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Article

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MANAGEMENT | RESEARCH ARTICLE

Education–occupation mismatch and its wage penalties: Evidence from Indonesia

Padang Wicaksono^{1*}, Imelda Theresia¹ and Badra Al Aufa²

Abstract: Overeducation poses a significant challenge in the job market, impacting both job mobility and wage. This study aimed to examine the influence of overeducation experience on two key factors, including 1) the probability of experiencing overeducation again in the current job and 2) the level of wage obtained from the current job. We use data from four surveys of National Labor Force Survey (SAKERNAS): February 2017, 20 August 17, February 2018, and August 2018. We employed the Multinomial Logistic Regression and a Fixed Effect Model analysis. The results showed that workers who had previously experienced overeducation in their past jobs faced a 31.64% probability of re-experiencing it. This probability was lower than the likelihood of transitioning to a matched job, which stood at 67.35%, hence, overeducation served as a transitional phase toward obtaining a suitable job. Additionally, this study found a wage disparity of 16.2% between workers with overeducation experience and those with matched experience when transitioning to a matched job. Interestingly, no wage difference was observed between the two groups when transitioning to overeducation jobs. In conclusion, training programs should be performed to enhance the productivity of new workers to enable them to adapt more quickly to the work environment and avoid wage penalties.

Subjects: Economics; Business, Management and Accounting; Industry & Industrial Studies

Keywords: developing countries; labor market; job mobility; job market; overeducation; vertical mismatch; wage penalty; human capital accumulation

1. Introduction

Indonesia's population is large by any standard, which in itself poses a major challenge. one of Indonesia's most significant employment issues is the disparity between the number of job seekers and job providers. In Indonesia, the number of job seekers exceeds the number of available positions. This circumstance led to the eventual emergence of unemployment issues in Indonesia. In 2020, there will be approximately 8.59 million registered job seekers competing for 3.48 million registered job openings. Only 2.90 million of these vacancies were filled. This information suggests that there is a mismatch between the demand for and supply of workers in the labor force, indicating that the labor market is not yet optimal for labor absorption (Indonesia Statistics Agency, 2020).

On the other hand, the 2020 Census of Population reveals that 70.72 percent of the population is of productive age; therefore, Indonesia remains in a demographic bonus period. This indicates that the productive age is greater than the non-productive age, and that the

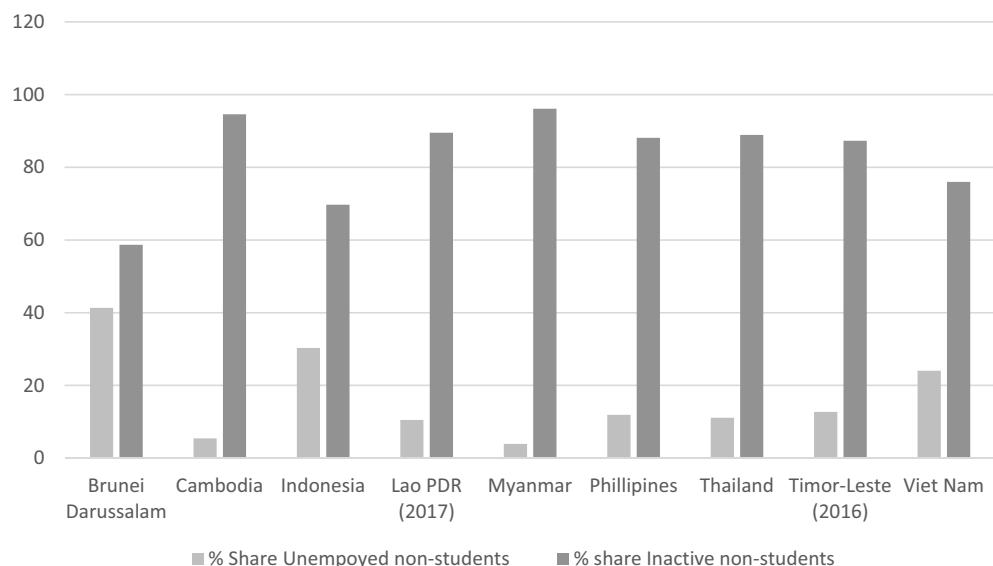
demographic bonus will cease to exist in 2036 (Sari & Ahmad, 2021). However, the effort should be performed to maximize the rate at which young people enter into the labor force in which can be measured through Not in Employment, Education or Training (NEET) analyses. Unfortunately, the ILO report stated that round one in every five young persons was NEET in Brunei Darussalam, Indonesia, Philippines and Timor-Leste. Indonesia has the second highest rate of unemployed non-students in Southeast Asia, while the rate of inactive non-students is relatively low compared to other Southeast Asian nations. In spite of this, the number of unemployed and inactive non-students in Indonesia is significantly higher than in other Southeast Asian nations, with 2.7 million and 6.3 million, respectively (Figure 1) (International Labour Organization, 2022).

