



The Effect of Investment and Unemployment Rate on Economic Growth in Indonesia

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Abstract. This study aims to analyze the effect of investment and unemployment rates on economic growth in 10 provinces in Indonesia during the period of 2013-2022. The research employs a panel data regression method with a fixed effect model to examine the partial and simultaneous effects between the independent variables, namely investment and unemployment rates, on the dependent variable, economic growth. The partial test results show that investment has a positive and significant effect on unemployment rates but a negative and statistically insignificant effect on economic growth. On the other hand, the simultaneous test results indicate that investment and unemployment rates together have a significant influence on economic growth. This suggests a mismatch in investment allocation, where investments are predominantly directed towards capital-intensive sectors that do not absorb large amounts of labor, as well as the lack of investment effectiveness in driving short-term economic growth.

Keywords: Investment, unemployment rate, economic growth, *fixed effect model*

1 Introduction

Its impact varies across different social and economic aspects. One such impact is job creation. In developing countries, economic growth tends to be less efficient in creating jobs compared to developed countries, leading to a new phenomenon of rising unemployment. Therefore, this condition requires economic policies that can stimulate growth and create more employment opportunities. [1]

International trade is seen as one of the driving forces of a country's economy. It has been shown to have a positive and significant impact on economic growth, both in the short and long term [2], [3]. Human capital enhancement is another crucial factor, as it improves the skills and competencies of the workforce, thereby boosting productivity and competitiveness, especially in developing countries [4]. The role of institutions is also highlighted, with inclusive institutions and reforms that enhance democracy becoming essential for fostering a conducive environment for economic growth [5], [6]. Foreign direct investment (FDI) is another significant contributor, providing capital, technology, and expertise that can spur economic development, particularly in low-income countries [2], [3]. Collectively, these factors underscore

the multifaceted nature of economic growth, which requires a comprehensive policy approach to leverage these diverse drivers.

In Indonesia, economic growth has tended to develop positively. This success is marked by the ability to maintain economic stability, especially in the post-COVID-19 pandemic era [7]. This growth has also been supported by foreign direct investment (FDI), which has had a significantly positive impact on economic growth, particularly in sectors such as manufacturing, mining, and real estate, although FDI has shown a negative response in certain sectors [8]. Despite this positive trend, challenges remain, such as limited fiscal space and rising inflationary pressures. This necessitates strategic policies to sustain growth. This is in line with the International Monetary Fund's (IMF) projections, which forecast positive economic growth for Indonesia in 2024-2025. Indonesia's economic growth is estimated to be 5% in 2024, while in 2025, it is expected to increase by 0.1 percentage points to 5.1%, as illustrated in the figure below.

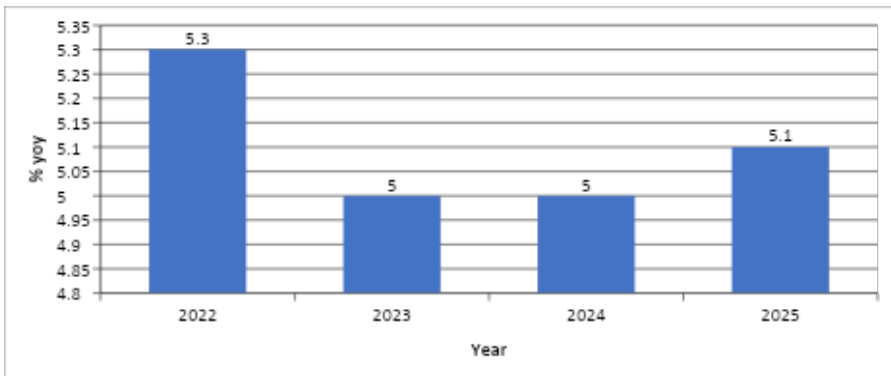


Fig. 1. : Indonesia's economic growth projection for 2022-2025

Source : Internasional Monetary Fund (IMF), 2024

In addition, investment plays an important role in driving economic growth, both foreign direct investment (FDI) and domestic investment. In the context of export growth, investment is crucial as it helps access export markets and boosts export activities among existing exporters. This highlights the importance of investment policies compared to other export support measures [9]. Meanwhile, public investment, particularly in the infrastructure sector, has a significant impact on the relationship between growth and inequality. Its influence varies depending on the framework applied, showing the complexity of public investment's effects on economic dynamics [10].

