The nexus between economic growth and educated unemployment

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Abstract. *In Indonesia, excellent academic performance in Java Island is not accompanied by successful job performance. The unemployment rate for educated people on this island is higher than that for those with less education. This study aims to investigate whether economic growth reduces educated unemployment. This analysis estimates the impact of economic growth on educated unemployment, with population growth and wage rates as covariates. This study employed the Fully Modified Ordinary Least Square (FMOLS) method to investigate the relationship between economic growth and educated unemployment. This method allowed us to examine the effect of economic growth on the unemployment rates of vocational high school and college graduates. The research utilized secondary data from the Indonesian Statistic, including educated unemployment, economic growth, population growth, and minimum wages in Java, except in The Jakarta Capital Special Region. The research also collected primary data through questionnaires distributed among these graduates to validate our regression results. The results show that economic growth does not lower the unemployment of vocational high school graduates. However, economic growth reduces college graduates' unemployment. The wage rate positively impacts the unemployment rate for graduates of vocational high schools and colleges. Population growth, however, does not affect the unemployment of college graduates; instead, it positively affects the unemployment of vocational high school graduates. Primary data support the study's finding that unemployment in vocational high schools is related to students' reluctance to seek employment in other regions. Conversely, college graduates are willing to leave their area to seek a job. This research brings a unique perspective to the issue of educated unemployment by highlighting the differential impact of economic growth on vocational high school and college graduates. The results underscore the need for diverse policies to address the problem of educated unemployment effectively.*

Keywords*: educated, unemployment, growth, Okun's law*

JEL classification*: J08, J21, O15*

1. Introduction

In Indonesia, most economic activities are located on Java Island, so this island has better infrastructure than other islands, including educational infrastructure. Adequate educational infrastructure encourages a high ratio of educated workers in Java. Educated workers have high skills and expertise. The government hopes they will not face problems when looking for a job so they do not become unemployed. However, excellent academic performance is not accompanied

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by successful job performance. In Java, the unemployment rate for educated workers is higher than that of workers with less education.

Unemployment is one of the main economic problems, so the government always tries to reduce the unemployment rate. Increasing economic output is one strategy to reduce unemployment through increasing job opportunities. As more inputs, including labor, are needed to increase output, the unemployment rate decreases (Knotek, 2007)**.** Economic expansion is inversely correlated with unemployment (Hjazeen et al., 2021). Lower unemployment follows more robust economic growth (Tesfaselassie & Wolters, 2018). The association between unemployment and economic expansion is demonstrated by Okun's law. Research of US economic data exhibited that the relationship between Gross Domestic Product (GDP) and unemployment served as the foundation for this law. Okun's law states that unemployment and economic growth are inversely correlated. Reduced unemployment will come after more robust economic growth.

Much research has supported Okun's law, which claims that a rise in output results in a fall in unemployment (Al-kasasbeh, 2022; Altunöz, 2019; Boďa & Považanová, 2021; Louail & Hamida, 2021). However, several studies have shown that an increase in economic output is not always followed by a decrease in unemployment, so they reject Okun's law's validity. They demonstrate that economic growth is not accompanied by a significant decline in joblessness (Bankole & Fatai, 2013; Lal et al., 2014; Valadkhani & Smyth, 2015).

Given the various research findings, this study will investigate Okun's law's applicability to Java's educated unemployment. The educated unemployment group consists of unemployed college and vocational high school graduates. College graduates possess knowledge and abilities different from those of vocational high school graduates. For this reason, this study will examine the validity of Okun law in unemployed vocational high school and college graduates.

The rest of the document is organized as follows: The literature is reviewed in Section 2. In Section 3, the data and techniques are presented. Section 4 presents the findings. The final section includes conclusions.