The government can improve this situation by continuing to promote the creation of more employment opportunities and by fostering the advancement of education. To increase the accumulation of human capital, which in turn increases the competitiveness of potential workers, this is done on a policy level (Burgess, 2016). Nevertheless, despite an increase in educational attainment over the past 20 years, Indonesia's human capital performance is still comparatively underdeveloped. Indonesia is ranked 87th out of 157 nations in the 2017 Global Human Capital Index, with a score of 62.19 (World Economic Forum, 2017). The general state of Indonesia is worse than that of Singapore (73.28), Malaysia (68.29), Thailand (66.15), the Philippines (64.36), and Brunei Darussalam (62.82), which are the other five ASEAN nations. Moreover, one of the lowest dimensions of Indonesia's Global Human Capital Index is know-how, which only reaches 50.21, placing Indonesia 80th out of 157 countries. This demonstrates that it is not only education that must be maximized to increase human capital in Indonesia in order to overcome employment problems, but also job placements that should match their abilities (job-education match).

In Indonesia, there is a significant prevalence of job-education mismatch, specifically vertical mismatch. According to the 2018 National Labor Force Survey (SAKERNAS), One in three of the Indonesian workforces (32,5%) experienced vertical mismatch. This also contributed to the low performance of know-how in the country (Indonesian Central Agency of Statistics, 2018). Despite the expansion of education in Indonesia over the past two decades, resulting in a highly qualified workforce, the lack of optimization in creating employment opportunities for individuals with medium and high skills exacerbates the issue of overeducation (Ginting, 2020; Ikhsan & Sentosa, 2021).

Figure 1. Youth NEET rates, educational attainment for South-East Asia economies with data, 2019 or most recent year available.

Source: ILO Report, 2022



According to Robst (2007b), vertical mismatch, which refers to individuals being overeducated for their jobs, can be influenced by labor demand and supply factors (Robst, 2007b). Initially, overeducation was considered a temporary phenomenon, and overeducated workers might accept a wage penalty in the short run with the expectation of higher wage in the long run, potentially through promotions (Rubb, 2003). This implies that workers may choose to invest more in education to enhance their chances of being hired, as higher educational levels are often perceived as a signal of reduced training costs for employers. Furthermore, overeducation can serve as a means to quickly fill labor market vacancies, as higher levels of education provide greater employment opportunities. In some cases, a worker may opt to accept a job for which they are overqualified, assuming it offers additional benefits, such as more leisure time (Vermeulen et al., 2014).

Any educational mismatch can significantly impact labor market outcomes of these individuals. Furthermore, in circumstances where these are widespread and persistent, it can have substantial economic and social consequences for workers, employers, and society (International Labour Organization, 2023). Overeducation can have positive effects on company productivity, but it is also associated with various negative consequences, as reported by preliminary studies (Kampelmann & Rycx, 2012). According to a study, 50% of graduates suffer from at least one form of educational mismatch, and both types have a negative impact on job satisfaction, with the double mismatch case having the most detrimental effect (Sam, 2020). Moreover, the educational mismatch positively correlates with skill mismatch and negatively affects job satisfaction (De Castro et al., 2015). Wage penalties can result from educational mismatch, where workers who are horizontally or vertically mismatched experience earn less compared to their well-matched counterparts (Sulaimanova, 2022).

Although overeducation has drawbacks, several young job seekers still select to accept jobs for which they are overqualified. This can be attributed to the stepping stone phenomenon, where these jobs are viewed as a means to ultimately secure a better match between their skills and a suitable position (Sicherman & Galor, 1990). However, the initial condition of overeducation in a career can either serve as a stepping stone or a trap in the context of job mobility (Meroni & Vera-Toscano, 2017). Studies attempted to compare the notion that individuals willing to take jobs below their qualifications was to use them as stepping stones towards more suitable employment in the future. This condition could also become a trap perpetuating the cycle of being overqualified for subsequent jobs. Meroni and Vera-Toscano (2017) successfully confirmed that there are variations in outcomes within the scope of the European Union. The study revealed that mismatched jobs could act as traps in Italy, Spain, the Czech Republic, and Japan while stepping stones towards suitable employment in the Netherlands, Belgium, France, Poland, the United Kingdom, Slovenia, Turkey, Portugal, and Lithuania. It was reported that countries such as Austria, Germany, Finland, Hungary, Norway, and Estonia experienced either a trap or a stepping-stone situation depending on the timeframe under analysis (Meroni & Vera-Toscano, 2017).

