positive influence on shifting regional classifications. A positive coefficient value indicates that the open unemployment rate will be higher in regions in the fast-growing classification, and developed and fast-growing regions. This indicates that in relatively underdeveloped areas economic growth rates and low incomes tend to be based on agriculture. A shift in primary patterns/structures to the secondary and tertiary sectors will result in reduced use of labour in the agricultural sector which causes the number of unemployed to increase. Increased investment means that the tendency for classification shifts from relatively underdeveloped to developing regions, and developed but depressed regions will be even greater.

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