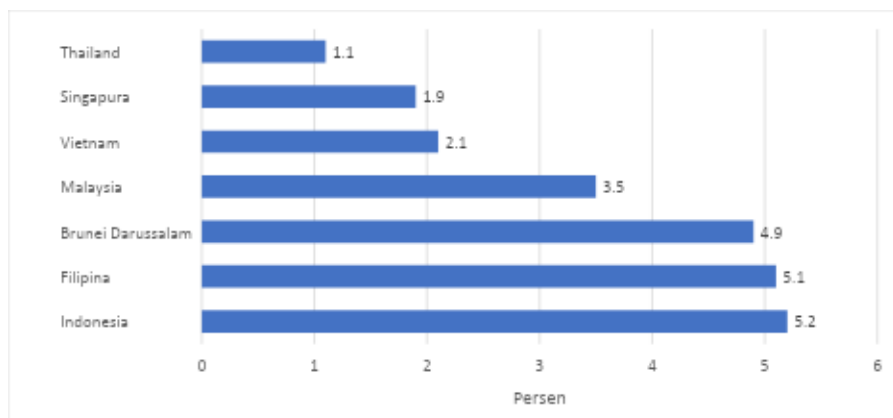
In Pakistan, infrastructure investment, especially in the transportation sector forming part of the China-Pakistan Economic Corridor, underscores the importance of both private and public capital. Private capital investment has been shown to drive GDP growth, while public capital investment follows GDP growth in accordance with Wagner's Law. This demonstrates that a legal environment supportive of private investors can enhance growth [11]. Keynesian macroeconomic theory emphasizes that delays in investment can disrupt the growth cycle. This model shows that the timing and speed of investment adjustment are critical in determining the characteristics of

economic growth cycles [12]. The effectiveness of investment in physical capital, infrastructure, as well as export-import activities is crucial in influencing patterns of economic growth. Its impact may vary depending on the context and type of investment made.

Another emphasis in investment analysis is seen in unemployment levels. This variable's relationship is supported by several studies that find a significant negative relationship between investment and unemployment [13]. Public investment, particularly in infrastructure and human resources, can increase output, reduce unemployment, and attract private investment [14]. The timing and method of investment funding are important factors, with infrastructure spending showing a greater impact during economic recessions [15]. Although some studies find a negative relationship between investment and unemployment in certain regions [16], other research highlights the importance of foreign direct investment (FDI) in job creation [17]. Therefore, policymakers must consider these factors when designing strategies to mitigate the economic crisis's impact on unemployment.

Positive economic growth does not always align with a reduction in unemployment, which remains one of the major macroeconomic challenges in various countries. In Indonesia, the unemployment rate has fluctuated in response to economic dynamics, government policies, and global conditions. The government faces significant challenges in addressing unemployment, which directly impacts poverty, crime, and other socio-political issues. Contributing factors to unemployment include low investment and an education system that fails to produce a skilled workforce, necessitating strategies to improve the investment climate and the education system [18].

Indonesia's labor market is also influenced by both international and domestic uncertainties that can hinder job creation and productivity improvement [19]. Despite these challenges, recent global developments, such as the rebound in commodity prices and favorable financial conditions, have provided some economic benefits, potentially leading to job creation [20]. In line with these issues, the IMF also released a projection of unemployment rates in ASEAN countries, showing Indonesia as the country with the highest unemployment rate in 2024. Overall, addressing unemployment in Indonesia requires a multifaceted approach, taking into account domestic policies and global economic trends.



Source : Internasional Monetary Fund, 2024

Fig. 2. Unemployment Rate Projection in ASEAN Region in 2024

Endogenous growth theory emphasizes the crucial role of investment in driving economic growth by leveraging internal factors such as technology, innovation, and human capital. According to Romer's model, technological change results from investment policies aimed at maximizing profits and fostering long-term growth. This model highlights that human capital is vital in determining the rate of growth, and insufficient human capital is allocated to research in equilibrium, suggesting that more investment in education and training can enhance growth outcomes [21]

Further elaborating on this, Aghion and Howitt's model introduces the concept of creative destruction, where vertical innovation from the competitive research sector drives growth. This model indicates that the size of the skilled workforce and research productivity are essential, showing that investment in R&D can significantly boost innovation and productivity [22]. Similarly, Grossman & Helpman (1994) also stress the importance of goal-oriented investment and the pursuit of profit through knowledge for long-term growth, reinforcing the idea that R&D investment is crucial for technological advancement.