Despite extensive studies on the effects of vertical education mismatch on various job-related factors, there is still a limited understanding of its influences, specifically overeducation in subsequent jobs. However, studies showed that its implications extend beyond the present employment context (Acosta-Ballesteros et al., 2018; Albert et al., 2021; Morsy & Mukasa, 2020; Scherer, 2004). Most studies examining overeducation focus solely on its impact on wage and aspects of the current job (Hasibuan & Handayani, 2021; Nordin et al., 2010; Robst, 2007a; Safuan & Nazara, 2005; Salas-Velasco, 2021). Understanding the impact of overeducation on wage requires considering the accumulation of human capital, such as cognitive ability (de Grip et al., 2005), and the signaling value it provides to employers (Baert & Verhaest, 2019). The model investigating the impact of overeducation on wage levels should also consider the role of this key determinant in previous positions. Only two studies have been identified, based on data from Canada (Chen & Fougère, 2014) and Chile (Sevilla & Fariás, 2020), which attempt to justify this relationship. However, these studies failed to thoroughly examine various match-mismatch scenario combinations in previous and current jobs. Therefore, it is necessary to

conduct a comprehensive analysis comparing the wage effects of different scenarios, such as match-over and match-match. This is aimed at better understanding the specific influence of overeducation in previous jobs on current wage.

In the Indonesian context, numerous studies in Indonesia have focused on the vertical mismatch analysis's determinants, influence on wages, duration of unemployment, and other variables. However, there is no research that examines the impact of prior vertical mismatch experiences on current job conditions. In fact, this phenomenon has the potential to have a significant impact on the nature and amount of wages earned in subsequent employment. It is crucial to examine it in order to determine the effect of changes in productivity signals and the accumulation of human capital from previous jobs on the determination of current employment. Given these circumstances, this study aims to analyze the potential occurrence of overeducation in previous jobs and its likelihood in current ones and examines the impact of this key determinant in previous positions on current wage levels.

2. Literature Review and Hypothesis Development

2.1. Education investment and vertical mismatch justification

The human capital theory proposed by Becker (1994) emerged as a seminal contribution to the discourse surrounding the significance of investing in education. According to Becker (1994), human capital theory posits that each worker possesses skills or abilities enhanced or acquired through training and education. Formal education and prior work experience are key factors in enhancing the resources of an individual. Utilizing these resources leads to an increase in productivity, which in turn affects wage levels. Meanwhile, it was concluded that individuals with similar educational qualifications would eventually provide equivalent productivity and wage. It is assumed that productivity will be reflected solely based on the level of education of the workers. According to the human capital theory, education determines productivity, suggesting that overeducation or over skilling is a temporary phenomenon resulting from inaccurate information. In the long run, employers need to make certain adjustments to optimize the utilization of available skills, while workers should seek better job matches to enhance their productivity and earnings (Becker, 1994; Quintini, 2011; Xu & Fletcher, 2017).

Contrary to the assumption that overeducation and skills mismatches are temporary, alternative human capital-based theories proposed these mismatches can persist in the long run (Quintini, 2011). These theories suggest that various factors contribute to the prevalence of overeducation. For example, in dynamic and technologically advancing environments, companies may hire workers with higher levels of education to effectively adapt to ongoing changes without incurring additional costs. This can result in a situation where overeducation becomes prevalent within such firms. On a global scale, hiring practices prioritizing over-skilling may be favored to ensure rapid responses in environments characterized by uncertainty and change. Overeducation and over skilling complement the evolving production process.

The assignment theory, introduced by Sattinger (1993), offers a valuable perspective that complements the discussion on educational investment and vertical mismatch (Sattinger, 1993). According to this theory, workers with equal education and productivity levels can earn different wage. This disparity arises due to the matching process between job vacancies, characterized by unique features (demand side) and the attributes of workers (supply side). Sattinger reported the crucial role played by these characteristics in determining the agreed-upon wage level. When a poor match, such as a vertical mismatch between workers and jobs, productivity tends to vary based on the amount of human capital accumulated through factors such as educational duration. This ultimately affects the wage level compared to a good match involving the required education for the same job.

2.2. Theory of job mobility: Between a stepping stone and a trap

When searching for employment, individuals can select a job that matches, falls below or surpasses their educational qualifications. However, challenges tend to emerge when transitioning to subsequent jobs. Previous work experience exerts an influence on the level of job that can be obtained in future employment. Scherer (2004) used two terms to elucidate the potential outcomes of this influence, namely the Stepping Stones hypothesis and Entrapment (Scherer, 2004).

