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Sectoral Scarring Effects of COVID-19 on Employees with Tertiary Education Degrees

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Abstract

Employees with tertiary education graduates in Indonesia have also been affected by the socio-economic impacts of COVID-19, but there needs to be more specific discussion from the scarring effect perspective. This research aims to analyze the decline in income among employees with tertiary education graduates during the COVID-19 pandemic by using Sakernas (National Labor Force Survey) data from August 2021 and descriptive and inferential Multinomial Logistic Regression methods. This research concludes that the scarring effect, in the form of income reduction, is more pronounced among tertiary-education graduate workers in the service and industrial sectors. In terms of job type, the income decline is more pronounced among blue-collar and gray-collar workers. In contrast, white-collar workers, who constitute the majority of higher-education graduates, experienced relatively less scarcity regarding income decline. After controlling the dependent and independent variables with individual characteristics, the research found that the industrial sector variable significantly influences the income decline among educated workers, followed by those in the service sector and the lowest in the agricultural industry. As the regression results show, university-educated workers in the industrial sector are likely to experience a 2.468 times greater income decline than those working in the agricultural sector and those with stable incomes. Meanwhile, educated workers in the service sector are likely to experience a 1.454 times greater income decline compared to those working in the agricultural sector and compared to those with stable incomes.

Keywords: scarring effect, covid-19, sectoral industry, tertiary education graduate employee, multinomial logistic regression.

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1. Introduction

The COVID-19 pandemic originated in Wuhan, China, and has significantly altered the economic landscape and labor markets in almost all countries, including Indonesia (Agita et al.,

2022; Tasmilah et al., 2023). The labor market for higher education graduates, both those entering the job market and those already employed, has been affected (Bianchi et al., 2020; Schady et al., 2023). These sudden changes were due to policies aimed at preventing the spread of COVID-19 through restrictions on socioeconomic mobility (Yarrow et al., 2020; Fiaschi & Tealdi, 2022). In Indonesia, restricting workers' social mobility and industrial activities is based on essential and non-essential business sectors according to their contribution to the economy (Budimanta, 2021).

On the other hand, the shifts in the labor market and preventive measures have caused a "scarring effect" for both workers and employers. The scarring effect during economic recessions is discussed by Huckfeldt in Understanding the Scarring Effect of Recessions (Huckfeldt, 2022). According to Huckfeldt, the scarring effect on workers during a recession is reflected in many job losses and the difficulty of regaining employment, except in jobs with lower skill requirements and wages. Similarly, Puteri (2022) adds that forms of scarring in the labor market during economic recessions include becoming unemployed, returning to work with reduced hours, and the extended time it takes for workers to find employment again.

The most severe form of the scarring effect, according to Putri (2022), is job loss. They are losing their jobs, diminishing future earning prospects (Fiaschi & Tealdi, 2022). Meanwhile, Schady et al. (2023) and Bianchi et al. (2020) explain that the scarring effect during the COVID-19 pandemic can manifest as decreased earnings, difficulties for new graduates in finding employment, longer waiting periods to secure a job, skill and competency degradation among workers, and possible psychological impacts on workers who lose their jobs. Huckfeldt's (2021) study elaborates that the scarring effect occurs because workers may find new employment that requires lower skills and offers lower pay, due to more selective recruitment during a recession.

The concept of the scarring effect in the labor market affects both employers and employees (Fiaschi & Tealdi, 2022). In this research, the scarring effect is from the perspective of workers, particularly those with higher education degrees. In this employment study, the scarring effect represents the impact experienced by workers due to income reductions caused by the COVID-19 pandemic.

In Indonesia, according to a survey by the Central Statistics Agency (BPS), the scarring effect experienced by workers includes income reduction, reduced working hours, temporary furloughs, and job loss or layoffs. A significant 35.78% of workers experienced an income decline due to the COVID-19 pandemic (BPS, 2020b). Additionally, 6 out of 10 respondents, or 60.74% of workers, were furloughed, reducing their income.

Workers with higher education were not immune to the crisis during the COVID-19 pandemic, as they also experienced income reduction, job loss, layoffs, or reduced working hours. As a result, these workers faced decreased income or even complete loss of income due to layoffs (Agita et al., 2022).

The scarring effect of income reduction needs to be specifically analyzed for workers with higher education, as they contribute to the educated labor force, which is a critical factor for the

economy. Although job loss is the most severe form of the scarring effect, income reduction is also crucial as it has long-term impacts on the economy and individual workers' well-being. Reduced income can affect workers' ability to meet their living needs and overall quality of life.