However, Young analysis challenges conventional policy by suggesting that increasing R&D efforts in larger economies does not always translate into higher growth rates, but instead highlights the need for diverse solutions to similar problems, which can be achieved through varied technological advancements. Additionally, Mulligan & Sala-i-Martin in their two-sector endogenous growth model underscore the importance of human capital in achieving conditional convergence, where growth rates are negatively related to initial income levels after accounting for human capital, further supporting the need for investment in education and training to enhance workforce adaptability and reduce structural unemployment.

Based on the explanation above, this research will analyze the effects of investment and unemployment, two crucial factors influencing a country's economic growth, including in Indonesia. Investment plays a key role in expanding production capacity and creating new jobs, while a low unemployment rate reflects the optimal utilization of human resources. In the context of Indonesia's dynamic economy, understanding how investment and unemployment impact economic growth is essential for formulating effective policies. Therefore, this research also aims to analyze the relationship between investment, unemployment, and economic growth, as well as explore its implications for the development of strategic and sustainable economic policies.

2 Method

In recent years, the relationship between investment, unemployment, and economic growth has garnered significant attention from economists and policymakers alike. Investment, both foreign and domestic, is often regarded as a key driver of economic growth, contributing to capital accumulation, technological advancements, and increased productivity. However, the link between investment and employment remains complex, as the effects of investment on reducing unemployment can vary

depending on several factors, such as the sectors that attract the most investment and the types of jobs created. Therefore, understanding how investment influences both economic growth and unemployment is crucial for formulating effective economic policies.

This study aims to explore these dynamics by employing panel data regression analysis to investigate the relationship between investment, economic growth, and the unemployment rate in Indonesia from 2013 to 2022. By including the unemployment rate as an intervening variable, this research seeks to provide a more nuanced understanding of how investment impacts economic growth indirectly through changes in employment levels. This analysis is expected to contribute to the broader discourse on economic development, offering insights that could assist policymakers in designing strategies to promote sustainable growth and job creation.

This research employs secondary data covering the period from 2013 to 2022, utilizing annual data spanning 10 years. The data were sourced from various official websites, such as the Central Statistics Agency (BPS), the Ministry of Investment, and the Ministry of Manpower of the Republic of Indonesia. This is a quantitative study that involves the use of numerical and statistical data. A panel data regression model is employed to analyze the relationship between the independent and dependent variables, with an intervening variable used to explain the connection between them.

In this study, the independent variable is investment, the dependent variable is economic growth, and the intervening variable is the unemployment rate. The operational definitions of each variable are as follows:

- Investment (X): Refers to the amount of Foreign Direct Investment (FDI) and Domestic Investment in Indonesia during the research period, measured annually in billions of rupiah.
- Unemployment Rate (Y1): Refers to the percentage of job seekers within the available labor force during the research period.
- Economic Growth (Y2): Refers to the real output value of the economy, measured by the real Gross Domestic Product (GDP) at constant prices during the research period, expressed in billions of rupiah

3 Result

3.1 Panel Data Regression Model

In panel data regression models, there are three primary estimation approaches: the common effect model (CEM), the fixed effect model (FEM), and the random effect model (REM). Among these models, determining which one is the most suitable for analysis is crucial. To identify the best-fitting model, various tests are conducted, including the Chow test and the Hausman test. Specifically, the Chow test is used to decide between the common effect model and the fixed effect model. By comparing the two models, the test aims to reveal which one provides better results for the analysis.

As shown in the table, the Chow test results for the model between variable X and Y1 indicate a cross-section F-statistic of 20.208591, with a corresponding p-value of 0.0000. Since the p-value is less than 0.05, this suggests that the fixed effect model is the preferred choice over the common effect model. Therefore, based on these test results, the fixed effect model is the appropriate model to use for the analysis of this panel data.