In the Stepping Stones hypothesis, previous work experience is a starting point for workers to attain jobs requiring higher qualifications. This phenomenon can be explained using the job-matching theory (Jovanovic, 1979) and career mobility (Sicherman & Galor, 1990). The job-matching theory posits that overeducation is a temporary mismatch caused by inaccurate information in labor market. However, as workers gain more information over time, they experience career mobility, leading to better job matches (Jovanovic, 1979; Sicherman & Galor, 1990).

The theory of career mobility offers a further understanding of the dynamics between education and upward job mobility. It implies that individuals with higher education than their colleagues are more likely to experience faster career advancement. This can be achieved through internal promotions or obtaining better career opportunities in subsequent jobs. The study conducted by Baert and Verhaest (2019) was consistent with these theories because it reported that unemployment signals lower productivity and more detrimental than a skills mismatch, thereby reducing the chances of individuals finding jobs matching their qualifications (Baert & Verhaest, 2019). This implies that a worker may experience a mismatch due to inaccurate information and the desire to avoid signaling low productivity. However, such a mismatch can later serve as a stepping stone towards securing future jobs that align with their qualifications.

The Trap Hypothesis presents an alternative viewpoint, suggesting that a mismatch in a previous job can result in the subsequent trap of continued mismatch. This hypothesis is supported by the dual labor market segmentation (Doeringer & Piore, 1975) and labor market signaling theories (Spence, 1973). In the theory of dual labor market segmentation, there are two types of market segmentation with two different characteristics. These include 1) primary jobs characterized by high wage and productivity and 2) secondary or side jobs with low wage and productivity. Movement from one segmentation to another tends to be limited. In the context of this study, the theory implies that when a worker is already in a certain job level, or this case, is overeducated, they are more likely to remain trapped in a similar level of mismatch in their next job.

The Trap Hypothesis is further supported by the theory of job market signaling proposed by Spence (Spence, 1973). According to Spence, employers face inaccurate information when evaluating job applicants, making it challenging to assess their true abilities. In this context, they often rely on educational signals and work experience as indicators of the qualifications of the applicants. Workers with overeducation can unintentionally send negative signals, as they may be perceived as unable to compete effectively in career paths that match their level of education. These workers may find themselves trapped in jobs that require lower skill levels than their educational attainment suggests.

Workers who have experienced overeducation in a previous position are more likely to be overeducated in their current position. As the unemployment rate rises (Badan Pusat Statistik, 2022) and the educated labor inflation rate rises (World Bank, 2018), Indonesia continues to struggle to absorb its labor force into better jobs (Ginting et al., 2020). In addition, the only available study from a developing nation, conducted in Chile (Sevilla & Fariás, 2020), found that overeducation persisted. In light of the similarities between the economies and employment conditions of Indonesia and Chile, the hypothesis of this study is that Workers previously overeducated are more likely to encounter this attribute in their current job.

H1: Workers who have experienced overeducation in a previous position are more likely to be overeducated in their current position.

2.3. Wage rates and human capital accumulation

The Mincer equation model, introduced by Mincer (1958), has been instrumental in understanding the determinants of wage. This model emphasizes the role of education and work experience in shaping the earning potential of an individual (Mincer, 1958). Mincer stated that the wage growth rate is influenced by several fundamental factors, such as education level and work experience. Furthermore, an increase in education raises the wage earned. This is because higher education will help workers achieve certain better positions. Education contributes to human capital accumulation, positively impacting productivity. Another important factor in the model is work experience. As workers gain more experience in their respective fields, their productivity tends to increase, although the rate of increase reduces over time due to diminishing returns.

Vertical mismatch among workers can profoundly impact their accumulation of human capital and cognitive abilities, ultimately leading to a decline in productivity (de Grip et al., 2005) and, subsequently, lower wage rates (Becker, 1994). Both the Stepping and the Trap Hypotheses emphasize the significance of overeducation as a strong signal that influences the decisions of employers in determining the value of wage earned. Therefore, it is crucial to enhance the current model by incorporating a dummy variable representing vertical mismatch in previous and recent jobs to understand its role in wage formation better.

Workers who were overeducated in their previous positions tend to receive lower pay rates in their current positions. This is consistent with the first hypothesis, which predicts that overeducation will persist. This persistence will then send a negative signal to employers and reduce the accumulation of human capital. Both of these effects will eventually result in a reduction in wages at the subsequent position. The hypothesis of this study is Workers who became overeducated due to their previous jobs tend to have lower wage rates in the current one.

H2: Workers who were overeducated in their previous positions tend to receive lower pay rates in their current positions.