2. Literature Review

Educated Unemployment

Educated unemployment is unemployment in workers graduating from vocational high school or higher education levels. Meanwhile, the low-education unemployed refers to unemployed graduates of elementary school and junior high school and those who have never attended school. Educated workers have different preferences from low-educated workers. Low-educated workers realize their limitations and usually take any job. It encourages low-educated workers to get a job. Educated workers, on the other hand, typically want specific job requirements. They're looking for well-paying, cozy employment. Educated workers aren't always drawn to the vacancies being provided. They usually wait for high-salary jobs (Kurniawan & Handayani, 2014) if unsatisfied with the available job openings (Fernandes et al., 2021). The high unemployment rate among educated workers results from their selective employment habits. They tend to want a job within a short distance from their location (Mulya, 2016) and a cozy workplace (Talamaosandi & Wirakusuma, 2017). Thus, educated unemployment is higher than those with low-education backgrounds.

The educated unemployment indicates a mismatch in the labor market. The company offers vacancies for educated workers to meet the company's needs. However, many educated job seekers are uninterested in the vacancies. They view existing job vacancies as unsuitable for their educational level. As a result, job seekers frequently hold off on applying for jobs. Throughout this waiting period, they become unemployed. However, subsidies from parents or family allow them to meet their daily needs while unemployed. Their wealthy familial circumstances (Dhanani, 2004) prevent them from exerting too much effort in their jobs. Therefore, the high open unemployment rate is generally caused by high educated unemployment.

Economic Growth

One indicator for measuring a government's performance is community welfare. However, government initiatives to increase welfare are occasionally hampered by high unemployment (Wahyuningrum & Soesilowati, 2021). High unemployment leads to low welfare rates and encourages discontent with the government. It causes people to defect from the ruling party and join others. Furthermore, in many nations, unemployment also impacts criminal activity and societal concerns (Anbaraki & Ismaili, 2021; Gao et al., 2017; Nagelhout et al., 2017). For this reason, the government continuously strives to lower unemployment (Cristescu, 2017).

One strategy to lower unemployment is to promote economic growth. The main components that affect economic growth are capital accumulation and technological progress. Capital accumulation occurs through investment, indicating additional capital in an economy. The capital increase encourages increased production capacity, increasing the number of potential outputs. Potential output is the maximum output produced in an economy if all factors of production are in full employment.

Additional capital requires complementary inputs, including labor. It means that an increase in investment leads to a rise in labor demand, reducing unemployment. The magnitude of the decrease in the unemployment rate depends on the choice of the type of technology used. If investment occurs in the labor-intensive production sector, it will significantly reduce unemployment. However, if investment occurs in the capital-intensive sector, its effect on unemployment reduction tends to be insignificant.

Researchers have examined Okun's law validity. Several of them claim that growth in output causes unemployment to decrease (Al-kasasbeh, 2022; Altunöz, 2019; Boďa & Považanová, 2021; Louail & Hamida, 2021). Others, however, contest the applicability of Okun's law, pointing out that economic growth is not always followed by a decline in unemployment. They show that, in several cases, economic growth does not lead to lower unemployment (Bankole & Fatai, 2013; Lal et al., 2014; Valadkhani & Smyth, 2015).

Altunöz (2019) revealed that real output and unemployment are inversely correlated. A decline in GDP leads to an increase in the jobless rate. Boďa & Považanová (2021) considers Okun's laws for 21 OECD nations. Okun's law asserts itself more strongly during declining output than during years of growth for most nations. Okun's laws are more robust in almost all countries when unemployment is falling and weaker when it is rising. Meanwhile, Okun's law is also tested for the Arab economy by Louail & Hamida (2021). Based on the Okun coefficient held for Arab countries, these countries aim to lower unemployment by accelerating their economic growth. Furthermore, Al-kasasbeh (2022) exhibited the existence of Okun's law in the Jordanian economy. This study reveals that declining output leads to increasing joblessness.