Table 1. Chow test variable X to Y1

Redundant Fixed Effects Tests
Equation: Untitled
Test cross-section fixed effects

Effects Test	Statistic	d.f.	Prob.
Cross-section F	20.208591	(9,89)	0.0000
Cross-section Chi-square	111.302966	9	0.0000

Source : output views 12

The probability value of $0.00 < 0.05$ then in the test for this first model it is determined that the fixed effect model is selected. The same thing is also determined in the X model against Y2, as follow

Table 2. Chow test variable X to Y2

Redundant Fixed Effects Tests
Equation: Untitled
Test cross-section fixed effects

Effects Test	Statistic	d.f.	Prob.
Cross-section F	30.320721	(9,89)	0.0000
Cross-section Chi-square	140.269423	9	0.0000

Sumber : Output views 12

The Hausman test is used to determine whether the fixed effect model or the random effect model is more appropriate for a given panel data analysis. This test helps to compare these two models by examining the probability value (p-value) for the random effect model. The decision rule is based on the significance of this p-value.

If the p-value is greater than 0.05, it indicates that the random effect model is the better choice, as there is no significant difference between the two models. However, if the p-value is less than 0.05, it suggests that the fixed effect model should be selected because it provides a better fit for the data. Thus, the Hausman test serves as a critical step in ensuring the proper model selection in panel data analysis.

Table 3. Hausman test variabel X to Y1

Correlated Random Effects - Hausman Test

Equation: Untitled

Test cross-section random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	5.622376	1	0.0177

Sumber : output eviews 12

Based on the results of the Hausman test, the p value = $0.0177 < 0.05$, so the best model to use is the fixed effect model method.

Table 4. Hausman test variabel X to Y2

Correlated Random Effects - Hausman Test

Equation: Untitled

Test cross-section random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	5.553068	1	0.0184

Source: Output eviews 12

Based on the table above, it is obtained $0.0184 < 0.05$, meaning that in this Hausman test the selected model is the Fixed Effect Model

3.2 t-Test (Partial Test)

Based on the selection of the panel data regression model in the previous section, it is determined that the fixed effect model (FEM) is the basis for testing the next hypothesis. The effect of investment variables (X) on the unemployment rate (Y1) obtained the following results:

Table 5. t test variable X to Y1

Dependent Variable: Y1
 Method: Panel Least Squares
 Date: 09/26/24 Time: 14:42
 Sample: 2013 2022
 Periods included: 10
 Cross-sections included: 10
 Total panel (balanced) observations: 100

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	8.842067	0.586396	15.07867	0.0000
X	0.258221	0.033452	7.719194	0.0000

Source : output evIEWS 12

The probability value of X $0.00 < 0.05$ means that the variable X does not have a significant effect on the unemployment rate. While the effect of the unemployment rate variable (Y1) on the economic growth variable obtained the following results:

Table 6. t test variable X to Y2

Dependent Variable: Y2
 Method: Panel Least Squares
 Date: 09/26/24 Time: 12:35
 Sample: 2013 2022
 Periods included: 10
 Cross-sections included: 10
 Total panel (balanced) observations: 100

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	8.034921	8.102740	0.991630	0.3241
X	-0.586807	0.316778	-1.852424	0.0673
Y1	0.652466	0.776866	0.839869	0.4033

Source : output evIEWS 12, 2024

The value of the X probability is $0.06 > 0.05$, so the X variable does not have a significant effect on the Y2 variable.

3.3 F Test (simultanius test)

The f test (simultaneous) is conducted based on the fixed effect model (FEM) as determined in the previous section. The f test will provide results regarding the relationship between variables simultaneously. The following are the results of data analysis using evIEWS software version 12

Table 7. Simultaneous test Variable X to Y2 and Y1

Cross-section fixed (dummy variables)			
R-squared	0.791828	Mean dependent var	6.472400
Adjusted R-squared	0.765806	S.D. dependent var	1.739563
S.E. of regression	0.841837	Akaike info criterion	2.605705
Sum squared resid	62.36463	Schwarz criterion	2.918326
Log likelihood	-118.2853	Hannan-Quinn criter.	2.732228
F-statistic	30.42973	Durbin-Watson stat	1.664636
Prob(F-statistic)	0.000000		

Source: output views 12, 2024

The probability value is $0.00 < 0.05$, so the investment variable (X) and unemployment rate (Y1) simultaneously have a significant effect on the economic growth variable (Y2).

3.4 R square test

R square, or the coefficient of determination, is a statistical measure in regression analysis that describes the proportion of variation in the dependent variable, proxied by the economic growth variable (Y2), that can be explained by the independent variable, proxied by the investment variable (X), and the unemployment rate variable (Y1) in the model.