3. Methodology

3.1. Data source and unit of analysis

This study utilized a pooled data from SAKERNAS provided by the Indonesian Statistics Agency (BPS) from February 2017 to August 2018 and August 2018. The surveys aim to collect nationally representative data on the workforce in Indonesia, capturing their general characteristics and conditions. Various variables from the survey will be used in this study, including wage level, duration of job search, age, gender, highest educational attainment, marital status, urban and rural status, work experience, certified training participation, occupation type, field of industry, collar type and workplace location. Additionally, the regency or city variable from SAKERNAS will be matched with GDP at constant prices, area size, and population data obtained from BPS to provide further contextual information. The total sample for the study is 7,223 individuals (1,480 individuals from February 2017, 2,483 individuals from August 2017, 956 from February 2018, and 2,376 from August 2018). We use data for 2017 and 2018 because the August 2019 SAKERNAS data collection uses the 1982 KJI for work experience classification so it is not in accordance with the 2014 KBJI classification system at current work; and the August 2020 and 2021 data sets are less representative as wage rates are susceptible to bias due to the impact of the COVID-19 pandemic.

The SAKERNAS data from 2017 to 2018 provides detailed information on the variables used in the analysis model. These variables include occupation types categorized according to the

Indonesian Standard Job Title Classification (Kementerian Ketenagakerjaan dan Badan Pusat Statistik, 2014) at the 1-digit level for previous and current occupations (Kementerian Ketenagakerjaan dan Badan Pusat Statistik, 2014). When this data is paired with the educational levels in Indonesia defined by the *International Standard Classification of Occupation* (ISCO) 2008, established by the *International Labor Office* (ILO), the vertical mismatch status of workers can be determined (International Labour Office, 2012). This study focuses on workers who meet certain criteria, such as having worked for at least one hour without interruption in the past week, completing primary or higher education, having work experience, falling within the age range of 15 to 65 years in their previous occupation, not working and studying simultaneously, residing in Indonesia, and having data on GDP and population density. Additionally, workers classified as 0 code (members of the Indonesian National Armed Forces and the Indonesian National Police) for experience and current occupation were excluded from the analysis. The matching process will specifically consider the highest level of education and the KBJI 2014 1-digit classification for current and previous occupations.

3.2. Variables

The variable examined in the two models is overeducation, which is determined by analyzing job positions within different categories. In Indonesia, job categories are classified according to the Indonesian Standard Job Title Classification (KBJI) adapted from the International Standard Classification of Occupation (ISCO) 2008. The KBJI classification assigns values from 1 to 9, with 1 representing positions that require the highest level of expertise and education and 9 depicting positions with the lowest skill and education requirements. The job codes are as follows 1) Managers, 2) Professionals, 3) Professional Technicians and Assistants, 4) Administrative Personnel, 5) Service Business Personnel and Sales Personnel, 6) Agricultural, Forestry, and Fisheries Skilled Workers, 7) Processing and Handicraft Workers, 8) Machine Operators and Assemblers, and 9) Blue collar workers.

The level of education used refers to the 2011 International Standard Classification of Education (ISCED) (United Nations Educational & O, 2012). These levels are categorized into four groups, such as 1) Elementary School or its equivalent, 2) Junior, Senior, and Vocational High Schools, or its equivalents, 3) Diploma (I-III), 4) D IV and strata 1, 2, 3. To establish the connection between education level and job title, the variables will be standardized based on the definition provided by the International Labor Organization (ILO). This classification will be used to determine the presence of vertical mismatch, as shown in Table 1.

This study focuses on two dependent variables, the status of overeducation and the natural logarithm of real wage per working time in the current job. The data for total wage earned is collected in four different periods for two years, measured in monetary and non-monetary forms, and adjusted for inflation using the Consumer Price Index. The natural logarithm transformation is applied to ensure the distribution of the dependent variable is normalized. The status match variable is categorized into three groups (match, overeducation, and undereducation) based on the standards defined by the ILO. To account for potential influences, several control variables are incorporated. These variables include individual characteristics such as work experience, duration of job search, gender, years of schooling, marital status, age, age at starting work, and job training. Industry characteristics, such as occupational category and sector of economic activity, were also considered. Furthermore, location characteristics, such as population density, urban status, and the natural logarithm of regional Gross Domestic Product, are also considered. The definition of each variable is presented in Table 2.

