Examining the Long and Short Run Effect of Young Workers on Macroeconomic Variables: An Application of Panel Autoregressive Distributed Lag Approach

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Abstract

The purpose of this research is to analyze the linkage between young workers and macroeconomic variables in Indonesia through a cointegration and causality approach. Multivariate causality between these variables. Using ARDL panel regression (Auto-Regressive Distributed Lag) with data from 2005 – 2019 covering 33 provinces in Indonesia. The results showed that the variable government expenditure on education had no effect on young workers in the short and long term, the variable economic growth only had a positive and significant effect on young workers in the long term. The increase in the minimum wage has a significant negative effect on young workers in the short term, and vice versa, it has a positive and significant effect on the long term. The last variable that has an effect is the investment variable which has a negative and significant effect in the short term on young workers. The results of multivariate causality testing between the variables above have the result that young workers have a two-way causal relationship with the minimum wage and have a one-way relationship with government spending on education.

Keywords: Government expenditure, Education, Economic Growth, Minimum Wage, Investment, Young workers, Panel Autoregressive Distributed Lag

1. Introduction

In the labor market, the young workforce with an age range of 15-24 years is in the most vulnerable position compared to other age groups to become unemployed (Eichhorst and Rinne, 2015; Caliendo and Schmidl, 2016). Young individuals entering the labor market are generally considered to be a population at risk. They face a higher risk of unemployment than older workers, are more likely to switch between unemployment, training and work, and are more likely to enter temporary jobs. Corbanese and Rosas (2016) state that young people are, on average, three times more likely to be unemployed than adults. The low absorption of young workers has been a serious problem since the 1990s and has not been significantly resolved until now. The global youth employment rate, since 1993 has always been below 90 percent (World Bank, 2019a), far below the overall world employment rate of 95 percent (World Bank, 2019b). The importance of solving the issue of youth workers has spurred the United Nations to target by 2020 the proportion of youth who are not working can be reduced to support inclusive and sustainable economic growth, full and productive employment and decent work for all which is the eighth goal of the Sustainable Development Goals (United Nation, 2015).

Indonesia is one of the countries that has a low level of youth employment, which is lower than the level of employment in the World and in Asia Pacific (Figure 1). Although Indonesia's employment opportunity rate for more than a decade has continued to increase to 94.87% in February 2018 (BPS, 2019), the absorption of young workers over the last 10 years has always been below 85%.
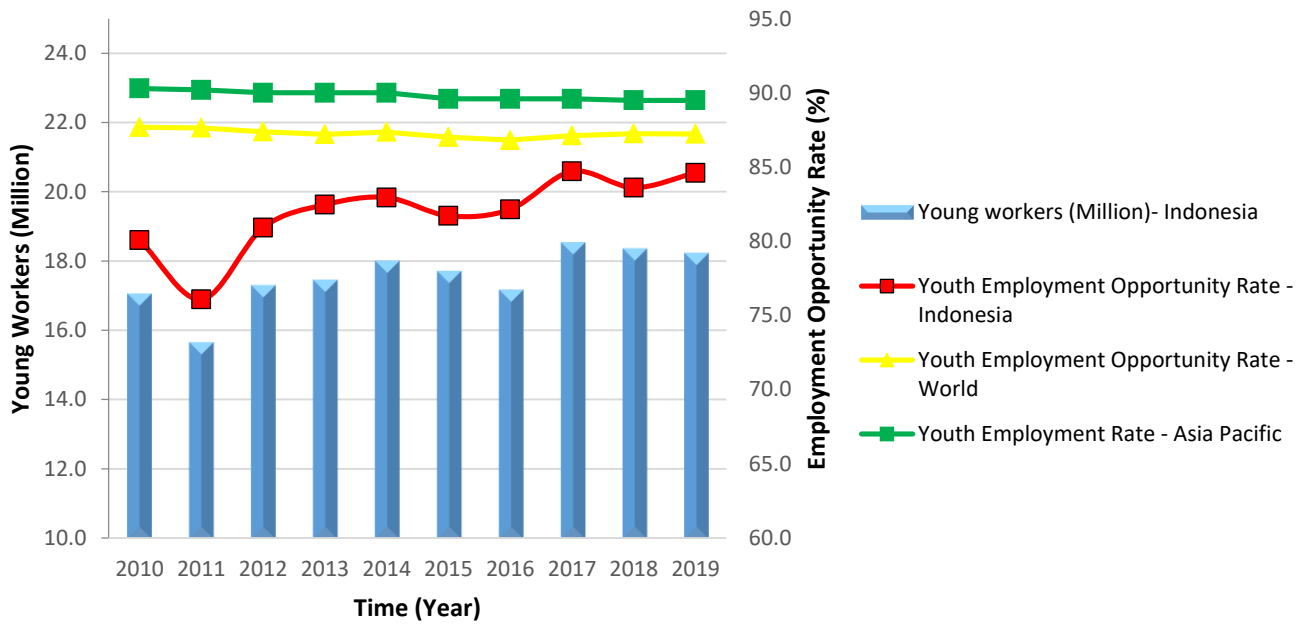
Figure 1. Number and Rate of Youth Unemployment (15-24 Years) in Indonesia,
Source: Central Bureau of Statistics and ILO, (2019)

Figure 1 show the youth employment rate increased from 80.1% in 2010 to 84.6% in 2019, although the annual trend is in an up and down condition. The smallest number of young workers occurred in 2011, amounting to 15.7 million people, and the largest occurred in 2017 which was 18.5 million people. Even though 2017 was the year with the highest labor absorption, when compared to the world employment rate which has a percentage of 87.1%, and in Asia Pacific at 89.5%, the youth employment rate in Indonesia is much lower. Basically, Indonesia has a large workforce. Currently, Indonesia is the fourth most populous country in the world with a population of 268 million people (World Bank, 2019c). In addition, Indonesia is also enjoying a demographic bonus which has started in the last few years and is expected to reach its peak in 2029-2030 (Puspadjuita, 2018).

