
Determinants of the Open Unemployment Rate in Six Selected Provinces in Indonesia

A. Khaerul Maudy Atharid^{1*}, Abd Rahim², Muhammad Syafri³, Diah Retno Dwi Hastuti⁴, Abd Rajab⁵

Abstract:

Open unemployment remains one of the major challenges in Indonesia's labor market despite continued economic development. Previous studies have generally examined the determinants of unemployment at the national level or across all provinces, while research focusing specifically on provinces with persistently high unemployment rates remains limited. This study aims to analyze the effects of economic growth, population growth, and human resource quality on the Open Unemployment Rate (OUR) in six Indonesian provinces with the highest unemployment rates DKI Jakarta, West Java, Banten, Riau Islands, North Sulawesi, and Maluku during the 2015–2025 period. The novelty of this study lies in examining these three determinants simultaneously using panel data regression in provinces with persistently high unemployment rates. This study employed a quantitative approach using secondary data obtained from Statistics Indonesia (BPS). Based on the model selection tests, the Random Effects Model (REM) was identified as the most appropriate estimation model. The results indicate that economic growth and human resource quality have a negative and statistically significant effect on the Open Unemployment Rate, whereas population growth has a negative but statistically insignificant effect. Collectively, all independent variables significantly affect the Open Unemployment Rate. The model explains 65.01% of the variation in the Open Unemployment Rate ($R^2 = 0.6501$), while the remaining 34.99% is explained by other factors outside the model. These findings suggest that strengthening economic growth and improving human resource quality are essential strategies for reducing unemployment, particularly in provinces with persistently high unemployment rates.

Keywords: *Open unemployment rate; economic growth; population growth; Human Development Index (HDI); regional labor market; panel data regression.*

Submitted: July 24, 2026, Accepted: August 13, 2026, Published: August 29, 2026

1. Introduction

Unemployment remains one of the major global issues faced by many countries because it affects economic growth and social welfare. Rising economic growth does not necessarily generate sufficient employment opportunities to absorb the entire labor force. In addition, population growth and the quality of human resources also influence unemployment levels (Utami & Armelly, 2023). In Indonesia, differences in economic conditions, demographic characteristics, and human resource quality across regions contribute to variations in unemployment rates among provinces. In Indonesia, the Open Unemployment Rate (OUR) remains one of the key challenges

^{1,2,3,4,5} Development Economics Study Program, Faculty of Economics and Business, Universitas Negeri Makassar, Makassar City, South Sulawesi Province, Indonesia. Email: maudykhaerul@gmail.com¹, abd.rahim@unm.ac.id², muhammadsyafri@unm.ac.id³, diah.retno@unm.ac.id⁴, abdulrajab@unm.ac.id⁵

to economic development. Although the national economy has continued to grow, unemployment rates still vary considerably across provinces (Yandra & Kurniawati, 2025). These differences are influenced by various factors, including economic growth, population growth, human resource quality, and each region's ability to create employment opportunities. Furthermore, differences in economic characteristics and labor market structures across provinces result in varying levels of effectiveness in reducing unemployment. This condition indicates that efforts to reduce the OUR cannot rely on a uniform approach but should instead be tailored to the characteristics and needs of each region (Hannan et al., 2024). Economic growth, population growth, and human resource quality are closely associated with the OUR. Higher economic growth tends to generate more employment opportunities, thereby reducing unemployment. Likewise, improvements in human resource quality enhance productivity and increase employment prospects. Meanwhile, population growth may contribute to higher unemployment if it is not accompanied by adequate job creation. Therefore, these three variables should be examined to better understand their effects on the OUR (Engelica & Chasanah, 2025).

Although the relationships among economic growth, population growth, human resource quality, and the OUR have been widely investigated, previous studies have produced mixed findings (Agustina et al., 2023). Several studies have reported that economic growth and human resource quality significantly affect the OUR, whereas others have found no significant relationship. Similarly, the effect of population growth on the OUR remains inconclusive. These inconsistent findings suggest that the relationships among these variables may depend on the economic, demographic, and social characteristics of each region. Therefore, this study aims to analyze the effects of economic growth, population growth, and human resource quality on the OUR in six provinces of Indonesia (Utami & Armelly, 2023). Although this study includes only three independent variables, each represents a broad dimension of economic development. Economic growth reflects the economy's capacity to Published by University of Airlangga. This is an human development represents the quality of the labor force, and population growth reflects changes in labor supply. Collectively, these three variables provide a strong theoretical foundation for explaining unemployment in Indonesia (Falah & Iek, 2025).

During the 2015–2025 period, Indonesia's economy continued to expand. Gross Domestic Product (GDP) increased from approximately IDR 8 trillion to more than IDR 13 trillion, while annual economic growth averaged around 5%, despite contracting by 2.07% in 2020 due to the COVID-19 pandemic. Over the same period, the Human Development Index (HDI) increased from approximately 69.0 to 75.90 in 2025, placing Indonesia in the high human development category. This improvement was supported by an Expected Years of Schooling (EYS) of 13.30 years, a Mean Years of Schooling (MYS) of 9.07 years, a Life Expectancy at Birth (LEB) of 74.47 years, and adjusted real per capita expenditure of approximately IDR 10 million per year in 2025.

In addition, Indonesia's annual population growth rate ranged from 1.09% to 1.45% during the 2015–2025 period, while the total population increased from approximately

255 million to 284 million. These trends indicate that Indonesia has a large and continuously growing economy, improving human capital quality, and a steadily expanding population. Together, these factors play an important role in shaping labor market conditions and influencing the national unemployment rate. The OUR declined from 6.18% in 2015 to 4.85% in 2025. However, it increased to 7.07% in 2020 due to the COVID-19 pandemic. Throughout the 2015–2025 period, the number of unemployed individuals remained relatively stable at approximately 7.4–7.5 million people, except in 2020, when it rose sharply to around 9.1 million as a consequence of the pandemic. A comparison of these trends is presented in the following section :

