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The Impact of Regional Economic Growth and Investment on Unemployment in Indonesia

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Abstract

Unemployment is a major employment issue faced by developing countries, including Indonesia. This study aims to analyze the influence of regional economic growth and investment on the unemployment rate in Indonesia. The study uses a quantitative approach with secondary data, in the form of panel data from 34 provinces from 2016–2020, sourced from the Central Statistics Agency (BPS). The analytical method used is panel data regression with a Random Effects Model. The results show that, partially, economic growth has a negative and significant effect on unemployment, while investment has a positive but insignificant effect. Simultaneously, both variables significantly influence unemployment. These findings provide implications for the government in designing policies to reduce unemployment by increasing quality economic growth and creating a conducive investment climate.

Keyword: Unemployment, Regional Economic Growth, Investment, Panel Data, Indonesia.

1. Introduction

Unemployment is a structural problem that continues to plague the Indonesian economy, particularly amidst development challenges that hinge on inclusive job creation (Mulya, 2024). Data from the Central Statistics Agency (BPS) shows that although the unemployment rate declined during the 2016–2019 period, the COVID-19 pandemic in 2020 caused a significant spike to 7.07%. This indicates the vulnerability of Indonesia's workforce to external shocks. Meanwhile, regional economic growth, as measured by GRDP and investment realization particularly Domestic Direct Investment (PMDN), is often considered the primary driver of employment (Soegoto et al., 2025). However, the empirical relationship between these two variables and the unemployment rate requires further study, particularly in Indonesia's highly diverse regional context (Suparman & Muzakir, 2023). This research is motivated by the urgency of understanding the extent to which macroeconomic policies can effectively reduce unemployment, particularly post-pandemic.

While numerous studies have examined the relationship between economic growth, investment, and unemployment, most previous studies have tended to be conducted at the national level or limited to specific regions (Puspadjuita, 2018; Suparman& Muzakir, 2023), such as Java or Sumatra. Furthermore, previous research results are often inconsistent some find investment to have a significant effect, while others find it insignificant (Lucas et al., 2018). Some studies also pay insufficient attention to the dimension of interprovincial diversity by using aggregate time series data. Thus, there is a gap in studies that integrate panel data approaches across all provinces in Indonesia over a period spanning the pre and early pandemic period. This study seeks to fill this gap by analyzing the effects of regional economic growth and investment on unemployment simultaneously and partially, using panel data from 34 provinces for the period 2016–2020.

This study aims to analyze the partial effect of regional economic growth on the unemployment rate in Indonesia. Furthermore, this study aims to further analyze the partial effect of investment on the unemployment rate in Indonesia. Finally, this study aims to analyze the simultaneous effect of regional

economic growth and investment on the unemployment rate in Indonesia. These objectives were formulated to provide comprehensive empirical evidence regarding the relationship between these three variables within the context of Indonesia's regional diversity.

This research makes both theoretical and practical contributions. Theoretically, this study enriches the labor economics literature by demonstrating that the relationship between investment and unemployment is not always linear and significant in the Indonesian context, while regional economic growth consistently has a negative effect. The use of the Random Effects Model (REM) in panel data analysis also emphasizes the importance of considering interprovincial heterogeneity. Practically, the findings of this study can serve as a reference for regional and central governments in designing more integrated policies that promote accelerated economic growth and equitable investment, particularly to reduce the gap in labor absorption between regions. Furthermore, this study provides policy recommendations oriented toward the quality of growth and labor-intensive investment, particularly in provinces with low investment realization but high unemployment rates.

2. The Art of Research

1. Unemployment Theory

Unemployment is defined as the portion of the labor force actively seeking employment at a specific wage level but not yet finding it (Baah-Boateng, 2015; Jones & Riddell, 1999). Generally, unemployment can be grouped into three categories based on the approach to labor utilization: unemployed, underemployed, and fully employed (Hussmanns, 2007). High unemployment rates not only reflect labor market imbalances but also have broad impacts on poverty, economic growth, and social stability (Alayseri et al., 2024; Stiglitz, 2015). Therefore, unemployment is often used as a key indicator in assessing a country's development performance (Feng et al., 2024: Soliman & Beram, 2025).