The demographic bonus, marked by the number of people who are in productive age, even the number of people aged 15-64 years is projected to be at the highest graph in history, reaching 64% of the total population of Indonesia of 297 million people (Kemenkeu, 2016). If this abundance of labor force can be utilized, then the acceleration of economic development in Indonesia will be achieved, and economic growth will grow significantly as happened in China, whose economic growth increased by 3.2% after the demographic bonus, as well as South Korea, Singapore and Thailand (Kurniawan and Managi, 2018). However, if this demographic bonus is not utilized optimally, with the creation of quality human resources, in accordance with market demands, and unfavorable economic conditions, it will create a very large number of unemployment and economic burdens, especially youth who are always the last resort. to be employed, and until now it is still the government's homework to deal with it.

If we look more closely, the level of job opportunities in each province varies greatly. This is due to differences in economic and geographical structures in each region (Oktafianto et al., 2019), as shown in Figure 2. In 2019, the employment opportunity rate in Indonesia was 84.6%, while the provincial employment rate ranged from 73.8% to 95.6%. The higher the level of job opportunities reflects the younger workers are absorbed. Bali Province is the province with the highest youth employment rate, and Maluku Province is the lowest province. In Maluku Province, there are nine other provinces that are below the value of Indonesia's youth employment rate, namely Aceh, Riau, Kep. Riau, DKI Jakarta, West Java, Banten, North Sulawesi, North Maluku, and West Papua. These differences underlie this study using the research area to the provincial level.

The low absorption of young workers will automatically increase the unemployment rate in that age range and will be a serious threat to economic growth and social stability (Fox et al., 2016). In addition, various studies confirm that the high rate of youth unemployment will increase the number of crimes such as murder, drug trafficking, armed robbery, kidnapping, prostitution, rape and terrorism (Caruso and Gavrilova, 2012; Ehinomen and Afolabi, 2015; Surajo and Karim, 2016), high youth suicide rates in certain parts of the world (Pitman et al., 2012), and in the long term will also affect individual health (Helgesson et al., 2013), and increase poverty (Durotoye, 2014). The impact of this youth unemployment problem has prompted the government to continue to make efforts to reduce it, one of which is through this research.
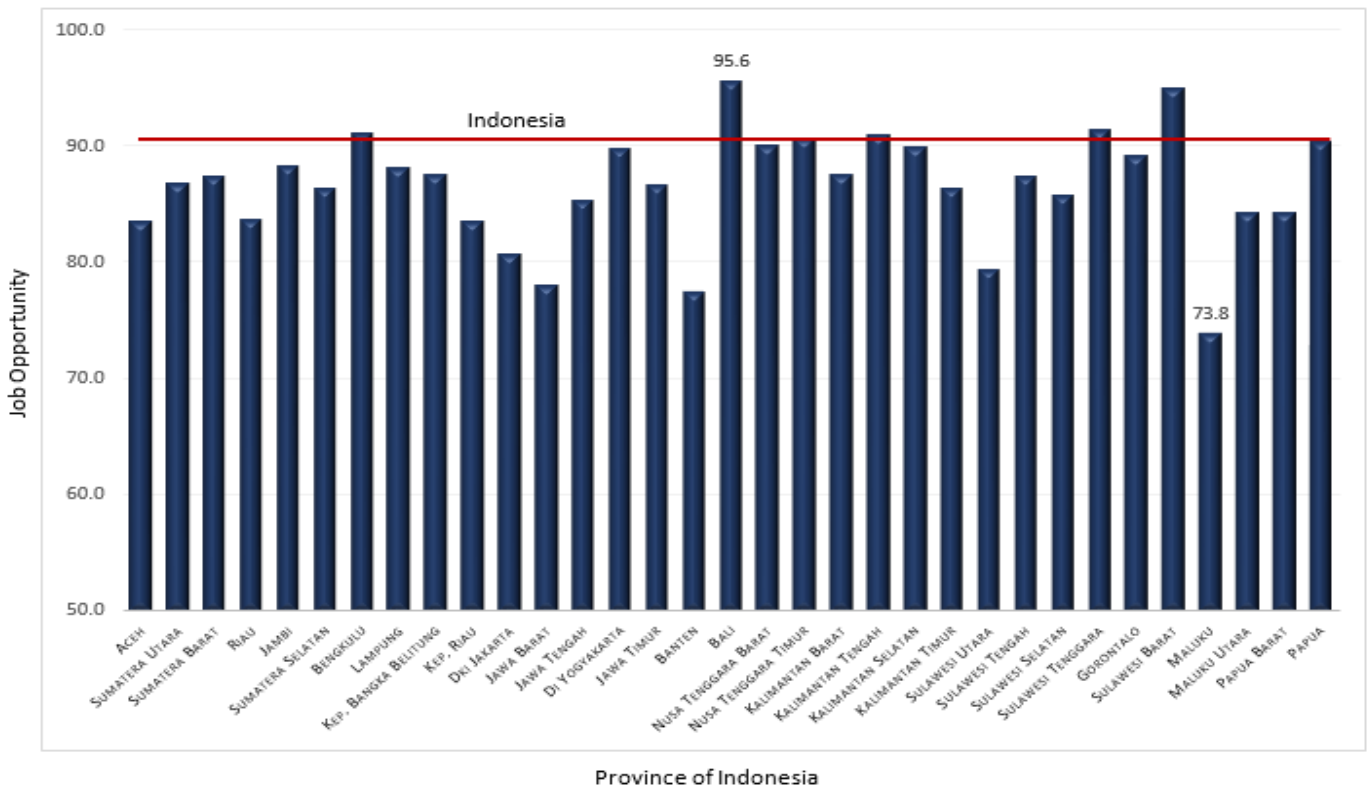
Figure 2. Level of Job Opportunity by Province in Indonesia in 2019
Source: Central Bureau of Statistics, (2019)