Other researchers, however, came to different conclusions that refuse Okun's law validity. Their findings demonstrate that economic expansion is not accompanied by a sizable decline in joblessness (Bankole & Fatai, 2013; Lal et al., 2014; Valadkhani & Smyth, 2015). Bankole & Fatai (2013) used the Engle-Granger cointegration test and Fully Modified OLS to estimate Okun's coefficient's size and test Okun's law's reliability in Nigeria. The regression results indicate a positive coefficient, which suggests that Okun's law elaboration is not applicable in Nigeria. Meanwhile, Lal et al. (2014) investigate the applicability of Okun's law in several Asian countries. They used an error correction mechanism and the Engle-Granger cointegration method to identify long-term associations among variables. This study shows that Okun's law may not apply in some developing Asian countries.

Valadkhani & Smyth (2015) also investigated Okun's legal viability in the United States. They use a Markov switching model to allow asymmetries within and between regimes and the possibility of changing error term variance over time. Within-regime asymmetry is much more pronounced than across-regime asymmetry in scope. They discovered evidence that Okun's law has weakened since the recession of 1981–1982. They demonstrate that the US jobless recovery is

not recent and has roots in the early 1980s recession. Based on these findings, they offered an analysis of the US jobless recovery and recommendations for reducing the adverse effects of future recessions.

Population Growth

Unemployment is closely related to the labor supply, and the two are strongly correlated (Apergis & Arisoy, 2017; Nemore et al., 2021). Labor supply is shown by the number of job seekers willing to work at a certain wage. The amount of job seekers is positively correlated with the population's size. Population growth is influenced by natural population growth and migration rates. The natural population growth depends on the difference between birth and death rates. Meanwhile, migration refers to the number of people who leave and enter an area. Generally, workers will move from their origin to regions with higher welfare.

The increase in the number of immigrants impacts the rise in labor supply in the destination area. If immigrants cannot be accommodated in several existing employment opportunities, the unemployment rate in destination areas will increase. Due to immigration, unemployment rises in low-income and low-middle-income countries (Huynh & Vo, 2023). It means that population growth has the potential to increase unemployment.

Wage Rate

Labor costs are one of the employers' considerations when choosing the type of production technology. Labor costs are the second highest cost component after raw material costs. For this reason, employers need to control costs to maintain company performance (Sylvia & Mulyungi, 2018). Labor costs are closely related to wage rates. The increase in the wage rate impacts the rise in labor costs, so entrepreneurs tend to change production technology to capital-intensive technology. The company replaces old production machines with new high-tech machines with fewer workers.

Labor absorption in capital-intensive industries is limited to skilled workers who can operate new high-tech machines. Advanced technology can increase production efficiency, marked by decreased production costs (Çalışkan, 2015). The increase in production efficiency positively impacts the company's performance, but this policy narrows job opportunities. The limited number of workers employed by capital-intensive companies affects the increase in the unemployment rate. Therefore, increasing wages that shift production technology to capital-intensive raises unemployment rates.

3. **Methodology and Data**

The Indonesian Statistics has produced secondary data used in this investigation. Secondary data for Java, except for the Jakarta Capital Special Region, include wage rates, population growth, economic growth, and educated unemployment including unemployment of vocational high school and college graduates. This study does not cover the condition of educated unemployment in the Jakarta Capital Special Region because there is no data on educated unemployment in the province. Secondary data includes publications from 2000 to 2020. The election in 2000 was a starting point based on considerations of that year, and it was the beginning of the implementation of regional autonomy. Meanwhile, the endpoint is in 2020 because the publication in that year is the latest. The selection of locations covering the island of Java is because Java has a better educational infrastructure, but educated unemployment on this island exceeds educated unemployment nationally.

Primary data complement the secondary data as a confirmation tool for the result of secondary data analysis. This data is utilized to clarify some phenomena that secondary data cannot explain. The primary data is obtained by sending electronic questionnaires to several vocational high school and college graduates. However, until the study was written, only 105 vocational high

school graduates and 120 college graduates returned the questionnaire. The data is summarized in Table 1.

Table 1. The Research Data

Secondary data	**Variables:**	**Scope**	**Sources**
	Wage rates Population Growth Economic Growth Unemployment of: - vocational high school graduates - college graduates	2000-2020	Indonesian Statistics
Primary Data	**Respondent Number**	**Collecting Method**	
	105 vocational high school graduates 120 college graduates	Electronic questionnaires	

Source: own conception.