2. Regional Economic Growth

Regional economic growth refers to the long-term increase in per capita output, as measured by Gross Regional Domestic Product (GRDP) at constant prices (Yusupov et al., 2019). This growth is influenced by various factors, such as human resources, natural resources, science and technology, culture, and capital accumulation (Mathur, 1999; Saleh et al., 2020). Economic growth theories, such as the Classical, Harrod-Domar, and Solow-Swan theories, emphasize the role of investment, savings, and technology in driving economic expansion (Ferrara, 2025). In a regional context, high economic growth is expected to create new jobs and reduce unemployment (Plummer & Taylor, 2001).

3. Investment

Investment is defined as expenditure on capital goods and production equipment to increase the production capacity of goods and services in the economy (Ningsi et al., 2023). Investment can be divided into autonomous investment, induced investment, and Domestic Investment (PMDN) and Foreign Investment (PMA) (Setyaningsih & Wulandari, 2025). The purpose of investment is not only to obtain financial returns, but also to encourage economic growth and employment (Ritter, 2012). Investment theories, such as Neo-Classical and Harrod-Domar theories, highlight the role of investment in increasing capital stock and labor productivity (El Yamani et al., 2020).

4. Relationship between variables

Regional economic growth is theoretically negatively related to unemployment, as increased output is usually accompanied by an expansion of employment opportunities (Elhorst, 2003). Meanwhile, investment is expected to reduce unemployment through the creation of new jobs, although this relationship can be influenced by factors such as the investment sector, labor quality, and geographic distribution (Anowor et al., 2019; Djambaska & Lozanoska, 2015). Simultaneously, both variables are considered to have a significant influence on the unemployment rate, where economic growth supported by equitable investment can accelerate labor absorption (Bykova et al., 2024).

5. Related Research

Several previous studies have examined the relationship between economic growth, investment, and unemployment, with mixed results. For example, Hasdiana et al. (2025) found that both economic growth and investment significantly influence unemployment in Indonesia, while Muliana et al.'s (2025) study in Sulawesi showed no significant effect on investment. These differences in results may be due to variations

in the time period, regional coverage, and analytical methods used. Therefore, this study seeks to provide updated empirical evidence with a national scope and a panel data approach to strengthen previous findings.

3. Method

This study uses a quantitative approach with secondary data to analyze the effect of regional economic growth and investment on unemployment in Indonesia. A quantitative approach was chosen because it allows for empirical and measurable testing of relationships between variables. The research design is explanatory, with the aim of testing hypotheses formulated based on a theoretical framework. This study relies on published statistical data to ensure the objectivity and reliability of the findings.

The data used in this study is secondary, in the form of panel data (pooled data) that combines time (time series) and cross-sectional dimensions. The data cover 34 provinces in Indonesia over a five-year period, from 2016 to 2020. All data were obtained from official publications of the Central Statistics Agency (BPS). These include the Open Unemployment Rate (TPT), Gross Regional Domestic Product (GRDP) at constant prices as a proxy for regional economic growth, and realized Domestic Investment (PMDN) as a proxy for investment. Panel data was chosen because it can capture inter-provincial diversity and the dynamics of change over time.

There are three main variables in this study. The dependent variable (Y) is the unemployment rate, measured by the Open Unemployment Rate (TPT) per province in percentage terms. The independent variables are: regional economic growth (X1), proxied by the GRDP growth rate at constant prices (percentage); and investment (X2), represented by realized Domestic Direct Investment (PMDN) in billions of rupiah. This operational definition allows for consistent measurement and facilitates research replication.

Data analysis was conducted using panel data regression. The general model used is:

$P = \alpha + \beta 1 PDRBit + ln\beta 2 Iit + eit$ .....(I)

Where is P: Unemployment, β: beta, α: constant, it: individual variable i and period t, ln: natural logarithm, GRDP: Gross Regional Domestic Product (proxy of economic growth), I: Investment, eit: error term. The selection of the appropriate estimation model is carried out through a series of specification tests, namely: Chow Test to choose between Common Effect Model (CEM) or Fixed Effect Model (FEM), Hausman Test to choose between FEM or Random Effect Model (REM), and Lagrange Multiplier Test to compare REM with CEM. Based on the test results, the selected model is the Random Effect Model (REM). Furthermore, partial statistical tests (t Test) and simultaneous (F Test) are carried out to test the significance of the influence of independent variables, as well as calculating the coefficient of determination (R^2) to measure the explanatory power of the model. Data processing is carried out using EViews 12 software.