In 2018, the Government of Indonesia allocated an education budget of 20% of the total State Revenue and Expenditure Budget. The large percentage of the education budget is expected to be able to realize the government's target of creating education and training in accordance with industry needs. Indonesia, which has 34 provinces with different education budget allocations, will of course also have differences in producing human resources and in the absorption of young workers. As can be seen in Figure 3, the plot of the education budget in each province varies. Government spending on education in 2018 was mostly budgeted in DKI Jakarta Province with a budget value of 58.7 trillion Rupiah, then followed by East Java Province with a budget value of 14.3 trillion Rupiah. Meanwhile, the province with the smallest education budget is the Province of the Bangka Belitung Islands, with a budget of 0.4 trillion Rupiah.
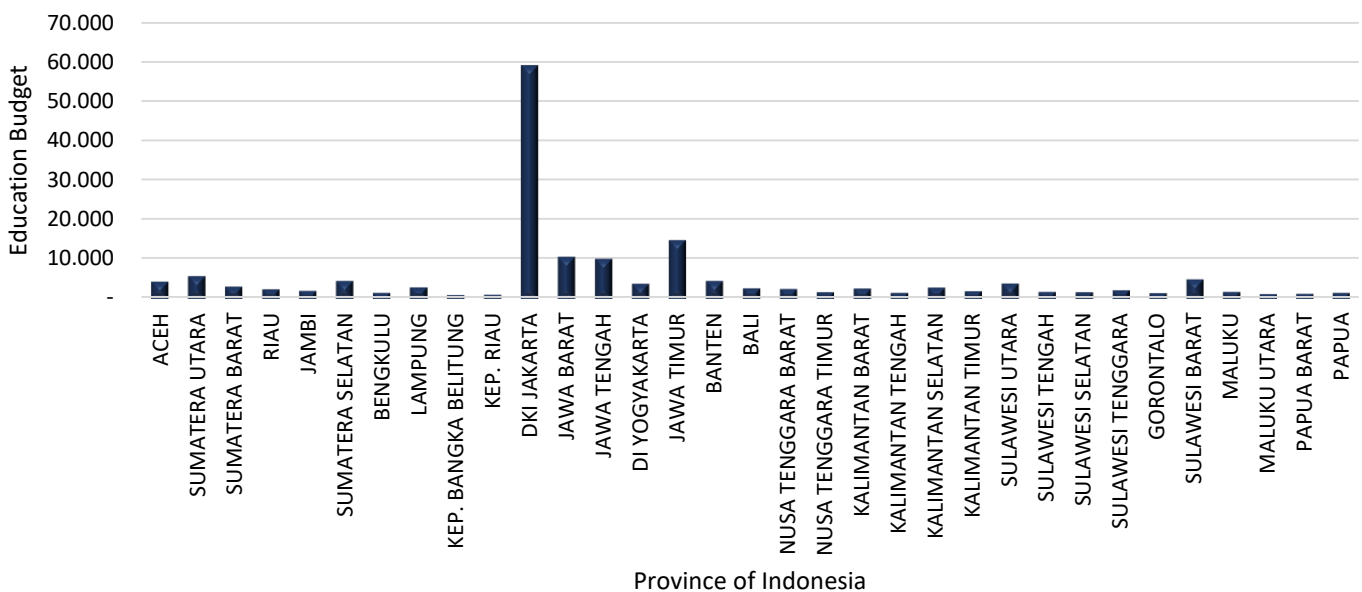

Figure 3. Education Budget by Province in Indonesia 2018 (Trillion)
Source: Source: Central Bureau of Statistics, (2019)