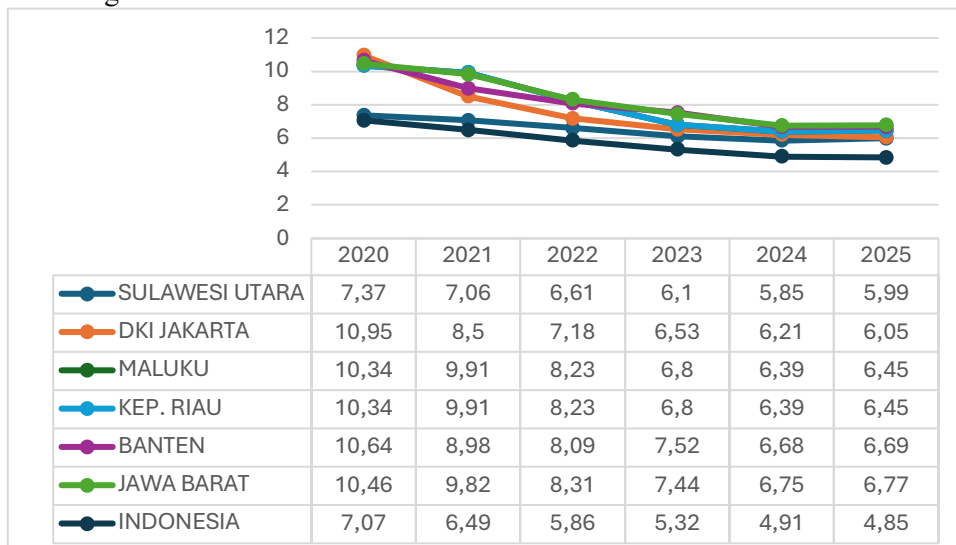


Figure 1. OUR in Six Selected Provinces and Indonesia
Source: Statistics Indonesia (BPS), 2020–2025.

As shown in Figure 1, the Open Unemployment Rate (OUR) in the six selected provinces consistently remained above the national average throughout the study period. Although Indonesia's economy expanded at an average annual rate of approximately 5% and the national unemployment rate generally declined over the past decade, the OUR in these provinces remained persistently high. This pattern indicates that the benefits of economic growth and improvements in the Human Development Index (HDI) have not been distributed evenly across regions. Variations in regional economic performance, labor market conditions, population growth, and levels of development are likely to explain these disparities. Therefore, this study investigates the effects of economic growth, the HDI, and population growth on the OUR in the six Indonesian provinces with the highest unemployment rates.

The persistently high OUR in these provinces is mainly driven by the imbalance between labor force growth and job creation. The number of job seekers has continued to increase, whereas employment opportunities have not expanded at a comparable rate. In addition, skill mismatches, rapid urbanization, dependence on a limited number of economic sectors, periodic economic slowdowns, and regional

development disparities further limit the labor market's capacity to absorb workers. As a result, these factors collectively contribute to the persistent unemployment disparities observed across the six selected provinces.

The novelty of this study lies in its focus on six provinces where the OUR has consistently remained above the national average despite sustained economic growth and continuous improvements in the HDI. Unlike previous studies that primarily examine unemployment at the national level or across all provinces, this study specifically investigates provinces experiencing persistent labor market disparities. By applying panel data regression, this study provides empirical evidence on the combined effects of economic growth, the HDI, and population growth in explaining regional unemployment disparities and offers a more targeted basis for regional employment policy.

2. Theoretical Background

Economic Growth

The OUR is one of the primary indicators used to assess labor market conditions and an economy's ability to absorb its labor force. It represents the percentage of the labor force that is unemployed but actively seeking employment (Hanushek & Woessmann, 2020). A high OUR indicates that available employment opportunities are insufficient to absorb the entire labor force. The OUR is influenced by several factors, including economic growth, population growth, and human resource quality. These factors play an important role in determining a region's capacity to create employment opportunities and reduce unemployment.

The relationship between economic growth and the OUR is explained by Okun's Law, introduced by Arthur Okun in 1962. According to this theory, economic growth is inversely related to unemployment. As the economy expands, production, investment, and business activity increase, encouraging firms to hire more workers to meet rising demand (Falah & Iek, 2025). Consequently, employment opportunities expand and the OUR tends to decline. Conversely, when economic growth slows, firms typically reduce production and hiring, resulting in fewer employment opportunities and higher unemployment. This relationship is further supported by the Solow Growth Theory, which emphasizes that long-term economic growth is driven by capital accumulation, labor, and technological progress.

Higher productivity enables firms to expand production, increase output, and generate additional employment opportunities. Likewise, Keynesian Theory argues that stronger aggregate demand encourages firms to increase production and investment, thereby raising labor demand. In contrast, weak aggregate demand reduces business activity and limits job creation. Collectively, these theories suggest that sustained economic growth not only strengthens economic performance but also plays a crucial role in creating employment opportunities and reducing the OUR (Ball et al., 2019).

Population Growth

The relationship between population growth and the OUR can be explained by Population Theory, proposed by Thomas Robert Malthus in 1798. This theory argues that population growth exceeding the pace of job creation may increase unemployment because the labor force expands while employment opportunities remain limited (Chattopadhyay, 2020). Therefore, the effect of population growth on unemployment depends largely on a region's ability to generate sufficient employment opportunities (Dhoba et al., 2024).

This perspective is supported by the Dual-Sector Theory, developed by W. Arthur Lewis, which explains that workers gradually shift from the agricultural sector to the industrial sector as economic development progresses. However, if the modern sector is unable to absorb the additional labor force, unemployment will persist (Chattopadhyay, 2020). In addition, Demographic Transition Theory suggests that population growth can become an economic opportunity through the demographic dividend when supported by adequate employment opportunities.

Conversely, if employment opportunities do not expand in line with the growing working-age population, unemployment is likely to increase (Rostiana & Rodesbi, 2020). This view is also consistent with Labor Market Theory, which states that unemployment occurs when the supply of labor exceeds labor demand. Therefore, population growth should be accompanied by economic growth, investment, and job creation to prevent rising unemployment (Marois et al., 2025).

Overall, these theories suggest that population growth does not necessarily lead to a higher OUR. Its impact depends largely on the ability of economic growth and labor market expansion to absorb the growing labor force. When employment opportunities increase alongside labor force growth, population growth can become an important driver of economic development. Conversely, when job creation is insufficient, rapid population growth is more likely to increase the OUR.