Table 1. Percentage of Open Unemployment in Indonesia 2016-2020 (Percent)

Province	2016	2017	2018	2019	2020	Province	2016	2017	2018	2019	2020
Aceh	7,57	6,57	6,34	6,17	6,59	Banten	8,92	9,28	8,47	8,11	10,64
North Sumatra	5,84	5,6	5,55	5,39	6,91	Bali	1,89	1,48	1,40	1,57	5,63
West Sumatra	5,09	5,58	5,66	5,38	6,88	NTB	3,94	3,32	3,58	3,28	4,22
Riau	7,43	6,22	5,98	5,76	6,32	NTT	3,25	3,27	2,85	3,14	4,28
Jambi	4,00	3,87	3,73	4,06	5,13	West Kalimantan	4,23	4,36	4,18	4,35	5,81
South Sumatra	4,31	4,39	4,27	4,53	5,51	Central Kalimantan	4,82	4,23	3,91	4,04	4,58
Bengkulu	3,30	3,74	3,35	3,26	4,07	South Kalimantan	5,45	4,77	4,35	4,18	4,74
Lampung	4,62	4,33	4,04	4,03	4,67	East Kalimantan	7,95	6,91	6,41	5,94	6,87
Kep. Bangka Belitung	2,60	3,78	3,61	3,58	5,25	North Kalimantan	5,23	5,54	5,11	4,49	4,97
Kep. Riau	7,69	7,16	8,04	7,50	10,34	North Sulawesi	6,18	7,18	6,61	6,01	7,37
Dki Jakarta	6,12	7,14	6,65	6,54	10,95	Central Sulawesi	3,29	3,81	3,37	3,11	3,77
West Java	8,89	8,22	8,23	8,04	10,46	South Sulawesi	4,80	5,61	4,94	4,62	6,31
Central Java	4,63	4,57	4,47	4,44	6,48	Southeast Sulawesi	2,72	3,30	3,19	3,52	4,58
Di Yogyakarta	2,72	3,02	3,37	3,18	4,57	Gorontalo	2,76	4,28	3,70	3,76	4,28
East Java	4,21	4,00	3,91	3,82	5,84	West Sulawesi	3,33	3,21	3,01	2,98	3,32

4. Result

A. Descriptive Analysis

Based on the data presented in Table 1, the number of unemployed in Indonesia decreased from 2016 to 2019, while it increased in the following year, 2020. The highest unemployment rate occurred in 2020, at 7.07%. Compared to the previous four years, from 2016 to 2019, the unemployment rate decreased annually, falling to 5.30% in 2017 and then again to 5.23% in 2019.

Table 2. GRDP in Indonesia 2016-2020 (Percent)

Province	2016	2017	2018	2019	2020	Province	2016	2017	2018	2019	2020
Aceh	3,29	4,18	4,61	4,14	-0,37	Banten	5,28	5,75	5,77	5,29	-3,38
North Sumatra	5,18	5,12	5,18	5,22	-1,07	Bali	6,33	5,56	6,31	5,60	-9,31
West Sumatra	5,27	5,30	5,14	5,01	-1,60	NTB	5,81	0,09	-4,50	3,90	-0,64
Riau	2,18	2,66	2,35	2,81	-1,12	NTT	5,12	5,11	5,11	5,24	-0,83
Jambi	4,37	4,60	4,69	4,37	-0,46	West Kalimantan	5,20	5,17	5,07	5,09	-1,82
South Sumatra	5,04	5,51	6,01	5,69	-0,11	Central Kalimantan	6,35	6,73	5,61	6,12	-1,40
Bengkulu	5,28	4,98	4,97	4,94	-0,02	South Kalimantan	4,40	5,28	5,08	4,08	-1,81
Lampung	5,14	5,16	5,23	5,26	-1,67	East Kalimantan	-0,38	3,13	2,64	4,74	-2,85
Kep. Bangka Belitung	4,10	4,47	4,45	3,32	-2,30	North Kalimantan	3,55	6,80	5,36	6,90	-1,11
Kep. Riau	4,98	1,98	4,47	4,84	-3,80	North Sulawesi	6,16	6,31	6,00	5,65	-0,99
Dki Jakarta	5,87	6,20	6,11	5,82	-2,36	Central Sulawesi	9,94	7,10	20,56	8,83	4,86
West Java	5,66	5,33	5,65	5,07	-2,44	South Sulawesi	7,42	7,21	7,04	6,91	-0,70
Central Java	5,25	5,26	5,30	5,40	-2,65	Southeast Sulawesi	6,51	6,76	6,40	6,50	-0,65
Di Yogyakarta	5,05	5,26	6,20	6,59	-2,69	Gorontalo	6,52	6,73	6,49	6,40	-0,02
East Java	5,57	5,46	5,47	5,52	-2,39	West Sulawesi	6,01	6,39	6,26	5,67	-2,42

Table 2 shows that Indonesia's economic growth rate fluctuates annually. From 2016 to 2018, economic growth continued to increase, reaching 5.03 in 2016, then rising to 5.07 in 2017, and then again to 5.17 in 2018. Meanwhile, economic growth declined in 2019 and 2020. In 2019.