Another macroeconomic variable that is often associated with young workers is the minimum wage. Marimpi and Koning (2018) state that in 30 OECD countries, an increase in the minimum wage will reduce the absorption of young workers. Likewise, in Indonesia, documents a decline in the youth employment market share of 0.3%, when the provincial minimum wage increased by 1%. According to Figure 4, DKI Jakarta is the province with the highest minimum wage in 2019, with a minimum wage value of IDR 3,940,972. The number of wages is much higher when compared to the neighboring province, namely Banten Province which has a minimum wage of IDR 2,267,965 and West Java Province IDR 1,668,372. The province with the lowest minimum wage is DI Yogyakarta Province with a minimum wage of IDR 1,570,922. while the province of Aceh has a minimum wage of IDR 2,916,810.
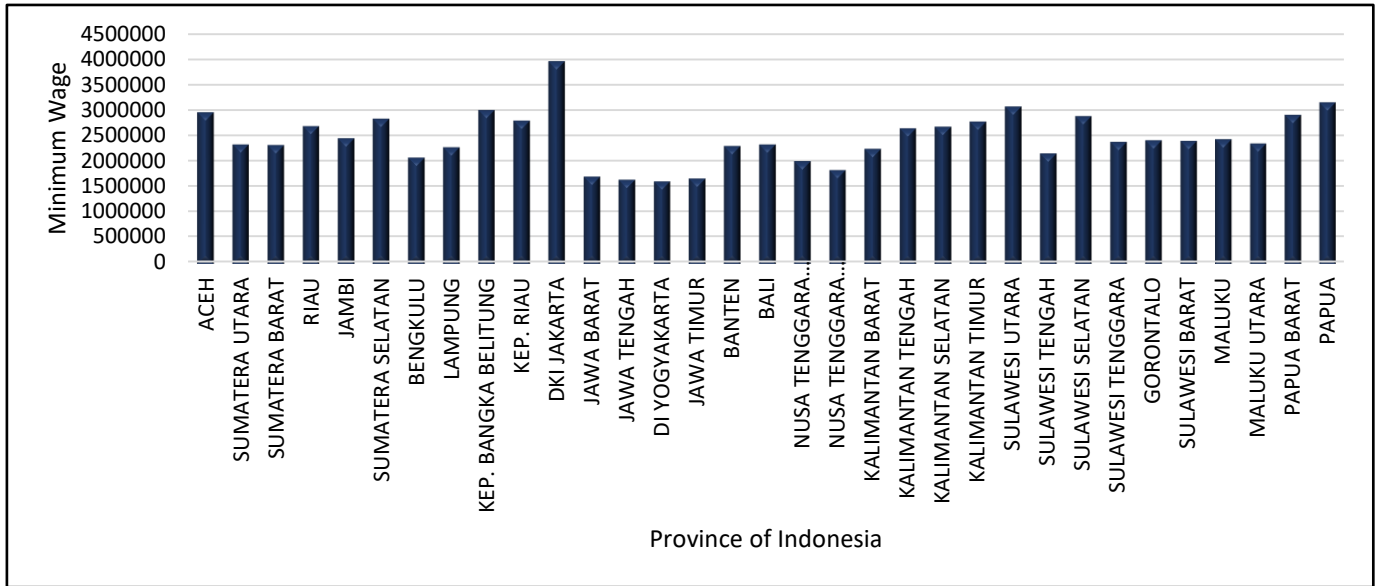

Figure 4. Minimum Wage by Province in Indonesia in 2019
Source: Central Bureau of Statistics, (2019)

Economic growth is the inflation-adjusted increase in the market value of goods and services produced by an economy over time and is conventionally measured as the percent rate of increase in real gross domestic product, or real GDP. Real GDP growth will positively and significantly affect the increase in youth employment (O'Higgins, 2012; Anyanwu, 2013). No exception in Indonesia, the difference in economic growth in each province will affect the absorption of labor, especially young workers. Figure 5 describes that DKI Jakarta Province has the highest GRDP of all provinces in Indonesia with a total value of 1,838,501 (billion rupiah). Meanwhile, the province with the lowest economic growth in Indonesia is North Maluku Province with a GDP value of 26,586 billion rupiah. Aceh's economic growth in 2019 grew 4.15% with a GRDP value of 164,210 (billion rupiah).
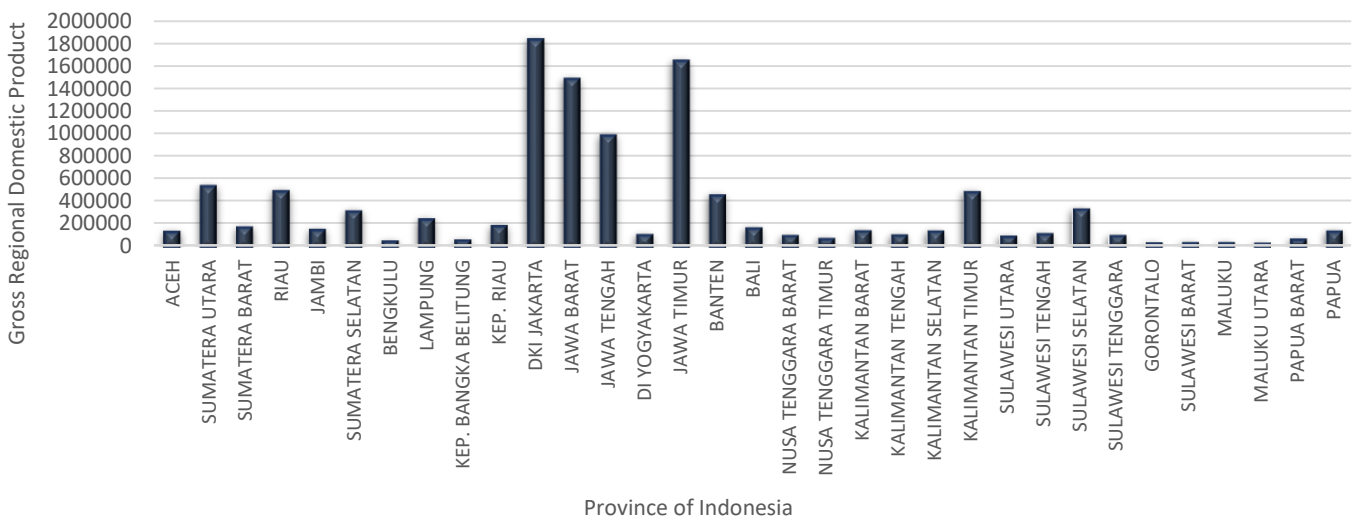