Human Resource

The relationship between human resource quality and the OUR can be explained by Human Capital Theory, introduced by Theodore W. Schultz and Gary S. Becker in the period 1961–1964. This theory argues that investments in education, health, and skills enhance labor productivity and improve workers' competitiveness in the labor market. Human resource quality, commonly measured by the HDI, reflects the workforce's educational attainment, health status, and overall capabilities. Individuals with higher levels of education and better skills are generally more adaptable to labor market demands, increasing their employability and reducing the likelihood of unemployment (Ehrlich & Pei, 2020).

The relationship between human resource quality and the OUR is further supported by Signaling Theory, proposed by Michael Spence in 1973, which suggests that education and skills serve as signals of workers' productivity and capabilities to employers (Arjun et al., 2020). Consequently, individuals with higher human resource quality are more likely to secure employment than those with lower levels of

education and skills. Similarly, Endogenous Growth Theory, developed by Paul Romer in 1986 and Robert E. Lucas Jr. during 1986–1988, emphasizes that investments in education, training, and knowledge accumulation increase labor productivity, foster innovation, and promote long-term economic growth (Tran et al., 2023).

As economic growth accelerates, employment opportunities expand, leading to lower OUR, particularly in regions with a more skilled and productive workforce (Arjun et al., 2020). Taken together, these theories suggest that improving human resource quality is a key strategy for reducing the OUR. A workforce with higher educational attainment, stronger skills, and better health is more productive, more adaptable to technological change, and better equipped to meet evolving labor market demands. Therefore, policies that strengthen education, healthcare, vocational training, and workforce skill development are essential for enhancing labor market competitiveness, expanding employment opportunities, and supporting sustainable economic development.

Previous Studies

Previous studies have extensively examined the determinants of the OUR; however, the findings remain inconclusive, particularly regarding the effects of economic growth, the HDI, and other macroeconomic factors. These inconsistent results suggest that differences in regional economic conditions and labor market characteristics may influence the relationship between these variables and the OUR.

Agustina et al. (2023) found that the OUR in Indonesia is jointly influenced by the HDI, inflation, population, the minimum wage, and the number of workers. Their study also revealed that the previous year's unemployment has a strong effect on the current year's OUR, indicating that unemployment is persistent over time. Similarly, Sunan and Sekaringsih (2023) reported that inflation, the HDI, and the regional minimum wage have significant negative effects on the OUR, whereas economic growth and investment have no significant effect. In contrast, Asmara and Saleh (2024) found that economic growth and inflation have significant negative effects on the OUR, while the provincial minimum wage is positively associated with the OUR. Paembonan et al. (2024) reported that economic growth and human resource quality jointly have a significant effect on the OUR in Central Sulawesi. However, when examined individually, neither variable has a statistically significant effect, although economic growth shows a positive relationship and human resource quality shows a negative relationship with the OUR. Different findings were reported by Leasiwal et al. (2022), who found that economic growth has a positive and significant effect on the OUR, whereas the minimum wage and the HDI have no significant effect in either the short or the long run. These inconsistent findings indicate that the effects of economic growth, the HDI, and other determinants on the OUR remain uncertain. Therefore, this study provides additional empirical evidence by examining the effects of economic growth, population growth, and the HDI on the OUR in the six Indonesian provinces with the highest unemployment rates.

Hypothesis

Based on the theoretical perspectives discussed above, economic growth, population growth, and human resource quality are the main determinants of the OUR. Higher economic growth promotes job creation, thereby reducing the OUR. In contrast, rapid population growth without sufficient employment opportunities is likely to increase the OUR. Meanwhile, improvements in human resource quality enhance labor productivity, employability, and workforce competitiveness, enabling workers to better meet labor market demands and contributing to a lower OUR. Therefore, policies that promote sustainable economic growth, expand employment opportunities, and improve human resource quality are essential for reducing the OUR and supporting long-term economic development. Based on this theoretical framework, the following hypotheses are proposed:

- H1: Economic growth has a negative and significant effect on the OUR in Indonesia.
- H2: Population growth has a positive and significant effect on the OUR in Indonesia.
- H3: Human resource quality, measured by the HDI, has a negative and significant effect on the OUR in Indonesia.
- H4: Economic growth, population growth, and human resource quality jointly have a significant effect on the OUR in Indonesia.

3. Methodology

Research Design

This study employs a quantitative research approach with both descriptive and inferential analyses. The descriptive approach is used to present the characteristics and trends of the research data through tables, figures, and statistical summaries. Meanwhile, the inferential approach is used to examine the relationships among the research variables and draw conclusions based on statistical analyses.

Population and Sample

The population of this study includes all provinces in Indonesia. However, the sample consists of six provinces with the highest OUR in 2025, namely DKI Jakarta, West Java, Banten, Riau Islands, North Sulawesi, and Maluku. These provinces were selected using purposive sampling with an extreme case sampling approach because they represent regions with the highest unemployment levels. This method allows the study to examine the factors influencing OUR in provinces experiencing severe unemployment conditions.

Data Collection

This study uses a documentation method based on secondary data. The data were obtained from official publications and databases of Statistics Indonesia (BPS) and several other official institutions covering the 2015–2025 period. In addition, relevant scientific articles and journal publications were used to strengthen the theoretical framework, support the discussion, and enhance the interpretation of the research findings.

Operational Definitions

Operational definitions describe each variable used in the study, including its measurement, indicators, unit of analysis, and data source. The variables are defined as follows:

1. Economic growth rate (%) (X_1)
2. Population growth rate (%) (X_2)
3. Human resource quality, measured by the HDI (X_3)
4. OUR (%) (Y)

Data Analysis

The data were analyzed using panel data regression analysis. Because this study adopts a parametric approach, the regression model was required to satisfy the classical assumption tests, including the multicollinearity test and the heteroskedasticity test, to ensure that the model met the necessary statistical assumptions. Furthermore, a series of panel data model selection tests, namely the Chow test, Hausman test, and Lagrange Multiplier (LM) test, was conducted to determine the most appropriate regression model. The results of these tests served as the basis for selecting the most suitable panel data regression model: the Common Effects Model (CEM), Fixed Effects Model (FEM), or Random Effects Model (REM). The regression equation is specified as follows:

$$TPT = \beta_0 + \beta_1 X_{1it} + \beta_2 X_{2t} + \beta_3 X_{3it} + e_{it}$$

Where:

Y : Open Unemployment Rate (OUR)

$\beta_1, \beta_2, \beta_3$: Regression Coefficients of the Independent Variables

X_1 : Economic Growth

X_2 : Population Growth

X_3 : Human Resource Quality (HDI score)

t : Time Series

i : Cross Section

e_i : Normally Distributed Error Term

4. Empirical Findings/Result

The findings indicate that the six provinces included in this study Jawa Barat (West Java), Banten, Kepulauan Riau (Riau Islands), DKI Jakarta (Special Capital Region of Jakarta), Sulawesi Utara (North Sulawesi), and Maluku exhibit distinct economic and labor market characteristics. These differences are reflected in the variation of the HDI, economic growth, Gross Regional Domestic Product (GRDP), the OUR, labor force size, and the number of unemployed individuals across the provinces. This variation indicates that each province has unique economic structures, demographic characteristics, and levels of regional development. These differences are largely driven by Indonesia's regional development disparities.