Operational Variables

The operational variables are explained as follows.

a. Economic growth is the growth rate of the gross regional product in percentage terms in every province in Java except Jakarta Capital Special Region (percent).
b. Population growth refers to the percentage increase in population in every province in Java, except for Jakarta Capital Special Region (percent).
c. The wage rate is the average hourly wage in every province in Java, except Jakarta Capital Special Region (thousand rupiahs).
d. Educated Unemployment refers to the unemployment rate in vocational high school graduates and college graduates in every province in Java, except Jakarta Capital Special Region (percent).

Analysis Tool

In this study, secondary data were analyzed using dynamic panel data regression. This approach has advanced technologically and is increasingly used in social science research (Gil-García & Puron-Cid, 2014). This analysis identifies whether economic growth is accompanied by decreased educated unemployment. Based on the regression results, it will be possible to identify whether Okun's law is supported. A cointegration test was performed to see if there was a long-term equilibrium link between multiple variables before doing additional analysis. In this research, cointegration testing uses the Kao model. If the finding indicates cointegration between these variables in the model, then the following procedure is regression analysis. This analysis estimates the influence of economic growth on educated unemployment, with population growth and wage rates as covariates. This research used the Fully Modified Ordinary Least Square (FMOLS) approach for regression analysis. Compared to the OLS method, this approach has benefits (Arize et al., 2015).

The following equation represents the regression model.

$$UNEMP_{it} = \beta_0 + \beta_1 GROWTH_{it} + \beta_2\, POPGROW_{it} + \beta_3 WAGE_{it} + e_{it}$$

Sequentially, UNEMP is educated unemployment, including graduates of vocational high school (UNEMPVHS) and college (UEMPCOLL). Meanwhile, GROWTH is economic growth, POPGROW is population growth, WAGE is the average hourly wage, and e is the residual.

4. Results

Table 2 describes each variable utilized in this research. The descriptive analysis summarizes the information for each variable. It is possible to establish the likelihood of a correlation between variables based on the descriptive study.

Table 2. Statistical Description of Variables

	GROWTH	POPGROW	WAGE	UNEMP VHS	UNEMP COLL
Mean	4.054	1.372	11.433	8.752	4.855
Median	4.460	1.320	11.008	8.470	4.520
Maximum	6.680	2.390	23.035	18.310	9.560
Minimum	-7.710	0.050	5.498	1.980	1.660
Std. Dev.	2.266	0.783	4.442	3.958	1.519

Source: authors' calculations based on Indonesian Statistics

Table 2 shows West Java had the highest unemployment rate (18.310%) among high school graduates with vocational training in 2010. Many residents need assistance finding jobs because of the high unemployment rate resulting from the enormous population and the economic crisis. Meanwhile, the lowest unemployment rate for vocational high school graduates, 1.980 percent, occurred in the Special Region of Yogyakarta in 2017. The small and household industrial sector supports the provincial economy, which is labor intensive, contributing to low unemployment rates. Furthermore, the highest unemployment rate among college graduates, 9.560 percent, occurred in the Special Region of Yogyakarta in 2018. It is presumably because the province's economy is dominated by small industries and households that do not require many highly educated workers. The lowest college graduate unemployment rate, 1.66 percent, occurred in Banten in 2014. The role of large and medium industries in Banten is quite dominant and capital-intensive, so it absorbs highly educated workers.

The highest economic growth of 6.68 percent occurred in East Java in 2010. The global economy continued to improve, and the national domestic economy was stable, encouraging high economic growth in East Java. On the other hand, the lowest growth rate of -7,710 ensued in Central Java in 2020 due to the COVID-19 pandemic, so some economic sectors experienced disruptions. Meanwhile, the highest population growth rate of 2.390 percent ensued in Banten in 2011. This condition is related to many migrants and is in line with the improving economy of Banten. Conversely, the lowest population growth rate of 0.05 occurred in Central Java in 2020. The declining economic performance was due to the COVID-19 pandemic, making some Central Java residents migrate to other areas.