Shifts influenced income or wage changes during the COVID-19 pandemic in the labor market. Income is determined by the supply of labor and the demand for labor by companies in the job market (Borjas, 2016). During the pandemic, the supply of labor exceeded the demand for labor by companies, as businesses faced production declines due to reduced demand for their products or services. Skilled and qualified labor remains key for workers to maintain or increase their income. As Mincer (1974) pointed out, human capital factors such as higher education, skills, and experience can enhance workers' wages.

The importance of higher education graduates maintaining employment during the COVID-19 pandemic is evident, as it enables them to meet their needs. Workers continuously strive to maximize their welfare by consuming goods and utilizing their leisure time within the constraints of their budgets (Becker, 1965). During COVID-19, workers who wished to continue consuming goods and services would allocate some of their valuable leisure time to work and earn income. Conversely, unemployed workers would spend more leisure time with fewer goods and services, resulting in a less enjoyable life (Becker, 1965).

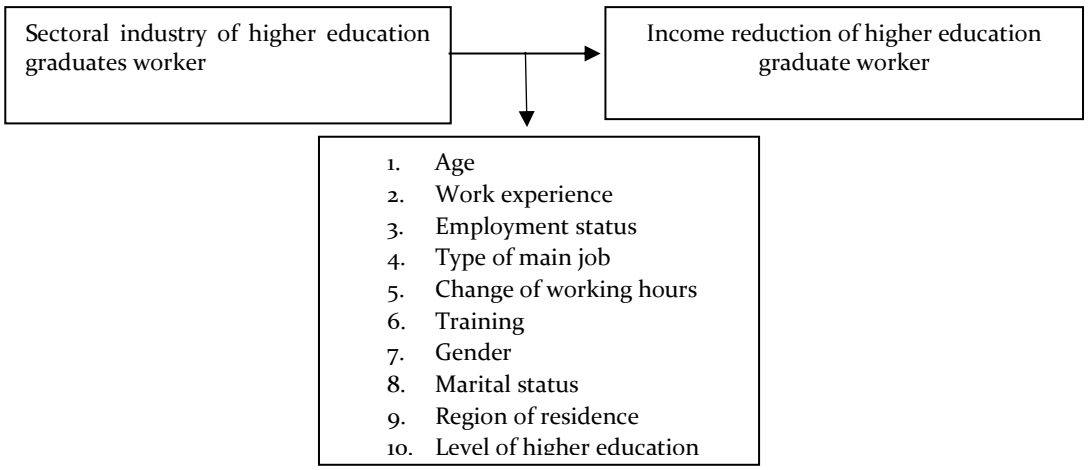
The aspect of income reduction for workers during COVID-19 is crucial because income significantly influences the economy. Moreover, income changes—whether they increase, remain the same or decrease—during COVID-19 affect the dynamics of wages in the labor market. One of these dynamics is influencing labor migration to other sectors, seeking additional jobs, extending working hours, transitioning to the digital sector, and participating in training (Mifrahi and Rahmat, 2023; Sinaga, 2023).

This study focuses on workers with higher education, considering their strategic role in the economy. Research by Sala-i-Martin (2004), Hanushek & Wossman (2008), and Ogundari & Awokuse (2018) in Mifrahi and Rahmat (2023) mentioned that higher education has a strong correlation with a country's economic growth and per capita economic growth. Each increase in higher education can drive faster technological advancements and enhance a country's ability to maximize its economic output. Mifrahi and Rahmat (2022) found that every 1% increase in higher education enrollment boosts per capita economic growth by 1.7%, higher than the 0.6% impact of primary school enrollment on economic growth.

Meanwhile, a study by Li et al. (2016) in China showed that basic human capital (basic education) contributes to growth through the factor-accumulation channel, while advanced human capital influences growth through the productivity channel, individually and simultaneously. Therefore, higher education graduates affect the economy by increasing productivity and aggregate national economic output. The presence of quality workers can accelerate economic development and strengthen Indonesia's competitiveness with other countries (Kemnaker, 2023).

Based on data on the highest level of education completed, the majority of higher education graduates are bachelor's degree holders (71.89%), followed by diploma holders (22.33%) and master's degree holders (5.22%) (Sakernas, 2021). In terms of industry sectors, most higher education graduates work in the transportation and warehousing sector and the trade sector, each comprising 8.28% and 8.19% of the workforce in those sectors. Outside of these two sectors, the proportion is smaller, ranging from 6% to 4% (Rahman et al., 2020; BPS, 2020b). The International Labor Organization (ILO) reports that these business sectors were among those most affected by the economic shocks due to the COVID-19 pandemic (ILO, 2020a).