Unequal economic growth, infrastructure development, investment, employment opportunities, and human capital development have contributed to substantial

differences in regional economic performance and labor market conditions (Suparman & Muzakir, 2023). Consequently, each province faces different challenges in promoting economic growth, improving the quality of human resources, and expanding employment opportunities. Based on these conditions, this study focuses on four key variables: the OUR as the dependent variable, and economic growth, population growth, and human resource quality, measured by the HDI, as the independent variables (Franse & Maichal, 2025). The characteristics and trends of these variables across the six selected provinces are presented in the following section:

Table 1. Human Development Index (HDI) in Six Provinces

Year	Provinsi (Score)					
	Maluku	Jawa Barat	Sulawesi Utara	Banten	Kepulauan Riau	DKI Jakarta
2020	71,34	72,61	73,67	74,41	77,69	81,92
2021	71,55	72,96	74,03	74,68	77,87	82,25
2022	72,04	73,63	74,52	75,25	78,48	82,77
2023	72,75	74,24	75,04	75,77	79,08	83,55
2024	73,40	74,92	75,68	76,35	79,89	84,15
2025	74,09	75,90	76,32	77,25	80,53	85,05

Source: (Badan Pusat Statistik, 2020-2025)

As presented in Table 1, the Human Development Index (HDI) varied considerably across the six provinces included in this study. Maluku recorded the lowest HDI, increasing from 71.34 in 2020 to 74.09 in 2025. Despite this improvement, Maluku's HDI remained below that of the other provinces, indicating persistent challenges in education, healthcare, regional accessibility, and economic development. In contrast, DKI Jakarta recorded the highest HDI, increasing from 81.92 in 2020 to 85.05 in 2025. This achievement was supported by better access to education and healthcare, higher income levels, and more developed infrastructure.

The components of HDI also showed significant disparities across provinces. DKI Jakarta recorded the highest Life Expectancy at Birth (LEB) at 75.99 years in 2025, while Maluku recorded the lowest at 70.68 years. This difference reflects variations in health conditions and access to healthcare services across regions (Sari & Kaluge, 2021). Regarding Mean Years of Schooling (MYS), DKI Jakarta recorded the highest value at 11.58 years, whereas West Java recorded the lowest at 9.46 years. Meanwhile, Expected Years of Schooling (EYS) remained relatively consistent across provinces, ranging from 13 to 14 years, indicating that access to education is relatively more equal, although educational attainment among adults still differs across regions (Mulyaningsih & Nuryakin, 2022). In addition, DKI Jakarta recorded the highest adjusted real per capita expenditure at approximately IDR 20 million per year, while Maluku recorded the lowest at approximately IDR 9 million per year.

These differences indicate disparities in health, education, purchasing power, and living standards across provinces. DKI Jakarta ranked first nationally in HDI, while the Riau Islands ranked third, reflecting relatively higher levels of human development compared with most provinces in Indonesia. These findings suggest that differences in HDI may influence labor quality, productivity, and labor market conditions. Therefore, policies aimed at improving education quality, healthcare access, and economic opportunities should be prioritized, particularly in provinces

with lower HDI levels, to reduce regional disparities and improve labor market outcomes.

Table 2. Economic Growth

Year	Provinsi (Persen)					
	DKI Jakarta	Maluku	Kepulauan Riau	Banten	Jawa Barat	Sulawesi Utara
2020	-2.39%	-0.91%	-3.80%	-3.39%	-2.52%	4.16%
2021	3.55%	3.63%	3.43%	4.49%	3.74%	5.42%
2022	5.25%	5.31%	5.06%	5.03%	5.45%	5.48%
2023	4.96%	5.21%	5.16%	4.81%	5.00%	5.39%
2024	4.91%	5.34%	5.02%	4.79%	4.95%	5.66%
2025	5.21%	4.56%	6.94%	5.37%	5.32%	6.16%

Source: (Badan Pusat Statistik, 2015-2026)

As presented in Table 2, the six provinces included in this study showed relatively similar economic growth rates, with differences generally within one percentage point. However, their GRDP values differed substantially due to variations in regional economic size, population, and economic structure. This finding indicates that similar economic growth rates do not necessarily represent equal economic capacity across provinces.

In 2020, almost all provinces experienced economic slowdowns due to the COVID-19 pandemic. However, North Sulawesi experienced a slowdown earlier in 2019, which was associated with lower government spending, weaker agricultural and manufacturing performance, and declining global commodity prices (Yulianita et al., 2023). After the pandemic, all six provinces gradually recovered and recorded positive economic growth as production, consumption, investment, and trade activities improved (Nurwati, 2022).

Overall, the economic slowdown was mainly driven by the pandemic, which disrupted production activities, reduced household purchasing power, weakened investment, and limited trade activities. These conditions affected various business sectors and contributed to slower economic growth across provinces (Nasution et al., 2021). Therefore, differences in economic performance across provinces reflect variations in regional economic conditions and recovery capacity. Since population growth also plays an important role in shaping labor market conditions and the OUR, the next section discusses population growth trends in the six provinces.