3.3. Analytical method

This study conducted descriptive and inferential analyses to examine the relationship between variables. Meanwhile, to gain initial insights, a simple cross-tabulation was performed to assess the association between the independent and dependent variables. The Multinomial Logistic Regression (Mlogit) estimation method addressed the first research question. This model helped

Table 1. Mapping the type of job and level of education

Education Group	Level of education			
	Elementary School	High School	Diploma	Higher education
Managers	Under-educated	Over-educated	Over-educated	Over-educated
Professionals				
Technicians and Associate Professionals				
Clerical Support Workers				
Services and Sales Workers				
Skilled Agricultural, Forestry and Fishery Workers				
Craft and Related Trades Workers				
Plant and Machine Operations and Assemblers				
Elementary Occupations	Correctly matched	Over-educated	Over-educated	Over-educated

Note:
■ Correctly matched ■ Under-educated ■ Over-educated

Table 2. Definition of the variables and data source

Variable	Definition	Data source
<i>Match</i>	Current Job Matching Status (0= Match, 1= Over, dan 2=Under)	The National Labor Force Survey: SAKERNAS, 2017 and 2018 (Indonesian Statistics Agency, 2021a; Indonesian Statistics agency, 2021b)
<i>Over_{t-1}</i>	1 = Overeducation at previous job; 0 = Other	
<i>Ln (Real wage)</i>	Natural Logarithm of Real Wage	
<i>Individual</i>	Individual Characteristics Variables (past_under, length of time waiting for work, gender, length of schooling, age of first work)	
<i>Job</i>	Industry Characteristics Variables (Labor, Business Sector)	
<i>Geographic</i>	Location Characteristic Variables (Population Density, Urban Status)	
δ_t	Time Effect	
γ_i	Island Effect	
ε_{it}	Error	

assess how exogenous variables impact the likelihood of being in the current job status of three group categories. By predicting the probabilities, the likelihood of being overeducated or matched in the current job for workers could be compared. The use of data from SAKERNAS in different periods helped control time-related biases in the estimation process. Considering the variation in labor market structures and patterns across different islands in Indonesia, it is essential to monitor the geographical location where the work is situated. The Mlogit model employed in this study was a modified version based on previous studies by Roller and Wicaksono (Christiane et al., 2020; Sitorus & Wicaksono, 2020):

$$\ln \left(\frac{\Pr(\text{match} = j)}{\Pr(\text{match} = 0)} \right)_{it} = \alpha_{it} + \beta_1 \text{Over}_{i,t-1} + \beta_{2n} \text{Individual}_{it} + \beta_{3n} \text{Job}_{it} + \beta_{4n} \text{Geographic}_{it} + \delta_t + \gamma_i + \varepsilon_{it} \quad (1)$$

In order to address the second research question, the Fixed Effect Model method, adapted from Hasibuan & Handayani and based on Mincer Equation Model (Hasibuan & Handayani, 2021; Mincer, 1958), was employed:

$$\ln(\text{Realwage})_{it} = \alpha_{it} + \beta_1 \text{over}_{i,t-1} + \beta_{2n} \text{Individual}_{it} + \beta_{3n} \text{Job}_{it} + \beta_{4n} \text{Geographic}_{it} + \delta_t + \gamma_i + \varepsilon_{it} \quad (2)$$

4. Results and discussions

4.1. Characteristics of the study sample

Table 1 summarizes the characteristics of the study sample. This study analyzes a sample of 7,223 individuals drawn from four consecutive periods of SAKERNAS. The sample includes 1,480 individuals from February 2017, 2,483 individuals from August 2017, 956 from February 2018, and 2,376 from August 2018. Among the sample, a predominant majority of 80.23% are male. Regarding marital status, 75.52% of the individuals are married, including those who are divorced. When considering job characteristics, a significant portion of the sample consists of individuals who have experienced job mobility and are currently employed in blue-collar occupations. Most of the sample comes from the manufacturing (40.3%) and service sectors (34.1%). Regarding geographical distribution, the population is nearly evenly split between rural and urban areas. The largest population concentration is observed in the Java-Bali region (39.35%), followed by Sumatra (27.98%).

The distribution of vertical mismatch status in the current occupation reveals that 57.15% of workers have a required education status (match), 22.00% are overeducated, and 20.85% are undereducated. This distribution is comparable to the previous occupation, where 57.4%, 24.4% and 18.9% of workers were matched, undereducated, and overeducated, respectively. It is important to note that in Indonesia, many individuals have not completed elementary school or only completed Junior High School (Badan Pusat Statistik, 2022). Consequently, there is a higher prevalence of undereducation or match education than overeducation, as shown in Figure 2. Regarding geographical characteristics, the study's distribution has reflected the SAKERNAS structure, in which the number of rural and urban residents is nearly equal. In addition, the province of Java-Bali has the largest population on the island (39.35%), followed by Sumatra (27.98%). Figure 3 is a map that provides a visual representation of the regional classification described previously.