The scarring effect on higher education graduates during the COVID-19 pandemic needs to be analyzed more deeply concerning the variables that influence it. Among them are industry sectors, which refer to the fields of business where higher education graduates work and earn income during the pandemic. which causes long-term effects and decreases workers' welfare (Puteri, 2022). The following is the research framework.



Picture 1. Research Framework

Referring to the research framework in this study, the hypothesis being tested is as follows: After controlling for individual characteristic variables, the scarring effect in the form of income reduction among higher education graduates during the pandemic is influenced by the sector in which they are employed.

This study aims to analyze the scarring effect of income reduction among higher education graduates in Indonesia based on their employment sector during the COVID-19 pandemic, with control over socio-demographic and job characteristics in Indonesia. The results of this study are expected to contribute to research on the scarring effect during the pandemic among educated workers, specifically higher education graduates. Additionally, this research is expected to enrich the literature on the employment conditions of higher education graduates during the COVID-19 pandemic.

2. Research Methods

This research uses data sourced from the National Workforce Survey (Sakernas), specifically the Sakernas of August 2021. Sakernas is a survey in Indonesia that produces employment indicators such as labor force participation rates by sector, unemployment rates, worker wage profiles, and other indicators. The analysis unit and research variables in Sakernas of August 2021 are used to represent the conditions during the COVID-19 pandemic.

The unit of analysis in this research is individuals who have completed their highest education level at higher education institutions, including diploma I, II, III, and IV graduates, and bachelor's degree (S1) through doctoral degree (S3) graduates. This unit of analysis is further selected to include only those currently employed and receiving wages. The number of such analysis units is 52.640. The majority (71,89%) are bachelor's degree (S1) graduates, followed by diploma I-III graduates at 19,12%, and master's degree (S2) graduates at 5.22% (see Table 1).

Table 1. Percentage of workers with higher education degree

Education level	Unit Analysis	%
S1	37.843	71,89
Diploma I/II/III	10.067	19.12
S2	2.748	5,22
Diploma IV	1.690	3,21
S3	272	0,52
S2 Terapan	20	0,04
TOTAL	**52,640**	**100**

Source: Sakernas Agustus 2021 (processed)

The analysis methods used are descriptive and inferential analysis. Descriptive analysis includes presentation through graphs, tables, and so on. Inferential analysis aims to explain the relationships between variables using statistical models. Additionally, hypothesis testing on the model is also necessary. In this study, the inferential analysis technique used is multinomial logistic regression. According to Djalal & Usman (2002), the multinomial logistic regression model is used because the dependent variable (Y) has more than two categories of multiple choices, and the independent variables are categorical and numerical. The multinomial logistic regression model is used to find the relationship between the multinomial response variable (y). The response variable y consists of more than two categories, generally denoted as 0, 1, or 2. These categories include decreased income, no increase in income, and increased income.

Hosmer and Lemeshow (2013) explain that the model used in multinomial logistic regression is denoted as follows.

$$\pi(x) = \frac{\exp(\beta_0+\beta_1 x_1+\beta_2 x_2+\cdots+\beta_b x_b)}{1+\exp(\beta_0+\beta_1 x_1+\beta_2 x_2+\cdots+\beta_b x_b)}$$

In this case, *x*1, *x*2, *x*3 .... and so on... represent the main independent variables and control variables. By including the independent and control variables according to the framework, the general form of the multinomial logistic regression model in this study is modified as follows:

Model 1 (Income Decrease)

$$\text{Ln}\left(\frac{p1}{p2}\right) = \beta 10 + \beta 11 Lapus1 + \beta 12 Lapus2 + \beta 13\ Umur + \beta 14 Pengalker + \beta 15 StatusKerja + \beta 16 Jenis\_Kerja1 + \beta 17 Jenis\_Kerja2 + \beta 18 Perubahan\_Jam + \beta 19\ Perubahan\_Jam + \beta 110\ Latih + \beta 111 jk + \beta 112\ \text{Status\_Kawin} + \beta 113\ Klasif + \beta 114\ Didik1 + \beta 115\ Didik2 \quad (1)$$

