

Investment and Unemployment Reduction: An Empirical Study of Indonesia using Panel Data Regression

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Abstract: One of Indonesia's seven development agendas is the improvement of competitive human resources. Therefore, government concerns in reducing employment. Currently, one of the government's efforts to reduce unemployment is to increase investment in various regions. This study aims to identify the effect of investment realization to the unemployment in Indonesia by using provincial panel data from 2006 to 2018. Furthermore, investments in this study are divided into foreign and domestic direct investment. The panel data evaluation gives a result that Feasible Generalized Least Squares with Seemingly Unrelated Regression (FGLS-SUR) is a suitable estimation for the analysis. Based on the model, this study finds that both foreign and domestic direct investments give a significant effect in reducing unemployment. This study can be used as a recommendation for the government to increase investment, especially the domestic, as well as sectors that absorb labor to accelerate the economic wheel and reduce the unemployment simultaneously.

1 INTRODUCTION

The Indonesian Government has set 7 Development Agenda in The Mid-Term National Development Plan (Rencana Pembangunan Jangka Menengah/RPJM) 2020-2024 (BAPPENAS, 2019). One of the Development Agenda is "improvement of competitive human resources". Therefore, reducing unemployment is one of the government's main concerns. Through 2020-2024, the government sets Indonesia's unemployment target of 4.0-4.6 percent in 2024. Various efforts have been made by the government to reduce unemployment, such as using external sources.

One of the external sources used by the government in reducing unemployment is through investment. The various government policies are expected to attract both domestic and foreign investors to invest in Indonesia. According to Act No. 25 of 2007 on Investment, attracting investors to invest in Indonesia aims to increase economic growth and create jobs. Besides, investment also aims to improve the competitiveness of the domestic business world. As a result, investment can reduce unemployment and improve people's welfare by

creating new jobs that will reduce the unemployment rate (Mankiw, 2009).

The interdependence between investment and the unemployment rate varies greatly from one region to another depending on the structure of the economy and type of investment received (Strat, 2015). Moreover, investment and unemployment rates also have various patterns because the economic structure and type of investment can change significantly in the long run (Parker, 2010). As a result, the government must consider investment when developing policies to reduce unemployment (Strat, 2015).

Blanchard (2011) argues that countries with higher unemployment have two big advantages in the eyes of foreign investors: a) a lot of available labor; b) has a great opportunity to find workers with lower wages. But when the unemployment rate in a country is too high, the foreign investor sees this as an indication of macroeconomic instability. Therefore, the country is not seen as a suitable place for potential investment (Brozen, 1958).

Various studies that discussed the impact of investment on unemployment proved that investment has a significant effect on reducing unemployment, both in the short and long term (Chaudhuri &

Banerjee, 2010; Mucuk & Demirsel, 2013; Schmerer, 2014; Strat et al., 2015). In Indonesia, Tegep et al. (2018) stated that unemployment and foreign investments did not have a direct relationship. Furthermore, unemployment and investment had two intermediary variables, namely economic growth, and regional minimum wages. To complete this gap, this study aims to prove that there is a direct effect between investments to unemployment. This study does not only cover foreign direct investments (FDI), but also domestic direct investments (DDI). This study also aims to see which investments have a greater impact on reducing unemployment. Therefore, this study is expected to be one of the considerations for the government to increase investment in reducing unemployment in Indonesia.

This study consists of five parts. The next section is a brief review of unemployment and investment and their relationship based on previous literature. After that, the third part presents data and study methodology. Part 4 presents the results of the study and is followed by discussion. This paper concludes with conclusions and brief recommendations to the government regarding investment to reduce unemployment.

2 LITERATURE REVIEW

2.1 Unemployment

Unemployment is part of the workforce that does not have a job and is looking for work; who do not have a job and prepare a business; those who do not have work and do not look for work, because they feel it is impossible to get a job; and those who already have jobs, but have not yet started working (BPS, 2020). The unemployment rate is used as an indicator to capture the reactions of labor markets to the change of the economy. Furthermore, unemployment is useful to determine the efficiency and effectiveness of the economy to hire labor and measure labor market performance (Benes & Walsh, 2018).