During the study period, the highest wage rate of IDR 23.035 per hour occurred in Banten in 2020. Large and medium-sized industries dominate the industrial sector in Banten. This industry utilizes capital-intensive technology and requires skilled workers; consequently, the wage rates are also high. On the other hand, the lowest wage rate of IDR 5.498 per hour occurred in Central Java in 2010. This province is dominated by the primary sector, causes low productivity and wage rates.

Table 3. Cointegration Test Results Based on the Kao Model

	t-statistic	
	Vocational High School Graduates' unemployment	College Graduates' Unemployment
ADF	-2.995	-2.001
Significance	0.001	0.023

Source: authors' calculations.

Furthermore, the cointegration test results show that the ADF value is negative and significant in unemployed vocational and college graduates (Table 3). It means that the variables

in both models have a long-term causal relationship. The residual resulting from the estimation of each model is stationary I (0).

Before forming a dynamic model, it is essential to determine the optimum lag length. Choosing lag is an important issue because a lag that is too short has the risk of model specification errors, while a lag that is too long reduces the degrees of freedom. The exact lag length is determined through Vector Autoregression (VAR) estimation by taking various periods as a starting point. Based on the VAR estimation results, the minimum Akaike Information Criterion (AIC) value occurs when the lag length is one year. It means that VAR estimation with a lag length of 1 will avoid model specification errors and the problem of reducing degrees of freedom (Table 4).

Table 4. Determination of Lag Length Based on Akaike Information Criteria (AIC)

Lag Length	Vocational High School Graduates' Unemployment	College Graduates' Unemployment
1 1	3.753*	3.831*
1 2	3.872	3.881

* The optimal lag length
Source: authors' calculations

The estimation results differ between vocational high school and college graduate unemployment. Economic growth positively affects college graduate unemployment, but it is not significant for vocational high school graduate unemployment. Meanwhile, population growth has a positive effect on unemployment for graduates of vocational high schools. In contrast, in the case of unemployment for college graduates, population growth has no effect. Nevertheless, the wage rate positively affects unemployment for vocational high school graduates and college graduates (Table 5).

For unemployment of vocational high school graduates, R^2 is high. It means that the variables in this model, including economic growth, population growth and wage, dominantly explain the variation of this unemployment. However, for college graduates, this variable only explains around 28% of the variation in unemployment. It means several other variables dominantly explain college graduate unemployment. College graduates have several characteristics that differ from vocational high school graduates because they have higher education degrees, more knowledge, higher skills, and higher entrepreneurship abilities. These variables are thought to influence educated unemployment. However, because this research focuses on analyzing the effect of economic growth on the level of educated unemployment, not all variables are included in the model.

Table 5. The Estimation Result

Number	**Variable**	**Vocational High School Graduates' Unemployment**	**College Graduates' Unemployment**
1	Economic Growth (-1)	0.056 (0.918)	-0.031* (-2.818)
2	Population Growth	1.574* (1.867)	-0.395 (-1.287)
3	Wage (-1)	0.168* (3.294)	0.152* (1.670)
	R^2	0.8908	0.2825

* Significant
Parenthetical numbers represent the statistic of the student test
the student test at (α=5%) is 1.659
Source: authors' calculations.

The estimation result exhibits different behavior between unemployed high school graduates and college graduates. Economic growth negatively affects college graduate

unemployment, while this variable does not impact vocational high school unemployment. The unemployment rate for college graduates decreases by 0.031 percent for every percent increase in economic growth. Increased output is correlated with stronger economic growth. More inputs, including labor, are required for higher output. It indicates that as the economy grows, more work possibilities become available, lowering the unemployment rate among recent college graduates. Compared to high school graduates with vocational training, fewer people have graduated from college. Most recent college graduates can find employment thanks to the job prospects brought about by economic expansion.