Figure 5. GRDP by Province in Indonesia in 2019 (Billion)
Source: Central Bureau of Statistics, (2019)

Investment is the last macroeconomic variable used in this study. Investment has a strong influence on employment. Maqbool et al. (2013) and Ahmad and Khan (2018) reveal that foreign investment is a significant determinant of unemployment in Pakistan in the short and long term. Not only foreign investment has a relationship with employment, the level of a country's domestic investment also has a positive and significant effect on youth employment in Africa and sub-Saharan Africa as researched by Anyanwu (2013). The investment value received by each province in Indonesia is different, both domestic investment and foreign investment, so that later job opportunities will also be different. Figure 6 displays that West Java Province received the largest investment from other provinces, with a total investment value of 137.5 trillion Rupiah. Meanwhile, the province that has the smallest investment is West Papua Province with an investment value of 1.07 trillion Rupiah.
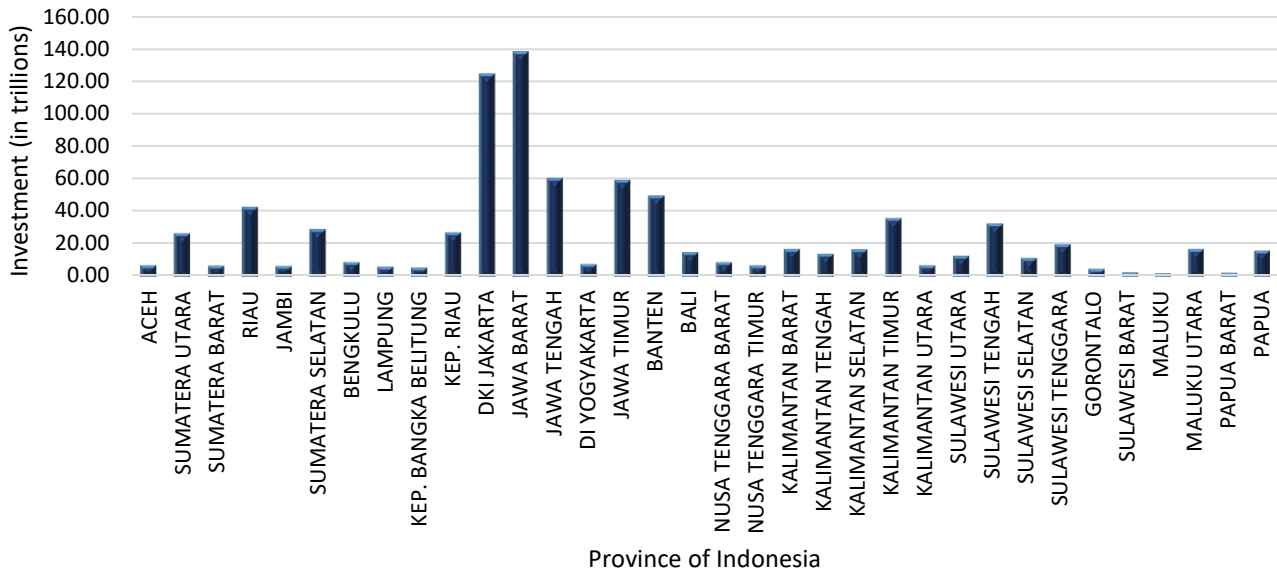

Figure 6. Investment by Province in Indonesia in 2019 (Trillion)
Source: Central Bureau of Statistics, (2019)

This study uses the four variables above and looks at their relationship with young workers in the form of cointegration (short-term and long-term) and causality which is very rarely studied, in order to explain about young workers from a different, more complex, and expected perspective. contribute more to solving these problems in Indonesia.

2. Materials and Methods

2.1. Materials

The scope of this research is in the field of economics, especially macroeconomics related to young workers. This study wants to analyze the short-term, long-term and causal relationship of macroeconomic variables consisting of government spending on the education sector, economic growth, provincial minimum wages and investment with young workers in Indonesia. This study uses secondary data in the form of quantitative data. The type of data used in this study is panel data, which is a combination of time series (time series data) and cross section (crossed data). The time series data used is data from 2005 to 2019 obtained from the ministry of finance, BPS, and Bank Indonesia. The areas that are the focus of analysis in this study are 33 provinces in Indonesia with a total of 495 data.