Table 8. R Square

R-squared	0.791828
Adjusted R-squared	0.765806
S.E. of regression	0.841837
Sum squared resid	62.36463
Log likelihood	-118.2853
F-statistic	30.42973
Prob(F-statistic)	0.000000

Source : Output views 12, 2024

The investment variables (X) and unemployment rate (Y1) are able to explain the economic growth variable (Y2) by 0.76 or 76%, while the remaining 24% is explained by other variables.

4 Discussion

4.1 Investment Variable (X) a Negative and Significant Effect on Unemployment Rate (Y1) in Indonesia

The panel data regression results show that the investment variable has a coefficient of 0.25, suggesting a positive relationship between investment (X) and the dependent

variable (unemployment rate, Y_1). This implies that for every 1-unit increase in investment, the unemployment rate increases by 0.25 units. Contrary to theoretical expectations, which posit that investment typically reduces unemployment, this result does not support the hypothesis. However, the significance test reveals that the probability value of the investment variable is 0.00, well below the 0.05 threshold. This indicates that despite the unexpected positive direction, the relationship between investment and unemployment is statistically significant.

According to classical economic theory, investment generally fosters job creation by expanding production capacity, thus boosting demand for labor. When governments or firms invest, the need for workers increases, theoretically leading to a reduction in unemployment. This is reinforced by the Keynesian Multiplier Theory, which asserts that an increase in investment spending has a multiplier effect on the broader economy, stimulating demand and promoting employment growth. Investment is expected to stimulate consumption and production, which, in turn, creates job opportunities.

However, the positive relationship between investment and unemployment observed in this study suggests that other factors may be at play. Misaligned economic policies, for instance, may hinder the ability of investment to generate jobs effectively. Additionally, government investment in infrastructure projects may not immediately benefit sectors that are crucial for large-scale employment growth. External macroeconomic conditions, such as shifts in global demand or domestic policy changes, including wage regulation or labor market restrictions, may also counteract the job-creating potential of investments. This misalignment could explain the contradiction between the theoretical expectation of job creation and the empirical results showing rising unemployment alongside increased investment.

This result could also point to the possibility of job displacement due to technological advancements or capital-intensive projects, where investments do not translate directly into increased demand for labor. Empirical studies, such as those by [26] highlight how investments in automation and technology can reduce the need for human labor, even in cases where overall economic productivity rises. Similarly, [27] note that investment in specific sectors may temporarily increase unemployment, particularly when the skills required for new jobs created by the investment do not match the existing workforce. Therefore, the nature of the investment and the economic context in which it occurs play a crucial role in determining its impact on employment outcomes.

4.2 Investment Variable (X) a Positive and Significant Effect on Economic Growth (Y2) in Indonesia

The coefficient for the investment variable (X) is -0.58, indicating a negative relationship between investment and economic growth. This suggests that for every 1-unit increase in investment, economic growth decreases by 0.58 units. This result contradicts the hypothesis that investment should have a positive impact on economic growth. However, the significance test shows that the p-value for the investment variable is 0.0673, which is higher than the conventional 0.05 significance level. Since the p-value exceeds 0.05, the negative effect of investment on economic growth

is not statistically significant. In other words, while the coefficient is negative, this relationship cannot be considered significant based on the regression results.

The hypothesis assumes that investment has a positive and significant effect on economic growth. However, the data suggest otherwise; investment does not positively impact economic growth and instead shows a negative relationship. Furthermore, this negative impact is not statistically significant. These findings emphasize that investment may not always yield positive outcomes for economic growth, especially if the investment is not efficiently directed toward productive sectors. Overinvestment in less productive or capital-intensive sectors can lead to suboptimal outcomes, negatively affecting economic growth.

Additionally, the effectiveness of investment largely depends on how it is allocated. Investment in sectors that generate high value and stimulate economic activity, such as innovation, technology, and education, tends to drive long-term growth. Conversely, investment in stagnant or non-productive areas may result in diminishing returns and can even drag down overall economic performance. These results highlight the importance of strategic investment planning to ensure that financial resources are channeled toward areas that contribute meaningfully to sustainable growth.

Moreover, this analysis serves as a reminder that the quality of investment is often more crucial than the quantity. Countries with significant investment flows must focus on creating favorable business environments, fostering entrepreneurship, and supporting sectors with growth potential. Otherwise, the anticipated economic benefits from increased investment may not materialize, or worse, may have unintended negative consequences for the broader economy.