Unemployment is an endless problem. Nowadays, technology continues to develop until it is finally able to replace human work. This leads people to worry that they will lose their jobs due to technology rather than job competition (Schmerer, 2014). It is not surprising that unemployment is one of the most frequently encountered topics in political debates (Mankiw, 2009). Unemployment in a region can be caused by various factors, including economic factors.

One of the economic factors that cause unemployment is the determination of minimum wages. This results in wages being unable to reach a level of balance between demand and supply of employment. The Indonesian Government, through regional heads, sets minimum wages annually in every province. As a result, there is a decrease in opportunities to find jobs and increase unemployment (Mankiw, 2009).

The regional minimum wage (RMW) changes every year considering inflation conditions and the decent living needs in the province in the previous year (BPS, 2020a). This is useful for adjusting wages to the current conditions of goods and services so that workers are still able to meet their needs properly. As a result, inflation also has a role in reducing this unemployment as stated in the Phillips Curve (Mankiw, 2009).

Okun's Law stated that economic growth has the opposite relationship to unemployment (Mankiw, 2009). The basic assumption of this idea is that when economic growth grows more than 2.25%, every 1% increase in output will reduce unemployment by 0.5%. In other words, an increase in economic growth in an area causes a decrease in unemployment. This is in line with the study by Tiger et al. (2018) that economic growth in Indonesia has a negative impact on unemployment. This means that the Okun law applies in Indonesia

Based on the previous paragraphs, it can be summarized that despite of investments, the factors that correspond to the unemployment are regional wages, economic growth, and inflation (Mankiw, 2009; Tegep et al., 2018). This is also supported by various economics theories such as Phillips Curve and Okun's Law. Thus, these factors are included in this study.

2.2 Investment

According to Act No. 25 of 2007 on Investment, foreign direct investments (FDI) is defined as all forms of capital investing activity by foreign capital investors, to undertake business within the Indonesian Territory. Meanwhile, domestic direct investments (DDI) are the investment activity to conduct business in the Indonesian territory by domestic investors using domestic capital.

Investment has goals to accelerate the economic wheel such as increasing economic growth, sustainable economic development, competitiveness of the domestic business world, as well as national technological capacity and capability. Furthermore, investments also can be optimized to create jobs,

encouraging the development of a populist economy, turning potential economies into real economic strength by using funds both from domestic and foreign, as well as improving the welfare of the community. As a result, President's Regulation No.20 in 2018 stated that in making investments, investment companies should prioritize Indonesian citizens in meeting the needs of workers, except if certain positions cannot be filled with Indonesian citizens.

Keynes (1936) asserted that the point of economic equilibrium occurs when aggregate demand is equal to aggregate expenditure. Unemployment occurs when aggregate demand is smaller than aggregate expenditure so that long-term output will not be absorbed by consumers and will result in unemployment. One factor driving aggregate demand is investment demand (Froyen, 2009). Meanwhile, Schumpeter's Theory (1942) emphasized the importance of the role of entrepreneurs in realizing economic growth, where entrepreneurs act as a group that is constantly making updates and innovations in economic and technological activities. These innovations such as introducing new goods, expanding the market of goods, developing new sources of raw materials, and making changes in the organization to increase the efficiency of company activities. Thus, the awareness of entrepreneurs about the possibility of making profitable innovations causes them to make loans and investments that increase the balance of economic development.

Investment is useful to increase the country's economic activities. Furthermore, investments have an impact on increasing employment, income, and consumption of the population (Mankiw, 2009). Investments also increase profits for the company which encourages them to produce more goods and expands their investments. As a result, the demand for new jobs is increased so that these conditions form a cyclic flow that will continue to drive economic growth in a country. (Schumpeter, 1939).