Table 3. Population Growth in Six Provinces

Tahun	Province (Persen)					
	DKI Jakarta	Maluku	Kepulauan Riau	Banten	Jawa Barat	Sulawesi Utara
2020	0.04%	2.55%	-5.71%	-3.84%	-2.11%	4.58%
2021	0.45%	0.74%	2.60%	-2.98%	1.05%	0.64%
2022	0.66%	1.03%	2.91%	1.58%	1.28%	0.79%
2023	-0.07%	2.06%	-1.25%	0.45%	0.92%	0.83%
2024	0.12%	1.31%	1.43%	1.01%	0.97%	0.76%
2025	-0.06%	1.28%	1.38%	0.85%	0.82%	0.73%

Source: (Badan Pusat Statistik, 2015-2026)

As presented in Table 3, Kepulauan Riau recorded the highest population growth rate among the six provinces during the 2020–2025 period, whereas DKI Jakarta recorded the lowest. In 2020, several provinces, including Kepulauan Riau, Banten, Jawa Barat, and DKI Jakarta, experienced declines in population growth as a result of the COVID-19 pandemic. The magnitude of these declines varied across provinces, reflecting differences in demographic characteristics and population mobility. It is important to note that the population growth rate measures changes in population size over time rather than the total population. Therefore, this study uses the population growth rate to ensure greater consistency and comparability across provinces. In addition, the provinces exhibited substantial differences in both GRDP and population size. These differences reflect variations in economic capacity, demographic characteristics, natural resources, and levels of regional development. Regional development disparities across Indonesia have also contributed to these differences, resulting in considerable variation in economic output and population size among provinces. The following section presents the 2025 GRDP and population data for the six provinces included in this study.

Table 4. Population and GRDP 2025

Province	Population (People)	GRDP (Million IDR)
DKI Jakarta	10,678,000	Rp2,263,237,040
Maluku	1,970,600	Rp38,906,050
Banten	12,537,400	Rp 560,270,870
Kepulauan Riau	2,213,500	Rp224,504,720
Jawa Barat	50,759,000	Rp1,845,316,740
Sulawesi Utara	2,701,800	Rp113,659,430

Source: (Badan Pusat Statistik, 2015-2026)

As presented in Table 4, DKI Jakarta recorded the highest GRDP in 2025, reaching approximately IDR 2.2 billion, indicating the largest economic capacity among the six provinces. As Indonesia's administrative and economic center, Jakarta generates substantially higher economic output than other provinces. In contrast, North Sulawesi recorded the lowest GRDP at approximately IDR 113 million, reflecting its smaller economic scale.

From a demographic perspective, West Java had the largest population, with approximately 50.8 million residents, while Maluku had the smallest population, with approximately 1.9 million residents. However, population size does not necessarily indicate population density. DKI Jakarta recorded the highest population density at approximately 16,115 people per square kilometer, whereas West Java recorded around 1,370 people per square kilometer. Meanwhile, Maluku had the lowest population density, with approximately 43 people per square kilometer in 2025.

These differences in economic capacity, population size, and population density reflect variations in regional development and demographic characteristics. Such conditions may influence economic activity, labor supply and demand, and the OUR (Gunawan, 2023). Therefore, the relationship among economic growth, population growth, HDI, and the OUR was further examined using panel data regression analysis. Before estimating the regression model, model selection tests, including the Chow

test, Hausman test, and LM test, were conducted to determine the most appropriate estimation approach (Tobing & Hanifa, 2024). The results of these tests are presented in the following section.

Table 5. Panel Data Regression Model Selection Tests

Test	Probability
Uji Chow	0.0000
Uji Hausman	0.4676
Uji Lagrange Multiplier	0.0000

Source: Eviews 13

Based on the model selection results, the REM was identified as the most appropriate estimation model for this study. The Chow test produced a probability value of 0.0000, which is below 0.05, indicating that the FEM was more suitable than the CEM. However, the Hausman test showed a probability value of 0.4676, which is above 0.05, indicating that the REM was preferred over the FEM. Furthermore, the LM test produced a probability value of 0.0000, confirming that the REM was more appropriate than the CEM.

The selection of the REM is also supported by theoretical considerations regarding the characteristics of the panel data. The REM assumes that individual effects among provinces are random and not correlated with the independent variables. This approach is appropriate because the six provinces in this study represent a sample of broader regional characteristics, where differences in economic structure, demographic conditions, and institutional factors are considered as random effects rather than fixed characteristics that directly influence the explanatory variables. Therefore, the REM allows the analysis to capture both within-province variations over time and differences across provinces more efficiently.

Based on both statistical testing and theoretical justification, the REM was selected as the final panel data regression model. Before conducting hypothesis testing using the t-test and F-test, classical assumption tests were performed, including multicollinearity and heteroskedasticity tests. Multicollinearity was evaluated using the Centered Variance Inflation Factor (Centered VIF), where a value below 10 indicates the absence of multicollinearity among the independent variables. The results of these tests are presented in the following section:

Table 6. Panel Data Model Selection Test

Variable	Centered VIF
C	NA
X1	1.151301
X2	1.220939
X3	1.066850

Source : Eviews 13

The multicollinearity test results indicate that all independent variables have Centered VIF values below 10. These findings indicate the absence of multicollinearity among the independent variables, suggesting that the regression model satisfies the

multicollinearity assumption and is suitable for further analysis. Subsequently, the heteroskedasticity test was conducted to determine whether the variance of the residuals remained constant across the regression model.

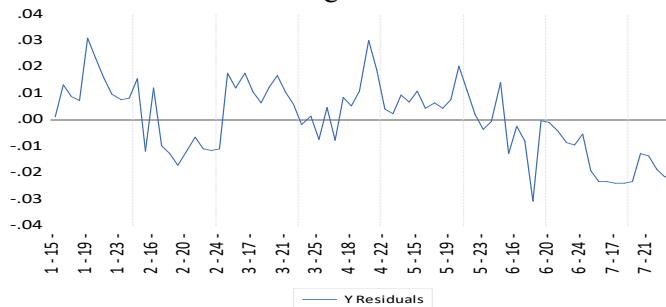


Figure 2. Scatter Plot

Source: EViews 13

Based on the scatter plot, the residuals are randomly dispersed and do not exhibit any discernible pattern. This result indicates the absence of heteroskedasticity, suggesting that the regression model satisfies the homoskedasticity assumption. Therefore, the model has met the classical assumption requirements, and the analysis can proceed to hypothesis testing using the *t*-test. The results of the *t*-test are presented in the following section.