Table 3. Hasil Chow Test

Test cross-section fixed effects			
Effects Test	*Statistic*	*d.f.*	*Prob.*
Cross-section F	24.325998	(33,133)	0.0000
Cross-section Chi-square	329.720299	33	0.0000

This study uses panel data from 34 provinces in Indonesia during the 2016–2020 period. The dependent variable is the Open Unemployment Rate (TPT), while the independent variables consist of Regional Economic Growth (proxied by GRDP at constant prices) and Investment (in the form of Domestic Direct Investment/PMDN). Descriptive statistics show that the average unemployment rate during this period was 5.08% with quite high fluctuations between provinces. Average economic growth was 3.92%, while average investment realization reached IDR 8,452.64 billion per province per year. There was significant variation between provinces, especially in 2020, when many provinces experienced economic growth contraction due to the COVID-19 pandemic.

Table 4. Hausman Test Results

Test Summary	*Chi-Sq.Statistic*	*Chi-Sq.d.f.*	*Prob.*
Cross-section Random	1.691547	2	0.4292

B. Estimation Model Selection

The panel data regression estimation approach can be performed using three types of tests: the first is the CEM (common effect model), the second is the FEM (fixed effect model), and the third is the REM (random effect model).

Table 5. Random Lagrange Multiplier Test

	Test Hypothesis		
	Cross-Section	Time	Both
Breusch-Pagan	220.3156 (0.0000)	0.396187 (0.5904)	220.7118 (0.0000)
Honda	14.84303 (0.0000)	-0.629434 (0.7355)	10.05053 (0.0000)
King-Wu	14.84303	-0.629434	4.285922

To select which method to use, a Goodness of Fit test was conducted using the Chow Test and the Hausman Test to select the best method in this study. To determine the best model in panel data analysis, a series of specification tests were conducted. The results of the Chow test showed a cross-section F probability value of 0.0000 (<0.05) (see table 3), thus rejecting the null hypothesis and indicating that the Fixed Effect Model (FEM) is better than the Common Effect Model (CEM). Furthermore, the Hausman test produced a chi-square probability value of 0.4292 (>0.05) (see table 4), which accepted the null hypothesis that the Random Effect Model (REM) is more appropriate than the FEM. For additional confirmation, the Lagrange Multiplier test also supports the use of REM with a Breusch-Pagan probability value of 0.0000 (see table 5). Thus, the model chosen for further estimation is the Random Effect Model (REM).

Table 6. Random Effect Model

Variabel	Coefficient	Std. Error	t-Statistic	Prob.
C	5.289670	0.606746	8.718103	0.0000
ECONOMIC GROWTH	-0.108209	0.016777	-6.450039	0.0000
INVESTMENT	0.027939	0.063689	0.438683	0.6615
Effects Spesification				
			S.D.	Rho
Cross-section random			1.620261	0.8311
Idiosyncratic random			0.730432	0.1689
Weighted Statistics				
R-Square	0.210192	Mean dependent var		1.008464
Adjusted R-square	0.200676	S.D. dependent var		0.817577
S.E. ofregression	0.729755	Sum squared resid		88.40192

C. Panel Data Regression Estimation Results

Based on the REM model (see table 6), the following regression equation is obtained:

$$P = 5.289670 - 0.108209(PDRB) + 0.027939(I) + e$$

The interpretation of this equation is as follows:

- The constant 5.289670 indicates that if economic growth and investment are both zero, the unemployment rate is estimated at 5.29%.
- The economic growth coefficient of -0.108209 indicates that every 1% increase in economic growth will decrease the unemployment rate by 0.108209%, assuming other variables remain constant.
- The investment coefficient of 0.027939 indicates that every 1 billion rupiah increase in investment actually increases the unemployment rate by 0.027939%, although the effect is not statistically significant.