2.3 Relationship between Investment and Unemployment

Karlsson et al. (2009) found that FDI had a positive influence on employment growth in which they used a sample of manufacturing companies from China in the period 1998 - 2004. In line with the study, Ajaga and Nunnekamp (2009) also found that in the United States, FDI has a positive long-term effect on the employment rate. Meanwhile, Lipsey et al. (2010) found that the shift in ownership from local to foreign

had a significant influence on growing employment in Indonesia.

Muafiqie (2018) through the Granger Causality analysis showed that FDI has a significant influence on the unemployment rate in Indonesia in 2000-2016. Furthermore, the analysis of the VAR model showed that FDI with a one-year lag has a negative relationship with the unemployment rate while a two-year lag has a positive relationship. Malik and Saima (2013) through the Johanson Co-integration approach found that there was a long-term relationship between FDI and the unemployment rate in Pakistan in 1970-2011. Meanwhile, the study of Adam and Zurek (2011) with the VAR approach shows that there is a short-term relationship between FDI and unemployment in Poland in 1995-2009.

In contrary to the studies mentioned previously, Rizvi and Nishat (2009) state that FDI has no direct impact on unemployment for the countries studied (China, India, and Pakistan in 1985 - 2008 period). Then, Sandika (2014) found that investment (FDI and DDI) in Pelalawan district, Indonesia in 2003-2012 had a positive but not significant effect on employment. This study also explained that domestic direct investment is more oriented to the development of sectors that do not absorb labour, so it does not increase employment opportunities for the community.

Based on the paragraphs that were mentioned above that investment has important roles in the economy. The investment is not only useful to accelerate the economic wheel but also opens jobs for society in the region so that the employment rate can be increased particularly when the investors expand their investments. Thus, this study hypothesized that the investment, both domestic and foreign, can reduce the unemployment in Indonesia.

3 METHODOLOGY

3.1 Data

This study uses balanced panel data of 33 provinces in Indonesia with an annual period from 2006 to 2019. Analysis using panel data has several advantages compared to using only cross-sectional or time-series data, particularly in controlling individual heterogeneity and the wealth of information obtained (Baltagi, 2008). Based on the literature review, the dependent variable used in this study is unemployment. Furthermore, the independent variables used in this study are domestic and foreign

investment, economic growth, and inflation. This data is disseminated on the BPS website (<https://bps.go.id>).

3.2 Analysis Method

This study uses two analytical approaches. The first is a descriptive analysis to get a brief overview of the correlation between investment and unemployment. After that, an inference analysis regarding the relationship between investment and unemployment is carried out using the model which is explained in equation 1.

$$unemp_{i(t)} = unemp_{i(t-1)} + \beta_1 DDI_{it} + \beta_2 FDI_{it} + \beta_3 inf_{it} + \beta_4 RMW_{it} + \beta_5 growth_{it} \quad (1)$$

With UNEMP being the level of open unemployment, DDI and FDI are respectively the realizations of domestic and foreign investment (trillion rupiahs). GROWTH is economic growth. RMW is the regional minimum wage in thousand rupiahs and INF is inflation for the year. The i and j explain the index of province and time, respectively.

Since this study uses panel data, the inferential analysis cannot be answered using ordinary multiple linear regression because it can lead to bias and autocorrelation because of individual heterogeneity (Moulton, 1986; 1987). This study uses panel data regression to deal with these problems. Panel data regression has three common types of models, namely fixed (FEM), random (REM), and common effect models (CEM) (Greene, 2018). These three models have differences in the assumptions of the effects contained in the model. Common effects assume there are no individual or time effects so estimates can be made directly with OLS. Fixed effects assume that individual effects are estimated and a fixed value. Meanwhile, random effects assume that individual effects are estimated and have random values.