Model 2 (Income Increase)

$$\text{Ln}\left(\frac{p3}{p2}\right) = \beta 20 + \beta 21 Lapus1 + \beta 22 Lapus2 + \beta 23\ Umur + \beta 24 Pengalker + \beta 25 StatusKerja + \beta 26 Jenis\_Kerja1 + \beta 27 Jenis\_Kerja2 + \beta 28 Perubahan\_Jam + \beta 29\ Perubahan\_Jam + \beta 210\ Latih + \beta 211 jk + \beta 212 Status\_Kawin + \beta 213\ Klasif + \beta 214\ Didik1 + \beta 215\ Didik2 \quad (2)$$

Where P1P_1P1 is decreased income, P2P_2P2 is income that does not increase or remains the same, and P3P_3P3 is increased. Once the multinomial logistic regression model is formed, the coefficients in the model will be interpreted in terms of the Relative Risk Ratio (RRR). This interpretation expresses the likelihood/probability of an observation with certain characteristics occurring in a successful event, i.e., how many times more likely it is compared to observations with other characteristics.

3. Results and Discussion

3.1. Descriptive Analysis

The researcher examines the characteristics of higher education graduates who are still employed based on Sakernas 2021 data from August. In terms of industry sectors, the majority of higher education graduates working during the COVID-19 pandemic were used in the service sector, accounting for 88.74%. In the industrial and agricultural sectors, the proportions were 6.90% and 4.36%, respectively. Regarding employment status, the largest proportion of higher education graduates were in the formal sector, at 86.80%, with the remainder in the informal sector. Most higher education graduates worked as white-collar workers, accounting for 79.92%. Only 8.74% worked in blue-collar jobs, and 11.34% in gray-collar jobs.

Regarding their highest level of education completed, the majority were bachelor's degree graduates at 71.89%, followed by diploma graduates at 22.33%. Postgraduate graduates were relatively few, at 5.78%. Most of them lived in urban areas (59.73%), while 40.23% lived in rural areas. In terms of marital status, the majority were married or previously married, accounting for 84.24%, while 15.76% were unmarried.

Looking at age and work experience, the average age of higher education graduates in this study is 40 years, with a median age of 39 years. The youngest age in this study is 20 years, and

the oldest is 84 years. The average work experience of higher education graduates in this study is 15 years, with a median of 14 years.

Regarding the dependent variable (Y), which is income reduction, 19.15% of higher education graduates experienced a decrease in income. Meanwhile, 71.21% had stable or unchanged income, and 9.64% had increased income. Thus, the largest proportion of higher education graduates had stable income compared to those with decreased or increased income.

In terms of industry sectors, higher education graduates who experienced income reduction were predominantly employed in the service sector (80.91%). In the industrial and agricultural sectors, the proportions were 11.77% and 7.32%, respectively. The trend shows that income for higher education graduates in the agricultural sector tends to decrease, as does income in the industrial sector. Conversely, income for higher education graduates in the service sector tends to remain stable (see Table 2).

Table 2. Income Decrease of Higher Education Graduate Worker

Variabel	Decrease	%	Remains	%	Increase	%	Total
Agriculture	738	7,32	1.343	3,58	212	4,18	10.083
Industry	1.187	11,77	2.099	5,60	346	6,82	3.632
Service	8.158	80,91	34.041	90,82	4.516	89,00	46.715
TOTAL	10.083	100	37.483	100	5.074	100	52.640

Source: Sakernas 2021

When considering the type of job, higher education graduates with white-collar jobs experienced a decrease in income of 52.10%. The trend shows that income for white-collar workers tends not to increase or remains the same. Conversely, income for blue-collar and gray-collar workers tends to decrease.

Regarding employment status, higher education graduates experienced a greater income reduction in formal employment (61%) compared to informal employment (38.32%). The trend indicates that income for informal workers tends to decrease, while income for formal workers tends to increase.

3.2 Inferential Analysis

Next, inferential analysis was conducted using multinomial logistic regression. This analysis aims to test the research hypotheses. The multinomial logistic regression model was applied to the dependent variable (Y), main independent variables, and control variables. Two models are used in this study: model 1 for income reduction and model 2 for income increase (see Table 3).