Table 7. t-Test Results

<i>Variable</i>	<i>Coefficient</i>	<i>Std. Error</i>	<i>t-Statistic</i>	<i>Prob.</i>
C	0.234645	0.028444	8.249303	0.0000
X1	-0.255900	0.050341	-5.083303	0.0000
X2	-0.077230	0.085925	-0.898802	0.3720
X3	-0.002002	0.000380	-5.268256	0.0000

Source: EViews13

The *t*-test was conducted to examine the partial effect of each independent variable on the dependent variable. Statistical significance was determined by comparing the absolute calculated *t*-value with the critical *t*-value of 2.9015 and by evaluating the probability (*p*) value. An independent variable was considered to have a statistically significant effect on the dependent variable when the absolute calculated *t*-value was greater than the critical *t*-value of 2.9015 or when the *p*-value was less than 0.05. Conversely, an independent variable was considered not to have a statistically significant effect when the absolute calculated *t*-value was equal to or less than the critical *t*-value or when the *p*-value was equal to or greater than 0.05.

The *t*-test results indicate that the economic growth variable (X_1) has a *p*-value of 0.0000, which is less than 0.05, with a calculated *t*-value of -5.0833 , indicating a statistically significant effect on the dependent variable. In contrast, the population growth variable (X_2) has a *p*-value of 0.3720, which is greater than 0.05, with a calculated *t*-value of -0.8988 , indicating that it does not have a statistically significant effect on the dependent variable. Meanwhile, the human resource quality variable (X_3) has a *p*-value of 0.0000, which is less than 0.05, with a calculated *t*-value of -5.2682 ,

indicating that it also has a statistically significant effect on the dependent variable. The estimated regression equation is presented as follows:

$$0.232 - 0.255X_1 - 0.077X_2 - 0.002X_3$$

Based on the regression results, the constant value was obtained at 0.232, indicating that when all independent variables are equal to zero, the value of the dependent variable is 0.232. Furthermore, the economic growth variable (X_1) has a regression coefficient of -0.255, meaning that a 1% increase in economic growth will reduce the dependent variable by 0.255. The population growth variable (X_2) has a regression coefficient of -0.077, indicating that an increase in population growth will reduce the dependent variable by 0.077. Meanwhile, the human resource quality variable (X_3) has a regression coefficient of -0.002, meaning that a one-unit increase in human resource quality will decrease the dependent variable by 0.002, assuming that other variables remain constant.

Furthermore, the F-test was conducted to determine whether the independent variables jointly affect the dependent variable. Statistical significance was assessed using the probability value of the F-statistic. The independent variables were considered to have a statistically significant joint effect on the dependent variable when the probability value of the F-statistic was less than 0.05. Conversely, they were considered not to have a statistically significant joint effect when the probability value was equal to or greater than 0.05. The test results are presented below.

Table 8. Results of the Simultaneous Test

R-squared	0.692084	Mean dependent var	0.073349
Adjusted R-squared	0.650096	S.D. dependent var	0.014444
S.E. of regression	0.008544	Akaike info criterion	-6.565130
Sum squared resid	0.004818	Schwarz criterion	-6.258454
Log likelihood	259.4749	Hannan-Quinn criter.	-6.442567
F-statistic	16.48271	Durbin-Watson stat	1.590622
Prob(F-statistic)	0.000000		

Source: EViews13

Based on the F-test results, the regression model is statistically significant, as indicated by a Prob(F-statistic) value of 0.0000, demonstrating that the independent variables jointly have a significant effect on the OUR. Furthermore, the adjusted R-squared value of 65.01% indicates that 65.01% of the variation in the OUR is explained by economic growth, population growth, and human resource quality, while the remaining 34.99% is attributable to other factors outside the research model. The regression results also indicate that all three independent variables have a negative relationship with the OUR. These findings are generally consistent with several established economic theories. Okun's Law explains that higher economic growth can reduce the OUR by creating more employment opportunities. Human Capital Theory argues that improvements in human resource quality enhance labor productivity, skills, and workforce competitiveness, thereby contributing to a lower OUR (Arifah & Prabowo, 2024).

Likewise, the Solow Growth Theory suggests that economic growth stimulates production and investment, leading to an expansion of employment opportunities. However, the results of this study indicate that population growth has a negative but statistically insignificant effect on the OUR. This finding differs from the Malthusian Population Theory, which suggests that population growth exceeding job creation may increase unemployment. The negative relationship found in this study indicates that an increase in population does not necessarily lead to higher unemployment in the six provinces analyzed.

Although the population continued to increase during the study period, the OUR showed a declining trend. This indicates that population growth was accompanied by improvements in economic activity and labor absorption capacity. An increasing population may expand the working-age population and stimulate demand for goods and services, which can encourage business expansion and create new employment opportunities. However, the insignificant effect suggests that population growth alone is insufficient to explain changes in the OUR. Instead, variations in unemployment are more strongly influenced by factors such as economic growth, human resource quality, and each province's ability to create and absorb employment opportunities. This condition may be explained by differences in economic structures, demographic characteristics, urbanization levels, and labor absorption capacity across provinces. According to Labor Market Theory, unemployment is determined by the interaction between labor demand and labor supply (Wafi & Kafa, 2024). Therefore, changes in the OUR are influenced not only by population growth but also by the ability of the economy to generate jobs and improve workforce quality. This finding is consistent with the results of this study, which show that economic growth and human resource quality have a stronger influence on the OUR than population growth.

Furthermore, Indonesia continues to experience significant regional disparities, with each province having different economic, demographic, and social characteristics. These differences are reflected in variations in economic capacity, income levels, population size, and other development indicators. Consequently, the relationship between economic growth, population growth, human resource quality, and the OUR may differ across provinces. To illustrate these regional disparities, this study employs the Lorenz Curve using 2025 GRDP per capita as the main indicator. GRDP per capita is widely used to measure regional economic output and average income levels, making it suitable for comparing economic conditions across regions. Through the distribution of GRDP per capita, the Lorenz Curve provides a clear illustration of regional economic inequality among the six provinces included in this study.