The panel data analysis starts with testing which model is the most suitable for the data. There are three panel data tests namely Chow (CEM vs FEM), Hausman (FEM vs. REM), and Breusch-Pagan Lagrange Multiplier (BP-LM) test (CEM vs REM). The detail of these tests can be seen in Greene (2018) and Baltagi (2008). In summary, if REM is selected, the estimation can be done directly using the generalized least squares method. Meanwhile, if CEM or FEM are selected, the variance-covariance structure with LM needs to be carried out. If the LM test gives an insignificant result, the estimation is

sufficient using ordinary least squares (OLS). Otherwise, a generalized least square (GLS) is utilized as the estimation method and a Lambda-LM test is employed to evaluate the cross-sectional correlation. The GLS is used for the estimation if there is no cross-sectional dependence and the feasible GLS with seemingly unrelated regression (FGLS-SUR) is used if otherwise.

The SUR approach was developed by Zellner (1962) to account the efficiency of the error correlation from the equation. The traditional panel estimation such as OLS suffered from large degrees of freedom. Meanwhile, generalized least squares (GLS) estimator do not always produce efficient variance component, particularly when there is a cross-sectional dependence (Baltagi, 2008). Thus, the combination of FGLS and SUR provides best linear unbiased estimator (BLUE) and efficient result when the data encounters heteroscedasticity and cross-sectional dependence. The details of FGLS and SUR can be found in Zellner (1962) and Baltagi (2008).

However, it should also be noted that since panel data regression is also solved by the least-squares method, classical assumptions of BLUE (normality, multicollinearity, heteroscedasticity, autocorrelation) is necessary to be tested so that the estimation results are consistent and unbiased. If the estimation method used is GLS or FGLS, heteroscedasticity and autocorrelation do not need to be tested because this method is robust to these assumptions.

Overall, this study uses R to conduct descriptive analysis and panel data for the initial stage (R Core Team, 2020). The descriptive analysis visualization is done using the ggplot2 package. Also, the best panel model evaluation is done using the plm package. Specifically, for FGLS with SUR weight (FGLS-SUR), the simulation is carried out using the Eviews application because the R does not provide this facility.

4 RESULTS AND DISCUSSIONS

4.1 Descriptive Analysis

Indonesia is a country that has abundant natural resource potential. This is shown by many countries that came to Indonesia in search of various materials. Until now, the potential of resources in Indonesia is huge, but Indonesia still cannot process the available resources optimally. As a result, this has triggered various parties including foreign countries to invest in Indonesia.

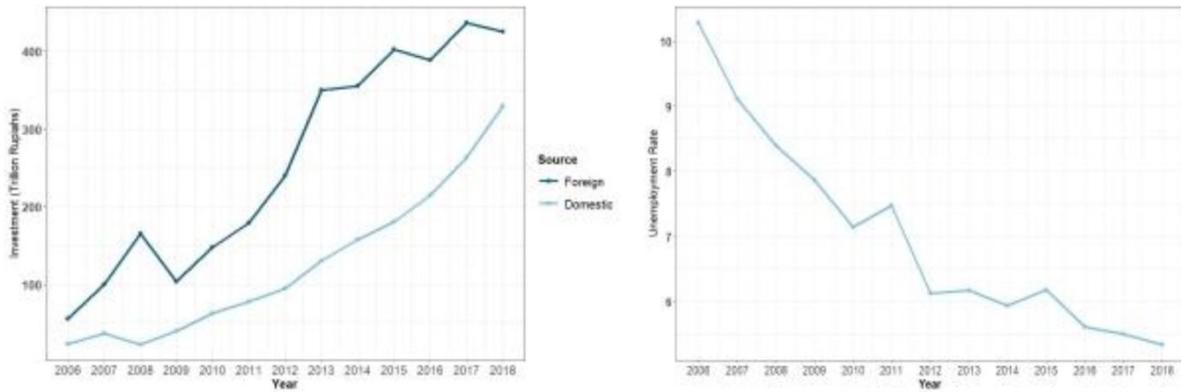


Figure 1: Investment development (left) and unemployment (right) in Indonesia.