Another factor is associated with the ability of college graduates to be entrepreneurial. College graduates get sufficient provisions so that they can become entrepreneurs. In almost every major, entrepreneurship courses are compulsory subjects. In addition, college graduates have a relatively comprehensive network so that they can identify business opportunities. College graduates are excluded from the unemployed group since they can start their businesses if they cannot find employment. This result demonstrates that Okun's law holds for recent college grads. For college graduates, higher economic growth results in lower unemployment rates. This result exhibits the correctness of Okun's law for college graduates. Joblessness for recent college graduates has fallen due to economic growth. It is in line with Hashmi et al. (2021), which shows the validity of Okun's law in Brazil, Russia, India, China, and South Africa (BRICS).

Conversely, the unemployment rate of vocational high school graduates is unaffected by the rate of economic growth. Vocational high school graduates' unemployment does not diminish with economic growth. It indicates that the number of job opportunities arising from economic growth is much lower than that of vocational high school graduates. Only a few vocational high school graduates can benefit from economic growth. Graduates of vocational high schools seek employment. Nevertheless, some graduates do not find employment as there are fewer job options than those who graduate from technical high schools. In addition, technological developments have caused some jobs to be replaced by machines. The application of digital technology has led to the loss of some jobs that vocational high school graduates have done. Thus, the number of job opportunities for vocational high school graduates has decreased.

Unemployment of vocational high school graduates is also caused by their inability to become entrepreneurs. When they fail to get a job in the labor market, they still need sufficient education and skills to become entrepreneurs. In addition, vocational high school graduates do not have a network as vast as college graduates, so they find it difficult to find business opportunities. Primary data shows that just 4% of vocational high school graduates become entrepreneurs. The remaining 86% want to become employees, and 10% are unemployed. Insufficient education in entrepreneurship and skills make them afraid to become entrepreneurs. Therefore, they are forced to become unemployed when they fail to get a job. Conversely, college graduates show different results.

Table 6. Job Status of Respondent

Job Status	Vocational High School Graduates		College Graduates	
	(person)	(Percentage)	(person)	(Percentage)
Employee	90	86	96	80
Entrepreneur	4	4	16	13
Unemployed	11	10	8	7
Total	105	100	120	100

Source: authors' calculations based on primary data.

A total of 13% of college graduates work as entrepreneurs. The remaining 80% become employees, and 7% are employed (Table 6). Sufficient education encourages college graduates to become entrepreneurs.

Furthermore, the personal character of vocational high school graduates is also linked to their unemployment. Some vocational high school graduates want to work just in their region. As

many as 22% of vocational high school graduates refuse to leave their homes to seek jobs in another region. The remaining 78% are willing to work in other regions. The low wages and high living costs in some regions probably make them unwilling to apply for jobs offered in other regions. In contrast, 90% of college graduates are willing to leave their region to look for a job. It means that just 10% of college graduates want to work in their respective regions (Table 7). Indeed, College graduates have sufficient education and are old enough to migrate to other regions.

Table 7. Willingness to Work in Other Regions

Attitudes	Vocational High School Graduates		College Graduates	
	(person)	(Percentage)	(person)	(Percentage)
Willing	82	78	108	90
Unwilling	23	22	12	10
Total	105	100	120	100

Source: authors' calculations based on primary data

Another factor is the nature of vocational high school graduates, who tend to be selective about jobs. Some vocational high school graduates deem the existing job vacancies inappropriate for their educational background. They feel these existing job vacancies require too much extra effort. Furthermore, the pickiness of the job offered is also associated with wage rates. Many existing vacancies are considered low-paid, so vocational high school graduates are uninterested. They frequently wait for new positions that fit their preferences. They are listed among the unemployed while they wait for a new position to open. Financial support from parents and family helps vocational high school graduates meet their needs while unemployed. On the other hand, college graduates are old enough so they have to start working or doing business. Sufficient education makes college graduates ready to do business when they fail to get a job in the labor market. Therefore, the study's outcome does not show Okun's law validity in the case of unemployment among vocational high school graduates. A decrease in unemployment of vocational high school graduates and an increase in economic growth are unrelated. This finding opposes Louail & Hamida (2021) assertion that a rise in economic output is accompanied by a decline in unemployment.