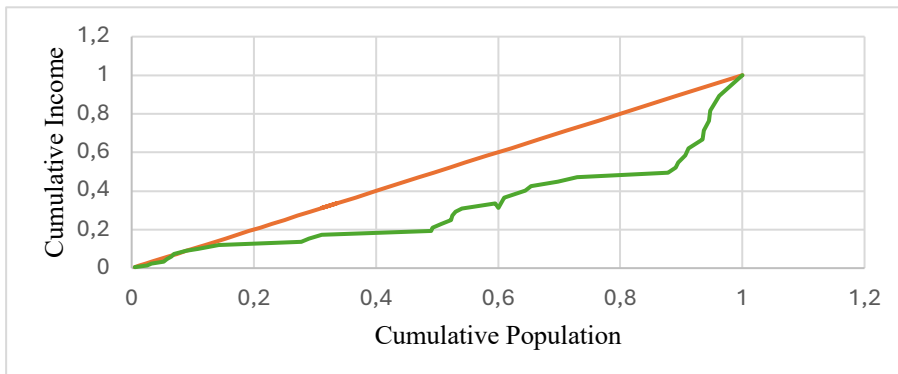


Figure 3. Lorenz Curve
Source: Microsoft Excel 2019

The Lorenz Curve in Figure 3 illustrates the level of regional economic inequality in Indonesia based on the distance between the curve and the line of perfect equality. The wider the gap between the Lorenz Curve and the diagonal line, the higher the level of inequality. As shown in Figure 3, the Lorenz Curve is relatively far from the equality line, indicating a high level of regional disparity. This finding is supported by the William Index calculation using GRDP per capita data in 2025, which reached 0.70 and indicates high regional economic inequality.

The high inequality is reflected in the substantial differences in GRDP per capita across provinces. Papua Pegunungan recorded the lowest GRDP per capita at approximately IDR 9.6 million per person, while DKI Jakarta recorded the highest at approximately IDR 211 million per person, which is about 22 times higher. These differences indicate that economic capacity remains concentrated in several regions, while other regions continue to experience lower levels of economic development.

These results differ from the BPS Gini Ratio, which indicates a relatively low level of inequality with a value of approximately 0.30. This difference occurs because the two indicators measure different aspects of inequality. The Gini Ratio reported by BPS uses household expenditure per capita to measure disparities in social welfare, while the William Index uses GRDP per capita to measure differences in regional economic capacity. Therefore, the different results do not indicate a contradiction but rather reflect different dimensions of inequality.

In addition to differences in GRDP per capita, regional disparities are also reflected in variations in economic growth, HDI, demographic conditions, and labor market characteristics. Differences in economic structures and development levels across provinces influence each region's ability to create employment opportunities. Therefore, the relationship between economic growth, HDI, population growth, and the OUR should be analyzed by considering the specific characteristics of each region. Differences in research findings due to the use of different variables are common in unemployment studies. These differences do not necessarily indicate errors, as unemployment is a complex phenomenon influenced by various economic, social,

demographic, and labor market factors. In addition, differences in research areas, study periods, analytical methods, and statistical limitations may affect the results. Therefore, variations in findings across studies may reflect differences in conditions and analytical approaches rather than contradictions among research outcomes.

5. Conclusions

Based on the findings of this study, it can be concluded that economic growth, human resource quality, and population growth are associated with the OUR in the six provinces examined. Economic growth and human resource quality have a negative and statistically significant relationship with the OUR, indicating that stronger economic performance and improvements in human resource quality contribute to lower unemployment by expanding employment opportunities and enhancing workforce productivity. In contrast, population growth has a negative but statistically insignificant relationship with the OUR, suggesting that population growth alone does not substantially explain variations in unemployment across the six provinces. The findings also indicate that differences in economic, demographic, social, and labor market characteristics across provinces contribute to varying unemployment conditions, implying that the relationships among these variables are not uniform throughout Indonesia. Therefore, policies aimed at reducing the OUR should prioritize sustainable economic growth, improvements in human resource quality, and employment creation while considering the unique characteristics and development needs of each province.

Based on the findings of this study, the government should continue to promote economic growth that generates new employment opportunities to reduce the Open Unemployment Rate (OUR). In addition, improving the quality of human resources through education, skills training, and better healthcare services should remain a priority to enhance workforce competitiveness in the labor market. At the same time, population growth should be balanced with the creation of adequate job opportunities to ensure that an expanding labor force does not lead to higher unemployment. Therefore, stronger coordination among economic, labor, education, and population policies is essential to sustainably reduce the Open Unemployment Rate.

References:

- Agustina, M., Astuti, H., & Susilo, J. H. (2023). Unemployment in Indonesia: An analysis of economic determinants from 2012–2021. *Signifikan: Jurnal Ilmu Ekonomi*, 12(1), 69–82. <https://doi.org/10.15408/sjie.v12i1.29247>
- Arifah, N. L., & Prabowo, P. S. (2024). Determinan tingkat pengangguran terbuka pada 21 daerah di Pulau Jawa. *Independent: Journal of Economics*, 4(1), 125–135. <https://doi.org/10.26740/independent.v4i1.60920>
- Arjun, K., Sankaran, A., Kumar, S., & Das, M. (2020). An endogenous growth approach on the role of energy, human capital, finance and technology in explaining manufacturing value added: A multi-country analysis. *Heliyon*, 6(7), e04308. <https://doi.org/10.1016/j.heliyon.2020.e04308>