4.3 Investment Variable (X) a Positive and Significant Effect on Economic Growth (Y2) Through Unemployment Rate (Y1) in Indonesia

Based on the results of the simultaneous test (F-test) in the regression output, the R-squared value is 0.7918. This means that 79.18% of the variation in economic growth (the dependent variable) can be explained by the variation in investment and unemployment (the independent variables). The remaining 20.82% is attributable to other factors not included in the model. Additionally, the adjusted R-squared value of 0.7658 indicates that after accounting for the number of independent variables, 76.58% of the variation in economic growth is explained by investment and unemployment. This implies that the model does a reasonably good job of explaining the variability in economic growth.

Further examination of the regression results reveals an F-statistic of 30.42 with a probability value of 0.00, indicating that, simultaneously, the variables of investment and unemployment significantly influence economic growth. In other words, the independent variables included in the model collectively have a significant impact on economic growth.

In classical and neoclassical economic theory, investment is considered a key driver of economic growth. By increasing the physical capital within an economy, investment enhances long-term production capacity, which in turn raises overall economic output. According to these theories, a positive relationship between investment and economic growth is expected. Conversely, unemployment tends to

have a negative relationship with economic growth. A higher unemployment rate reduces economic output because fewer workers are employed in the production process. Therefore, it is generally expected that higher unemployment will negatively affect economic growth [28]

Empirical research in various developing countries shows that the relationship between investment and economic growth is often significant, though the strength of the effect may vary depending on how efficiently the investment is allocated and which economic sectors benefit from it [29]. For example, investment in capital-intensive industries may not directly lead to inclusive economic growth or generate substantial employment, thereby limiting its impact on certain indicators. In this model, the variables of investment and unemployment are found to significantly influence economic growth in Indonesia. These findings are consistent with economic theory, which posits that investment is a primary engine of growth, while high unemployment poses a barrier to achieving economic expansion.

Additionally, these results underscore the importance of directing investment toward sectors that can generate broad-based economic benefits. Investments that promote innovation, entrepreneurship, and job creation tend to have a more substantial and long-lasting positive effect on economic growth. Similarly, policies aimed at reducing unemployment can complement investment-driven growth by ensuring that more people are actively engaged in the production process, contributing to higher output and productivity.

5 Conclusion

Based on the results of partial and simultaneous tests, it was found that investment does not align with theoretical expectations regarding its effects on unemployment and economic growth. Partially, investment actually shows a positive and significant relationship with unemployment, which contradicts classical and Keynesian economic theories. According to these theories, investment should increase production capacity and create jobs, thus reducing unemployment. However, in this study, the results indicate that investment tends to increase the unemployment rate. These findings may reflect a mismatch in investment allocation, where more investment is directed towards capital-intensive sectors that do not absorb a large labor force, or there are structural issues in the labor market causing a temporary negative effect.

Furthermore, the analysis also shows that investment has a negative impact on economic growth. This suggests that the investment made during the observation period did not have a strong impact on promoting economic growth in the analyzed provinces. Investment may have been more directed toward long-term projects that require time before generating economic impact, or the allocation of investment was ineffective in sectors that directly contribute to the increase in gross domestic product (GDP). These results emphasize the importance of assessing the types of investments made and ensuring that they are directed toward productive sectors that can immediately boost the economy.

On the other hand, the simultaneous test shows that overall, investment and unemployment have a significant effect on economic growth. This indicates that while the individual effects of each variable may not fully align with theoretical

expectations, the combination of these two variables together influences economic performance. However, these results also suggest that other factors play a role in explaining economic growth besides investment and unemployment, such as fiscal policy, inflation, and global conditions. Therefore, further research is needed to explore how investment allocation and labor dynamics can be optimized to achieve sustainable economic growth in Indonesia.

In the context of this study, there is an indication that the investment made has not been optimal in promoting job creation and economic growth in Indonesia, especially in the short term. Consideration of the types of investments made and the structure of economic sectors must be prioritized to enhance the effectiveness of investment in boosting economic growth and reducing unemployment. Hence, further research is needed to explore the types and sectors of investment that are more effective in achieving inclusive and sustainable economic growth in Indonesia.

6 Acknowledgements

This Research was supported by a Center for Education Financial Services (PUSLAPDIK Indonesia) and Indonesia Endowment Funds for Education (LPDP Indonesia).

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