Meanwhile, population growth positively impacts vocational high school unemployment, while this variable does not affect college graduates' unemployment. The increase in population by 1 percent was followed by the rise in the unemployment rate for vocational high school graduates by 1.547 percent. The population increase impacts the labor force, especially the workforce with vocational high school education. It is inseparable from the 12-year compulsory education program, which affects an increased number of vocational high school graduates. Their number is far greater than college graduates, so the available job opportunities can only accommodate some vocational high school graduates looking for work. Some vocational high school graduates who failed to find work were forced to become unemployed. Therefore, an increase in population is followed by a rise in the number of unemployed high school graduates.

Meanwhile, the unemployment rate for college graduates is unaffected by population growth. The number of college graduates is relatively small compared to vocational high school graduates. Only a tiny proportion of the population has pursued a college education. The high cost of studying at university has caused several youths not to continue their education to the tertiary level. In addition, family needs have forced some young people to join the workforce to sustain their family's income. The study results align with Heliati (2019) that population growth positively affects unemployment. This result also supports the finding of Musa et al. (2019) that the population positively affects unemployment.

Furthermore, the unemployment rate for college and vocational school graduates is positively impacted by salary rates. When college graduates and vocational high school graduates earn more money, they become more unemployed. A rise in wage rate of 1 percent is followed by a 0.168 increase in vocational high school graduates' unemployment and by 0.152 college

graduates' unemployment. Each year, wage rates increase due to a rise in the provincial minimum wage. An increase in the wage rate encourages firms to change their production technology. Consideration for cost control makes firms utilize capital-intensive technology to reduce production costs. Based on the Indonesian Statistics data 2010, about 20.2 thousand workers were required to produce 1 billion rupiahs of output in Java. However, in 2019, to make 1 billion rupiahs of output in Java, only 14.6 thousand workers were needed. Therefore, several job seekers face difficulty entering the job market. The educated unemployment rate will rise with an increase in the wage rate. This data refutes the claim made by Comola & De Mello (2011) that there is a positive association between a rise in the minimum wage relative to average wages and a net increase in employment. This result, however, is consistent with Siregar & Batubara (2022) who stated that a rise in minimum wage has little impact on unemployment in nearby areas.

5. Conclusions

Effects of economic growth on educated unemployment differ between graduates of vocational high schools and colleges. The unemployment rate for college graduates is negatively impacted by economic growth, whereas it does not affect the jobless rate for graduates of vocational high schools. It indicates that Okun's law legitimacy is upheld when college graduates are unemployed. Nonetheless, there is little evidence to substantiate Okun's law validity regarding the unemployment of vocational high school graduates. This distinction pertains to traits shared by graduates of vocational schools and colleges. Since there are considerably more vocational high school graduates than college graduates, the growth has little effect on the unemployment rate of vocational high school graduates. Meanwhile, population growth positively affects the unemployment rate of vocational high school graduates, but the jobless rate for college graduates is unaffected. Furthermore, the wage rate positively impacts both the unemployment of vocational school graduates and college graduates. The company uses capital-intensive technology to control costs and respond to increased pay rates, so the unemployment rate for college and vocational school graduates increases. Therefore, the government cannot rely on economic growth to reduce educated unemployment. The government must identify alternative strategies, such as developing labor-intensive businesses and increasing entrepreneurship. If there are job seekers who do not find work, they can enter the business world. The businesses that are built will increase demand for labor so that educated unemployment is reduced. However, this research has several limitations. This report does not discuss unemployment-related factors, such as personnel characteristics and vacancies created by economic growth on the island of Java. Future research should focus on the relationship between educated unemployment and personnel characteristics and the types of jobs created.

***Authors' contribution**: Introduction, J.S.; Literature review, J.S., M.A.E.P.; Methodology and data, J.S.; Research results, J.S., M.A.E.P.; Conclusion, J.S., M.A.E.P.*

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