Table 3. The Results of Parameter Estimation Test for Income Reduction of Higher Education Graduates Worker

Variable	Odds Ratio	
	Model 1 (Decrease)	Model 2 (Increase)
(1)	(2)	(3)
Main Independent Variable		
Sectoral industry		
- Industry	2,468***	1,291**
	(0,000)	(0,019)
- Service	1,454***	1,003
	(0,000)	(0,970)
- Agriculture (*ref*)	-	-
Control Variable		
Age	0,994**	0,966***
	(0,019)	(0,000)
Work experience	0,999	1,013***
	(0,848)	(0,000)
Employment status		
- Informal	4,961***	1,656***
	(0,000)	(0,000)
- Formal (*ref*)	-	-
Type of main work/jobs		
- Blue collar	2,312***	1,057
	(0,000)	(0,505)
- Grey collar	3,658***	1,293***
	(0,000)	(0,000)
- White collar (*ref*)	-	-
Change of working hours		
- Unchanged	0,331***	0,792***
	(0,000)	(0,000)
- Increased	0,484***	3,405***
	(0,000)	(0,000)
- Decreased (*ref*)	-	-
Training		
- Have training	0,907***	1,470***
	(0,000)	(0,000)
- Havent training (*ref*)	-	-
Gender		
- Male	1,269***	1,025
	(0,000)	(0,420)
- Female(*ref*)	-	-

Variable	Odds Ratio	
	Model 1 (Decrease)	Model 2 (Increase)
Marital status		
- Married	0,997	1,195***
	(0,944)	(0,000)
- Not married (*ref*)	-	-
Region of residence		
- City	1,724***	0,964
	(0,000)	(0,249)
- Village (*ref*)	-	-
Education		
- Sarjana	0,880***	1,025
	(0,000)	(0,499)
- Pascasarjana	0,789***	0,881*
	(0,000)	(0,098)
- Diploma (*ref*)	-	-
P-value Likelihood Ratio Test : 0,000***		

Note: * Significant at 10%, ** Significant of 5%, and *** Significant 1%; The numbers in parentheses are standard error values.

From the results of the parameter estimation test above, the influence of the industry sector on the tendency of monthly income reduction among higher education graduates, after controlling for other independent variables, is as follows:In the income reduction model, higher education graduates in the industrial sector are significantly more likely to experience monthly income reduction, with a likelihood 2.468 times greater compared to those whose income remains unchanged and compared to graduates in the agricultural sector. Additionally, higher education graduates in the service sector are significantly more likely to experience monthly income reduction, with a likelihood 1.454 times greater compared to those with unchanged income and compared to graduates in the agricultural sector.

Regarding monthly income increase, higher education graduates in the industrial sector are 1.291 times more likely to experience an income increase compared to those whose income remains unchanged and compared to graduates in the agricultural sector. This study finds that the industrial and service sectors significantly impact the income reduction of higher education graduates. Meanwhile, in the income increase model, the industrial sector has a stronger impact on income growth compared to the agricultural sector. The service sector does not have a significant impact on income increase for higher education graduates during the Covid-19 pandemic in 2021.

These findings align with previous research indicating that the industry sector can affect wage changes (Glaeser & Maré, 2001; Kim et al., 2013). They also support the conclusions of Cortes and Forsythe (2020) that income reduction during Covid-19 is influenced by job type and industry sector.

4. Conclusion and Recommendations

The results of this study show that before controlling for individual characteristics, 19.15% of higher education graduates experienced a scarring effect in the form of income reduction during the COVID-19 pandemic in 2021. The most significant income reduction was observed among higher education graduates in the service sector, accounting for 80.91% of the total 10,083 workers who experienced income reduction in 2021. The remaining workers were in the industrial and agricultural sectors, at 11.77% and 7.32%, respectively. The trend indicates that income for higher education graduates in the agricultural and industrial sectors tends to decrease, while in the service sector, it tends to remain stable.

From the income reduction model, higher education graduates in the industrial sector are 2.468 times more likely to experience income reduction compared to those in the agricultural sector and compared to those with stable income. Higher education graduates in the service sector are 1.454 times more likely to experience income reduction compared to those in the agricultural sector and compared to those with stable income.

Using labor market theory, the government needs to implement effective policies to keep economic supply and demand activities running by adopting digital technologies, thus maintaining employment and productivity. To prevent income reduction among higher education graduates, support from the government, companies, and workers is needed to maintain marginal productivity through technology adoption (Brent Orrel, 2020). Given that higher education graduates are technologically literate (Mifrahi & Rahmat, 2023). Given the limitations of this study, future research should focus on the income of higher education graduates and industry sectors in the post-pandemic period, as productivity among higher education graduates is crucial for national economic growth.

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