4.2. Analysis of the effect of overeducation experience on the probability of returning overeducation in the current job

Table 3 shows the distribution of vertical mismatch status in the study sample. The analysis conducted revealed a significant chi-square value of less than 0.05, indicating the current employment status depends on the previous one. This dependency is also supported by the magnitude of Cramer V, which ranges from 40% to 88%, indicating the level of association between the two variables. An interesting pattern emerges where workers who became overeducated due to their previous job are more likely to encounter it in the current one. This can be observed from the higher occurrence of over-over cases (overeducation in both previous and current jobs) compared to over-match or over-under incidents. For instance, in August 2018, 233 workers (9.81%) experienced over-over, and this number is greater than the over-match (198 or 8.33%) and over-under (5 or 0.21%) in the same period. This pattern also occurred in February 2017, 2018, and August 2017. On the other hand, it is possible for workers who became overeducated due to their previous job to transition to a matched-education status. For instance, in August 2017, out of 505 workers, 216 (42.77%) successfully transitioned from overeducation to a matched-education status. This number is nearly equivalent to the total number of workers who remained overeducated (287 workers or 56.83%).

A result showed the existence of a specific group of workers transitioning from match education to overeducation. This group comprises 160 workers, comprising 11.36% of the total sample in February 2017, who experienced a shift from matched education to overeducation. It ultimately led to the emergence of a new category of overeducated workers. In terms of trend, this number tends to increase proportionally, with the percentage of individuals falling into the overeducation category in their current job, previously having a matched-education status, reaching 13.25% and 14.27% in August 2017 and 2018, respectively. The only exception to this upward trend occurred in

Figure 2. Sample distribution by characteristics.

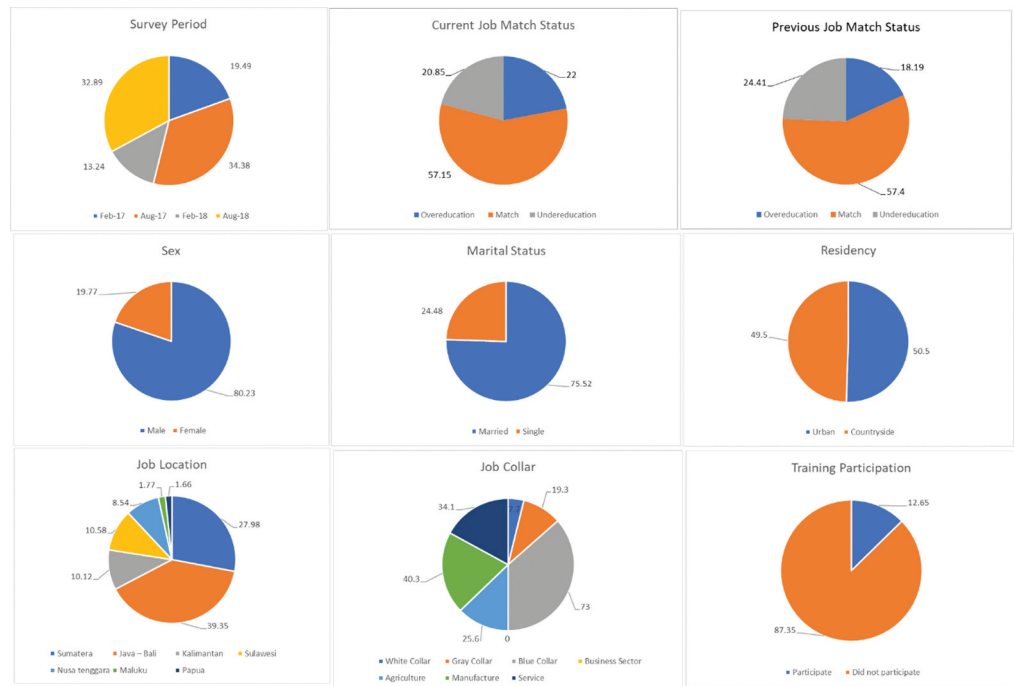
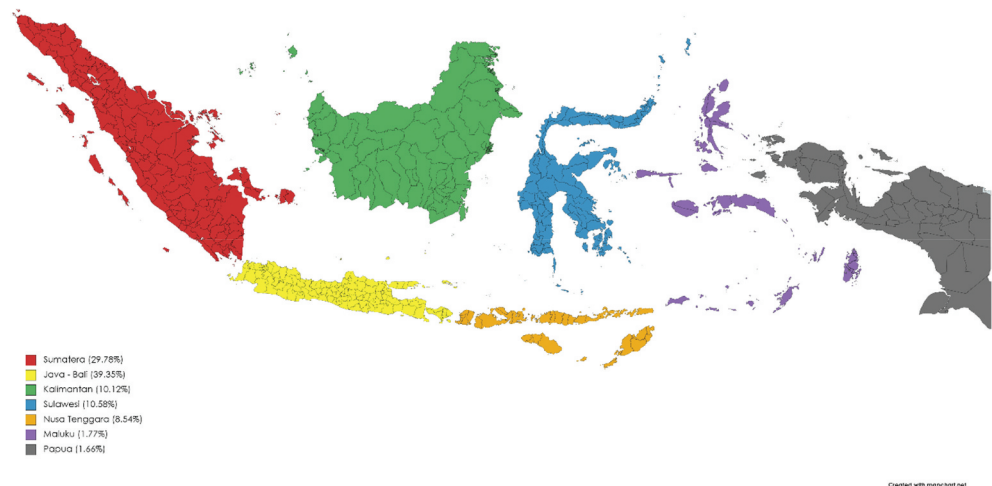