Figure 1 presents the development of domestic and foreign investment while unemployment is presented side by side. From Figure 1, investment, both domestic and foreign in Indonesia has a trend that tends to increase from time to time, although there is a slight decline. Meanwhile, unemployment in Indonesia has the opposite trend, i.e., decreases from year to year. This indicates that investment in Indonesia has an inverse relationship with unemployment. Figure 2 shows the unemployment trend, which is indicated by a line graph, as well as the amount of investment indicated by the shaped point that represents the province. The picture in the left shows foreign investment and the right shows

domestic investment. A larger point means larger investments made in the province. From the left side figure 2, the top five FDI are dominated by provinces in Java. While investments made in areas outside of Java Island are found in several provinces in Sumatra. The Papua region is also one of the places to invest because the area has natural resources such as gold and uranium. Like North Sumatra, Riau is also an investment area because of the abundant oil and gas in the province. Furthermore, the trend of unemployment in each province also tends to decline annually. This indicates that in general, foreign investment in each province can reduce unemployment.

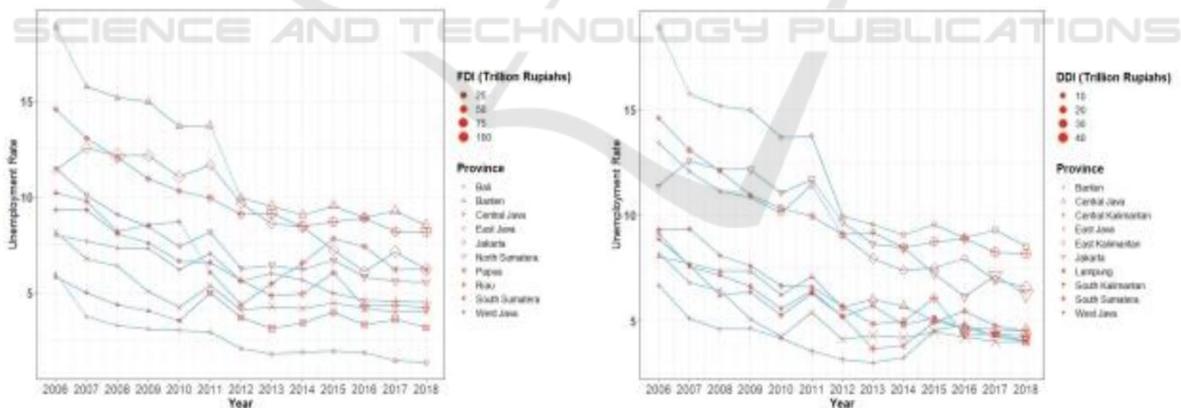


Figure 2: Unemployment and Investment trends in 10 provinces with the highest FDI (left) and DDI (right).

Meanwhile, DDI is mostly realized outside Java Island, such as the Kalimantan Island which also has a lot of mining areas such as coal, aluminium, and gold. Furthermore, dense forest areas on the Island make it potential to create a plantation. As a result, the Kalimantan region attracts domestic investors to invest. Just like FDI, several regions on the island of Sumatra, such as South Sumatra and Lampung, also attract domestic investors to make investments. From

the unemployment view, the trend in each province also tends to decrease every year. This indicates that domestic investment also contributed to reducing unemployment.

Based on the paragraphs above, it can be concluded that investments made in each region contribute to the reduction in unemployment. To prove this, the next section discusses the effect of the

investment on unemployment. The method used has been discussed in the previous section.