2.2. Methods

The model used in this study is the ARDL (Auto Regressive Distributed Lag) model using panel data to analyze the short-term, long-term and causal relationship of macroeconomic variables consisting of government spending on the education sector, economic growth, provincial minimum wages and investment with young workers in Indonesia. This model is used because there are differences in the level of stationarity of the data on the tested variables, where this study uses a time series that is partly stationary at the at level and partly stationary at the first difference level. Therefore, the ARDL model is the right model to be used in this study. The analytical methods carried out include the unit root test, determining the length of the lag that is included in the estimation model, cointegration test, ARDL estimation model, Granger causality test, and model stability test. The ARDL estimation model is used to answer the first objective of this study, which is to find out the short-term and long-term effects of government spending on

education, economic growth, provincial minimum wages, and investment with young workers in Indonesia. While the Granger causality test was used to answer the second research objective, namely to find out the causal relationship of government spending in the education sector, economic growth, provincial minimum wages, and investment with young workers in Indonesia. The following is the equation model in this study.

$$\Delta lnPUM_{j,t} = \alpha_{0i} + \sum_{i=1}^{n} \alpha_{1i}\Delta lnPUM_{i,t-1} + \sum_{i=1}^{n} \alpha_{2i}\Delta lnPPP_{i,t-1} + \sum_{i=1}^{n} \alpha_{3i}\Delta lnGRDP_{i,t-1} +$$

$$\sum_{i=1}^{n} \alpha_{4i}\Delta lnUMP_{i,t-1} + \sum_{i=1}^{n} \alpha_{5i}\Delta lnINV_{i,t-1} + \beta_{11}lnPUM_{j,t-1} + \beta_{21}lnPPP_{j,t-1} + \beta_{31}lnGRDP_{j,t-1} +$$

$$\beta_{41}lnUMP_{j,t-1} + \beta_{51}lnINV_{j,t-1} + u_{j,t}$$

Where $lnPUM_{j,t}$ young workers are seen from the composition of workers aged 15-24 years against workers in all ages, the formula is the number of workers aged 15-24 divided by workers in all ages (15-60+) multiplied by 100%. In $PPP_{i,t}$ is government expenditure on the education sector in terms of the education budget with the source of APBN funds; $lnGRDP_{i,t}$ is economic growth calculated based on the formula for this year's GRDP minus the previous year's GRDP divided by the previous year's GRDP multiplied by 100%. In $UMP_{i,t}$ is the provincial minimum wage as seen from the growth rate of the UMP whose formula is adapted from the GRDP rate formula and $lnINV_{i,t}$ is investment in terms of domestic investment (PMDN) and foreign investment (PMA).

3. Results and Discussion

Stationary test is carried out to determine whether there is a unit root contained between variables or in other words, whether there is stationary data, where non-stationary data causes the regression results to be skewed. Stationarity test conducted in this study using the Im, Pesaran and Shin (IPS) Test Statistic approach.

Table 1. Panel Unit Root Im, Pesaran and Shin (IPS) Test Statistic

Variable	Individual Intercept		Individual Intercept and Trend	
	At Level or I(0)	First Difference or I(1)	At Level or I(0)	First Difference or I(1)
PUM	- 2.185 (0.014)		- 4.624 (0.000)	
PPP	5.238 (1.000)	- 13.118 (0.000)	- 3.043 (0.001)	
GRDP	- 3.214 (0.001)		- 1.649 (0.049)	
UMP	- 5.578 (0.000)		- 1.585 (0.056)	- 6.039 (0.000)
INV	- 9.024 (1.000)	- 5.281 (0.000)	- 3.266 (0.999)	- 3.406 (0.000)

Table 1 illustrates that each variable has different stationarity at the level (I (0)) or at the first difference level (I (1)). Such as PUM, GRDP, and UMP variables which are stationary at the level, while the other two variables, namely PPP and INV are stationary at the first difference. Because there is a difference in stationarity, the ARDL panel model is eligible to be used in this study. In this study, the optimal lag was selected based on the AIC (Akaike Information Criteria) value. By looking at the AIC criteria, the lag that produces the best model in this study is the ARDL Panel (3.1.1.1.1). The next stage is the cointegration test on the model. Cointegration test aims to determine whether the non-stationary variables are cointegrated or not.

Table 2. Cointegration Panel Regression

Predoni Cointegration Test	Statistic	Weighted Statistic
Panel v-Statistic	-3.320 (0.999)	-4.514 (1.000)
Panel rho-Statistic	3.634 (1.000)	2.671 (0.996)
Panel PP-Statistic	-8.615 (0.000)	-11.585 (0.000)
Panel ADF-Statistic	-3.436 (0.000)	-3.461 (0.000)
Group rho-Statistic	5.029 (1.000)	
Group PP-Statistic	-17.437 (0.000)	
Group ADF-Statistic	-2.071 (0.019)	
KAO Cointegration Test	t-statistic	
ADF	-3.912 (0.000)	

The cointegration test in this study uses the Cointegration with Predoni Panel and KAO Based which aims to see several integrated variables in different orders I (0) or I (1). Table 2 shows that the results of the cointegration panel test between PUM, PPP, GRDP, UMP, INV, and C are significant at the 5 percent and 1 percent levels, so it can be concluded that there is a short-term to long-term relationship between the four variables. The results of the ARDL panel regression are eligible because the Error Correction Term (ECT) coefficient has a negative and significant slope. Because this model meets the requirements, it can be used as a model for analyzing the linkage between young workers and Indonesia's macroeconomic variables, which include government spending on education, economic growth, minimum wages and investment as shown in Table 3.