D. Statistical Hypothesis Testing

- t-Test (Partial):
  The economic growth variable has a t-statistic value of -6.450039 with a probability of 0.0000 (<0.05) (see Table 6), indicating a negative and significant effect on unemployment. Meanwhile, the

investment variable has a t-statistic value of 0.438683 with a probability of 0.6615 (>0.05), indicating no significant partial effect.

- F-Test (Simultaneous):
  The F-statistic value of 22.08878 with a probability of 0.000000 (<0.05) (see Table 6) indicates that, simultaneously, economic growth and investment have a significant effect on unemployment.
- Coefficient of Determination (R^2):
  The R^2 value of 0.210192 indicates that approximately 21.02% (see Table 6) of the variation in the unemployment rate can be explained by economic growth and investment variables, while the remaining 78.98% is influenced by other factors outside the model.

5. Discussion

The research findings, which show a significant negative effect of regional economic growth on unemployment, align with theory and most previous empirical research. These results confirm that increases in Gross Regional Domestic Product (GRDP) are generally accompanied by an expansion of economic activity, which creates demand for labor. This mechanism operates through increased output of goods and services, which requires additional production inputs, including human resources. Therefore, policies that successfully promote high-quality and inclusive economic growth at the regional level can be an effective instrument for reducing unemployment, as found in research by Awad-Warrad & Muhtaseb (2017).

On the other hand, the results showing that investment (PMDN) has no significant effect on unemployment paint a more complex picture. This finding indicates that increased investment value does not automatically translate into proportional employment. This phenomenon can be explained by several factors, including: (1) the nature of investment, which is not always labor-intensive, but may be more capital-intensive or technology-intensive, which actually displaces labor; (2) Large disparities in the geographic distribution of investment, where labor absorption is concentrated only in certain provinces such as DKI Jakarta, West Java, and East Kalimantan, while other provinces do not receive the same benefits; (3) Mismatch between the skills of the available workforce and the needs of the industry financed by new investment. These findings are consistent with research by Muliana et al. (2025) in Sulawesi and Sudirman et al. (2021) in Jambi City.

Although investment is partially insignificant, the F-test results demonstrate that simultaneously, economic growth and investment significantly influence unemployment. This confirms that the two variables interact to influence the labor market. Investment can be a long-term driver of economic growth, which in turn creates jobs. In other words, the employment impact of investment may not be direct, but rather indirect, through stimulating regional economic output growth. This interaction reinforces the importance of an integrated policy approach, where investment incentives should be directed to support leading sectors that drive regional economic growth.

Overall, the findings of this study highlight two key policy issues. First, the need for equitable development and investment across regions to ensure the benefits of job creation are widely enjoyed, thereby reducing the gap in unemployment rates between provinces. Second, the importance of improving the quality of economic growth by ensuring that it is labor-intensive (employment-friendly) and supported by appropriate investment sectors. Practical implications: regional governments need to develop strategies that not only pursue high investment realization but also consider the elasticity of labor absorption from each investment project and the availability of qualified human resources in their regions.

6. Conclusion

Based on panel data analysis from 34 provinces in Indonesia for the 2016–2020 period, this study concludes that regional economic growth has a negative and significant effect on the unemployment rate, while investment (PMDN) has no significant effect partially. However, simultaneously, both variables are shown to have a significant effect on unemployment. This finding indicates that efforts to reduce unemployment require a strategy that emphasizes improving the quality and inclusiveness of regional economic growth, in addition to efforts to encourage investment oriented toward job creation.

This study has several limitations that should be acknowledged. First, the study period (2016–2020) encompasses the COVID-19 pandemic, which constitutes an extraordinary external shock, so the dynamics of the relationship between the variables may not fully represent normal conditions. Second, the study focuses only on two independent variables (economic growth and investment), while other factors such as education level, inflation, minimum wages, and labor productivity are not included in the model. Third, the use of aggregate investment (PMDN) data cannot capture differences in impacts by industry or sector, even though labor-intensive and capital-intensive sectors may have different effects on labor absorption.

Theoretically, this study strengthens empirical evidence that the relationship between investment and unemployment is not always linear and straightforward, and emphasizes the importance of a panel data approach that takes regional heterogeneity into account. Practically, this research provides clear policy implications: the government needs to promote inclusive and quality economic growth, while designing selective investment policies, namely by providing incentives for investment in labor-intensive sectors and in areas with high unemployment rates. Furthermore, supporting policies such as workforce skills training and improvements to the regional business climate are needed to ensure that economic growth and investment are truly able to optimally absorb the workforce.

Acknowledgments

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