- Asmara, G. D., & Saleh, R. (2024). Determinants of unemployment: Empirical evidence from Indonesia. *Widya Cipta: Jurnal Sekretari dan Manajemen*. <https://doi.org/10.31294/widyacipta.v8i2.12123>
- Badan Pusat Statistik. (2025). *Jumlah penduduk, laju pertumbuhan penduduk, distribusi persentase penduduk, kepadatan penduduk, dan rasio jenis kelamin penduduk menurut provinsi, 2025*. <https://www.bps.go.id/id/statistics-table>
- Badan Pusat Statistik. (2025). *Indeks Pembangunan Manusia (IPM) menurut provinsi (metode baru)*. <https://www.bps.go.id/id/statistics-table>
- Badan Pusat Statistik. (2025). *Produk domestik regional bruto atas dasar harga konstan 2010 menurut provinsi*. <https://www.bps.go.id/id/statistics-table>
- Badan Pusat Statistik. (2026). *Tingkat pengangguran terbuka menurut provinsi*. <https://www.bps.go.id/id/statistics-table/2/NTQzIzI=/tingkat-pengangguran-terbuka-menurut-provinsi.html>
- Ball, L., Furceri, D., Leigh, D., & Loungani, P. (2019). Does one law fit all? Cross-country evidence on Okun's law. *Open Economies Review*, 30(5), 841–874. <https://doi.org/10.1007/s11079-019-09549>
- Chattopadhyay, S. (2020). Growth, income distribution and unemployment in a two-sector economy. *Metroeconomica*, 71(4), 715–733. <https://doi.org/10.1111/meca.12299>
- Dhoba, H., Mutema, P., Akinlade, A. T., & Madondo, E. (2024). Population growth and unemployment in South Africa: A 24-year analysis. *International Journal of Business Ecosystem & Strategy*, 7(3). <https://doi.org/10.36096/ijbes.v7i3.708>
- Ehrlich, I., & Pei, Y. (2020). Human capital as engine of growth: The role of knowledge transfers in promoting balanced growth within and across countries. *Asian Development Review*, 37(2). <https://doi.org/10.1142/S0116110520400090>
- Engelica, H., & Chasanah, K. U. (2025). Analyzing the impact of poverty, unemployment, and education on the Human Development Index (HDI) in Sragen Regency. *Sunan Kalijaga: Islamic Economics Journal*, 4(1). <https://doi.org/10.14421/skiej.2025.4.1.2616>
- Falah, M. M., & Iek, M. (2025). Analisis pengaruh penduduk dan pertumbuhan ekonomi terhadap pengangguran di Provinsi Papua. *Jurnal Kajian Ekonomi dan Studi Pembangunan*. <https://doi.org/10.56076/jkesp.v10i1.5421>
- Fitriani, E., & Nurwati, N. (2022). Dampak pandemi COVID-19 terhadap perekonomian Indonesia. *Jurnal Ekonomi dan Kebijakan Publik*.
- Gunawan, B. T. (2023). Do natural resources affect unemployment? Evidence from Indonesian province panel data. *Signifikan: Jurnal Ilmu Ekonomi*, 12(2), 231–244. <https://doi.org/10.15408/sjie.v12i2.31824>
- Hannan, Z., Jacob, J., Niam, S. K., Dewi, S., & Nashih, M. (2024). The effect of unemployment, economic growth, level of education on the Human Development Index with poverty as mediation. *Jurnal Ilmiah Edunomika*, 8(1). <https://doi.org/10.29040/jie.v8i1.11624>
- Hanushek, E. A., & Woessmann, L. (2020). Education, knowledge capital, and economic growth. In S. Bradley & C. Green (Eds.), *The economics of education* (2nd ed., pp. 171–182). Academic Press. <https://doi.org/10.1016/B978-0-12-815391-8.00014-8>

- Marois, G., Potančoková, M., Bezat, A., & Crespo Cuaresma, J. (2026). Projecting labour market imbalances and skill mismatch under demographic change in the EU. *European Journal of Population*, 42, Article 4. <https://doi.org/10.1007/s10680-025-09758-2>
- Mulyaningsih, T., & Nuryakin. (2022). Human development and regional economic performance in Indonesia. *Jurnal Economia*, 18(2), 183–197.
- Nasution, D. A. D., Erlina, & Muda, I. (2021). Dampak pandemi COVID-19 terhadap perekonomian Indonesia. *Jurnal Benefita*, 6(2), 212–224. <https://ejournal.ildikti10.id/index.php/benefita/article/view/5313>
- Paembonan, L., Yohan, & Nabir. (2024). Impact of economic growth and quality of human resources on unemployment: Central Sulawesi case study 2016–2020. *International Journal of Social Science and Business*. <https://doi.org/10.23887/ijssb.v8i1.72148>
- Rostiana, E., & Rodesbi, A. (2020). Demographic transition and economic growth in Indonesia. *Jurnal Economia*, 16(1). <https://doi.org/10.21831/economia.v16i1.29846>
- Sari, D. W., & Kaluge, D. (2021). Human development, health, education, and regional economic performance in Indonesia. *Jurnal Ekonomi Pembangunan*, 22(2), 173–188.
- Sunan, N. M., & Sekaringsih, R. B. (2023). Determinants of unemployment rate in Indonesia (2011–2021 period). *Bulletin of Islamic Economics*, 2(1). <https://doi.org/10.14421/bie.2023.021-04>
- Suparman, & Muzakir. (2023). Regional inequality, human capital, unemployment, and economic growth in Indonesia: Panel regression approach. *Cogent Economics & Finance*, 11(2). <https://doi.org/10.1080/23322039.2023.2251803>
- Tobing, N. W., & Hanifa, N. (2024). Pengaruh jumlah penduduk, UMK, dan tingkat pengangguran terbuka terhadap penyerapan tenaga kerja di Provinsi Jawa Tengah. *Independent: Journal of Economics*, 4(1), 85–94. <https://doi.org/10.26740/independent.v4i1.60215>
- Tran, T. K. O., Dao, L. T., Nga, P. T. H., & Nguyen, H. T. (2023). Impacts of human capital, the Fourth Industrial Revolution, and institutional quality on unemployment: An empirical study in Asian countries. *Journal of Eastern European and Central Asian Research*, 10(2). <https://doi.org/10.15549/jeecar.v10i2.1010>
- Utami, D. Y., & Armelly. (2023). Demographic, economic, and human well-being: Their influence on the unemployment rate in 34 provinces of Indonesia. *Economina*. <https://doi.org/10.55681/economina.v2i10.898>
- Wafi, F. A., & Kafa, M. Z. (2024). Determinants of educated unemployment in Indonesia: A comprehensive logistic regression analysis. *Convergence: The Journal of Economic Development*, 6(2), 107–126. <https://doi.org/10.33369/convergencejep.v6i2.36759>
- Yandra, A. R., & Kurniawati, T. (2025). Impact of economic growth, human capital, and population growth on unemployment rates in West Sumatra Province. *Jurnal Ilmu Ekonomi (JIE)*. <https://doi.org/10.22219/jie.v9i04.42280>
- Yulianita, A., Ramadhan, D. R., & Mukhlis. (2023). Factors affecting economic growth in Indonesia. *Signifikan: Jurnal Ilmu Ekonomi*, 12(2), 245–262. <https://doi.org/10.15408/sjie.v12i2.31186>