Table 3 Result of ARDL Panel Regression

Estimate	Variable	Coefficient	t-Statistic	*
Long Run	PPP	0.172646	1.125503	0.2616
	GRDP	0.401105	7.690707	0.0000*
	UMP	0.259119	11.63806	0.0000*
	INV	-0.164306	-17.34248	0.0000*
Short Run	C	14.79744	4.557829	0.0000*
	ΔPPP	2.941415	1.204199	0.2298
	ΔGRDP	1.581317	0.643720	0.5204
	ΔUMP	-0.284538	-2.134250	0.0339**
	ΔINV	-0.696896	-1.648271	0.1007
	ΔPUM (-1)	0.096896	0.477066	0.6338
	ΔPUM (-2)	-0.049536	-0.476585	0.6341
	ECT (-1)	-0.890186	-5.592414	0.0000*

Note: *, and ** significance level of 1%, and 5%

Another function of the ECT-1 coefficient is to determine the speed of adjustment of the short-term to long-term balance. In the table above, the ECT-1 coefficient on the ARDL panel regression is -0.890186, the coefficient value concludes that if there is a difference between the desired result and what actually happened or there is an error disturbance that increases or decreases in young workers by 1%, then immediately corrected or adjusted for imbalance (disequilibrium) in the variable of young workers themselves each period of 89%.

In this study, a causality test was conducted to determine whether the variables of young workers, government spending on education, economic growth, minimum wages and investment had a unidirectional, two-way causality relationship or had no relationship at all. From the results of the Granger Causality Test in Table 4, it can be seen that there is a one-way causality relationship between the Young Age Workers (PUM) variable and Government Expenditure on Education (PPP), where PPP affects PUM. Schultz (1961) states that the education budget is an investment for labor productivity growth, because with an increase in the education budget there will be an expansion of the education system which will change the job structure and skill expectations of employers in a positive direction (O'Reilly et al., 2015).

Table 4 Result of Multivariate Causality Testing

Dependent Variable	Independent Variable				
	PUM	PPP	GRDP	UMP	INV
PUM	-	4.73843	0.92096	3.99982	1.13136
		0.0029*	0.4307	0.0080*	0.3362
PPP	2.26363	-	0.01544	4.18604	12.086
	0.0806		0.9974	0.0062*	1.E-07*
GRDP	0.74465	0.11415	-	1.40556	0.10245
	0.5260	0.9518		0.2407	0.9586
UMP	7.29972	3.74413	0.54621	-	1.23198
	9.E-05*	0.0113**	0.6510		0.2978
INV	2.48236	18.9806	0.36828	0.27396	-
	0.0606	2.E-11*	0.7759	0.8442	

Note: *, and ** significance level of 1%, and 5%

The effect of government spending on the education sector on young workers in Indonesia is positive but not significant in both the short and long term. The positive relationship is in line with the research of Kawar and Tzannatos (2013), who say that to reduce youth unemployment, it is necessary to increase public spending on the education sector to increase access to high-quality education for all Lebanese. However, the insignificance of the estimation results indicates that the inefficiency of government spending on the education sector, as found by Sonje et al. (2018). Government spending that is not well-targeted will not increase the education index (Fadlli et al., 2019), and ultimately affect the quality of human resources. This can be seen from Indonesia's education quality score on the Program for International Student Assessment (PISA), which is still very low, below the OECD average. The low level of youth human resources will make it difficult for them to enter the job market later.

Based on the estimation results, in the short term, the effect of economic growth on young workers is not significant as found by Thioune and Kane (2018), and Pratama et al. (2020). However, economic growth has a positive and significant effect on young workers in the long run. This finding is in line with Okun Law's theory which states that an increase in economic growth will have a negative effect on the number of unemployed and a positive effect on employment. Gough et al. (2013) also stated that economic growth is very important to solve employment problems. Because, economic growth is one approach that can intervene in policies to generate employment, especially for young people through the expansion of job opportunities. This is in line with what Anyanwu (2013) found, that real GDP growth positively and significantly affects youth employment in the overall estimate of Africa, sub-Saharan and North Africa.

An increase in the minimum wage has a significant negative effect on young workers in the short term, where a one percent increase in the minimum wage will reduce 0.28% of young workers, or in other words, it will increase youth unemployment. Young workers are identical with workers who have low education and work experience, so that young workers become a vulnerable group to get a job when the minimum wage is increasing, because the company is certainly looking for workers with much more experience to compensate for the wages given for company efficiency. However, if viewed in the long term, the effect of the minimum wage on young workers is positive and significant, this is related to the increase in workers in the informal sector. Muravyev and Oshchepkov (2016), an increase in the minimum wage will threaten employment among young people, as well as an increase in informal employment as a solution for young workers who have low-skilled marginal productivity. This situation will lead to a decrease in wages and an increase in employment in the informal sector (Hohberg and Lay, 2015 Muravyev and Oshchepkov, 2016). This increase in the informal sector mainly occurs in developing countries (Mora and Muro, 2017). Even in Indonesia, the reduction in the formal sector, as a result of minimum wage increases, is less pronounced due to a much larger increase in informal sector employment (Comola and De Mello, 2011).