4.2 Results

Based on the model evaluation results (see appendix), Chow and Hausman test show rejection to the null hypothesis which means that the best model used in this study is FEM. The produced model does not violate the multicollinearity between independent variables. However, the model violates several assumptions namely the significant heteroscedasticity and serial autocorrelation. Consequently, this study uses FGLS-SUR as the estimation method. The result of Shapiro-Wilk normality test shows that the residual of FGLS-SUR estimation is normally distributed (p-value=0.067), i.e. the model produced is consistent and unbiased so that it can be interpreted appropriately.

$$\begin{aligned} unemp_{it} = & 7.302 - 0.016FDI_{it} - 0.024DDI_{it} + \\ & 0.053inf_{it} - 0.001RMW_{it} + \\ & 0.021growth_{it} \end{aligned} \quad (2)$$

Table 1 presents the results of a simulation of the relationship between investment, inflation, UMR, and economic growth using FEM with FGLS-SUR as the estimation method. The model produced in table 1 can be written mathematically as follows:

Table 1. FGLS-SUR Simulation Result

Variable	Coeff	Std. Error	t-Statistic	Prob.
C	7.302	0.3820	19.139	0.000
FDI	-	0.0080	-2.017	0.044
DDI	-	0.0115	-2.048	0.041
INF	0.053	0.0303	1.763	0.078
RMW	-	0.0003	-3.340	0.000
GROWTH	0.021	0.0179	1.194	0.233

Based on table 1, it can be seen that at 5% significance level, the variables that influence the unemployment rate are both domestic and foreign investment, as well as regional minimum wage. These variables give a negative effect to unemployment. Meanwhile, inflation and economic growth gives insignificant positive effect to the unemployment rate. Based on equation 2, it can be seen that in a constant state, the general unemployment rate is 7.302 percent. Meanwhile, when FDI in a province increases by 1 trillion rupiahs, the unemployment rate in a region decreases by 0.016 percent. When compared with foreign

investment, domestic investment of 1 trillion rupiahs has a greater influence, namely reducing unemployment by 0.024 percent. On the other hand, an increase in regional minimum wage by one thousand rupiahs can reduce unemployment by 0.001 percent. In other words, an increase of one hundred thousand rupiahs would reduce the unemployment rate by 0.1 percent. Therefore, it can be concluded that not only both domestic and foreign investment which give good impact in reducing unemployment in Indonesia, but also the regional minimum wage.

4.3 Discussions

From the results, it can be seen that this study finds the expected results as hypothesized previously that both domestic and foreign investment has a direct relationship to the reduction in unemployment in Indonesia which can be seen from the significance of the coefficients on the two variables. This is contrary to the study of Tegep et al. (2018) which states that investment has no direct relationship to unemployment. This is in line with Keynes (1936) theory which views the investment as one of the factors that drive labour demand. Schumpeter (1942) theory also states that the importance of the role of entrepreneurs in investing to reduce unemployment. Besides, investment at a high level will encourage high labour demand so that more jobs will be created, and this will lead to a decrease in unemployment (Mankiw, 2009).

Meanwhile, the unemployment reduction in Indonesia due to the increase of foreign investment is in line with the study by Lipsey et al. (2010) which states that increasing foreign investment in Indonesia will open up new jobs which will reduce the unemployment rate. Based on the data from the Indonesia Investment Coordinating Board (BKPM), the most foreign investors investing in Indonesia in 2018 came from Singapore (US\$ 9.2 billion, 31.4% of total FDI) and Japan (US\$ 5 billion, 16.7% of total FDI). Both countries do not send a lot of labours so that more domestic workers are absorbed in Indonesia (BKPM, 2019). When viewed from the sectors entered, Singapore tends to be involved in the paper & printing, chemical & pharmaceutical, food, electronics, and machinery & metal sectors with a workforce of 1,880 people. From this point of view, Indonesia is quite benefited because in addition to obtaining investment it also receives benefits in the form of absorbing large numbers of domestic workers.