In the short term, investment has no significant effect on young workers, as found by Mkombe et al. (2020), but investment has a significant negative effect on young workers in the long term, as found by Anyanwu (2013). This is because investment tends to reduce labor because capital-intensive techniques accompanied by high technology tend to have better productivity and efficiency so that to produce the same or even greater amount of output, less labor is needed. In addition, the use of high technology tends to require workers with higher. Granger's causality test also reveals that youth employment and economic growth are not mutually exclusive. Young workers do not cause economic growth (GDP) because the probability of 0.52 is not significant and economic growth does not cause young workers because the probability is 0.43.

The results of another Granger causality analysis show a bidirectional causality between young workers and the minimum wage (UMP). The estimation results are in line with the research of Mitsis (2015) which also looks at the unemployment side, namely the minimum wage policy can affect the unemployment rate as much as the unemployment rate can affect the minimum wage. Next is the variable of young workers who do not have a causal relationship with investment. Young workers do not cause investment (INV), and vice versa, because the probability of both is greater than 0.05. This is because investment flows, both domestic and foreign investments, flow into capital-intensive sectors, not labor-intensive sectors, so that investment does not influence increasing young workers in Indonesia, as well as young workers which do not lead to investment.

Another variable that does not have a causal relationship is the variable of economic growth with government spending on education. The two variables are not mutually dependent as seen from the probability of both being greater than 0.05. The results of this study strengthen the research of Muthui et al. (2013), and Yakubu and Akanegbu (2015) which have been carried out previously. Next is the variable of government expenditure on education and the variable of the minimum wage which has a bidirectional causality relationship. Government spending on education causes the minimum wage, and vice versa, because the probability of both is less than 0.05. Another bidirectional causality relationship is found in government spending on variable education and investment. The results of this study are in line with research (Wang, 2005; Hussain et al., 2009; Fitrianti et al., 2015). Empirical results show that government spending on education has a positive effect on private investment. government spending on education

will increase human capital and labor productivity, which is expected to encourage private investment. Likewise, with investments that have a relationship with government spending on education.

The results of the Granger test in this study indicate that the causal relationship does not apply to economic growth and the minimum wage. the minimum wage does not cause economic growth because the probability of 0.24 is not significant and economic growth does not cause the minimum wage because the probability is 0.65. This result is in line with the research of Sunal and Sezgin Alp (2016) which shows that there is no causality in either direction between the real minimum wage growth rate and the GDP growth rate in Turkey. Another variable that does not have a causal relationship is the relationship between economic growth and investment variables. Granger's results explain that the two variables are not dependent on each other. The results of this study are in line with the research conducted by Priyanka Jain et al. (2013); Mandishekwa (2014); and Acquah and Ibrahim (2020) who found that economic growth and investment did not have an impact on each other in Russia, Africa, Zimbabwe and Nigeria. The last test is testing the minimum wage and investment variables. Based on the results of the Granger test, it was found that the two variables did not have a causal relationship, as evidenced by the probability value of both being greater than 0.05. The absence of a causal relationship can be understood because each variable stands alone, investing more in capital-intensive sectors while the minimum wage has more impact on labor-intensive sectors.

4. Conclusion

Based on research conducted to examine the relationship between young workers and macroeconomic variables in Indonesia through a cointegration and causality approach, it can be concluded that the variable government spending on education does not significantly affect young workers in both the short and long term. The variable of economic growth only has a positive and significant effect on young workers in the long term. The increase in the minimum wage has a significant negative effect on young workers in the short term, and vice versa, it has a positive and significant effect on the long term. The last variable that has an effect is the investment variable which has a negative and significant effect in the short term on young workers.

The results of multivariate causality testing between the variables of government spending in the education sector, economic growth, provincial minimum wages, and investment and young workers in Indonesia have varying results, variables for young workers and minimum wages, government spending on education and minimum wages, and government spending on Education and investment have a two-way causality relationship. One-way causality is only found in the Granger relationship between government spending on education and young workers. While the relationship of other variables such as young workers and economic growth, young workers and investment, economic growth and government spending on education, economic growth and minimum wages, economic growth and investment, as well as minimum wages and investment do not have a causal relationship.

Several policies that can be implemented to increase youth workers based on the above results include 1) Formulating an efficient education budget policy. Government spending on the education sector that is targeted and effective will increase the education index and the quality of human resources, especially for young people. This increase will have an impact on the absorption of more and more youth workers, 2) Increase the productivity of the sectors that contribute the largest GRDP, especially labor-intensive sectors such as agriculture and industry so that the increase in economic growth will be in line with the increase in the youth workforce, 3) Encouraging investors to invest in labor-intensive sectors, so that increased investment will be followed by employment. So that the problem of unemployment can be solved.

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