In addition to unemployment reduction, increasing foreign investment can be useful to

increase domestic trade competitiveness (Gamariel and Hove, 2019). This will also trigger domestic entrepreneurs to continue to make better innovations so that domestic work has a high level of competitiveness towards foreign countries. Besides, the output produced will continue to be of better quality so that each investor will expand and open up new jobs while encouraging economic growth (Alvaro, 2006). However, even though foreign investment encourages economic growth, the country does not get a full profit from the trade results because some of the profits go back to their home countries (OECD, 2002).

Meanwhile, the increase in domestic investment can be useful to increase economic growth in the country as a whole because of the profits that are returned to the country itself so that the country can become less dependent on other countries (Djulius et al, 2019). In 2018, DDI which amounted to Rp328.6 trillion (Approx. US\$ 22.3 Billions) was dominated by the transportation, warehouse, and telecommunications sectors (17.8%) and construction (13.7%) (BKPM, 2019). This is in line with the Indonesian government's program in recent years where the sectors related to human resources such as infrastructure and construction, telecommunications, health, and tourism sectors are further enhanced (BAPPENAS, 2019). Therefore, the existence of the program is an attraction for domestic investors because of the prospect of large profits going forward, while also being able to reduce the level of domestic unemployment due to labour demand to develop these sectors to achieve economic growth for social welfare, as in line with the investment purpose which stated in the Act No. 25 of 2007.

On the other hand, inflation has a positive but not significant effect on unemployment. This means that the Phillips curve does not apply in Indonesia. This result is in line with the study of Trimurti and Komalasari (2014) which says that the positive effect of inflation on the level of open unemployment in Indonesia is caused by Indonesia's dependence on imported goods, the weakening of the rupiah against foreign currencies which causes an increase in the price of goods, as well as a higher inflation rate in Indonesia caused by rising fuel prices and transportation tariffs not caused by an increase in aggregate demand, as assumed on the Philips curve (Mankiw, 2009). Inflation caused by an increase in aggregate demand will cause producers to increase their production capacity by increasing the number of workers, which means the number of unemployed will decrease.

Minimum wages in a region have a significant impact on reducing unemployment in Indonesia, which is in line with findings from Comola and de Mello (2011) about the lighthouse effect in employment. According to lighthouse effect, the inactive labours are attracted to the labour market due to the escalated wages. Therefore, an increase in the minimum wage that is relatively stable is needed so that it will provide companies, economic sectors, and the community with the readiness and ability to develop and improve the business activities. Also, a conducive business climate also needs to be created by the government to widen the level of community economic participation to improve welfare and benefit from economic development.

Besides inflation, economic growth does not have a significant impact on unemployment. These results indicate the incompatibility of Okun's law in Indonesia in the study period. Institute for Development of Economics and Finance asserted that economic growth in Indonesia has not been able to create increased employment opportunities due to the lack of improvement in the tradable sector compared to the non-tradable sector, even though the tradable sector is a sector that can absorb more labour (INDEF, 2017). The study is also supported by 2018 investment data from BKPM where Indonesia relies on economic growth in the service sector (non-tradable sector) which minimally absorbs labour. According to the Indonesian Ministry of Trade, the tradable sector is a sector that produces output products that can be traded on foreign markets, while the non-tradable sector produces output products that cannot be traded on foreign markets (BPPKP, 2018).

5 CONCLUSIONS

This study aims to describe the direct relationship between investment and unemployment in Indonesia using panel data at the provincial level from 2006 to 2018. The investment studied in this study is not only foreign direct investment but also domestic direct investment. This study concludes that both domestic and foreign investment has a direct impact on unemployment. Therefore, the government needs to improve its investment strategy to increase state revenue while at the same time reducing unemployment. Moreover, potential investments to achieve these objectives are investments in sectors that absorb a lot of labours. Although foreign investment has a good impact on domestic innovation in terms of increasing resources that have competitiveness, increasing domestic investment is

also very much needed to improve the domestic economic cycle. As a result, the welfare of the people in Indonesia has increased, which is then followed by an economy that is growing higher.

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