Figure 3. Sample distribution by island in Indonesia.



February 2018, when there was a decrease. These findings serve as an initial indication of the Trapped Hypothesis, suggesting that overeducated workers are more likely to encounter this attribute again in their current occupation. This phenomenon reflects Spence's (1973) job-market signaling theory that inaccurate information about the productivity of workers leads employers to assess individuals based on their education level and prior work experience (Spence, 1973). Consequently, overeducated individuals may inadvertently signal a negative aspect of job productivity.

Table 4 shows the results of Mlogit estimation, which is divided into three columns. In Column 1, the estimation results are shown without utilizing any fixed effects. Meanwhile, in Column 2, the estimation results are displayed with fixed effects applied to the observation time. Column 3 shows the estimation results using fixed effects on both the observation time and the job location island. Workers with a match education status are used as the reference group in the analysis. In this

Table 3. Distribution of vertical mismatch status												
Previous Job	February 2017				August 2017				February 2018			
	Current Job				Current Job				Current Job			
	Over (%)	Match (%)	Under (%)	Under (%)	Over (%)	Match (%)	Under (%)	Under (%)	Over (%)	Match (%)	Under (%)	Under (%)
Over	181 (12.86)	151 (10.72)	4 (0.28)	2 (0.08)	287 (11.56)	216 (8.70)	2 (0.08)	34 (3.56)	1 (0.10)	2 (0.21)	233 (9.81)	5 (0.21)
Match	160 (11.36)	645 (45.81)	73 (5.18)	156 (6.28)	329 (13.25)	895 (36.05)	156 (6.28)	10 (1.05)	552 (57.74)	4 (0.42)	339 (14.27)	155 (6.52)
Under	5 (0.36)	79 (5.61)	110 (7.81)	335 (13.49)	5 (0.20)	258 (10.39)	335 (13.49)	2 (0.21)	14 (1.46)	337 (35.25)	4 (0.17)	323 (13.59)
Total	346	875	187	493	621	1369	493	46	567	343	576	483
Pearson Chi square	547.054				939.236				1.5e+03			
p-value	0.000				0.000				0.000			
Cramer's V	0.4408				0.4349				0.8866			

Table 4. Estimating the Multinomial Logistic regression coefficient

Reference group: match educated at current job

Variables	Over (1)	Over (2)	Over (3)
Independent variables			
Overeducated at previous job	1.433***	1.295***	1.302***
Individual characteristics			
Waiting time for work	-0.0271**	-0.0336**	-0.0338**
Undereducated at previous job	-1.542***	-1.595***	-1.573***
Sex	-0.118	-0.140	-0.127
School years	0.384***	0.406***	0.418***
Age at starting work	-0.000161	0.000828	0.000765
Industry Characteristics			
White collar	-2.132***	-2.145***	-2.193***
Grey collar	-2.333***	-2.505***	-2.555***
Manufacture sector	0.458***	0.410***	0.393***
Service sector	0.444***	0.510***	0.512***
Geographic Characteristics			
Density	-6.76e-05***	-4.49e-05***	-6.18e-05***
Urban area	-0.243***	-0.302***	-0.332***
Time Fixed Effect			
August 2017	-	0.0508	0.0309
February 2018	-	-1.875***	-1.845***
August 2018	-	0.123	0.0984
Island Fixed Effect			
Java/Bali	-	-	0.155*
Kalimantan	-	-	0.114
Sulawesi	-	-	-0.282**
Nusa Tenggara	-	-	-0.324**
Maluku	-	-	-0.458
Papua	-	-	-0.890***
Constant	-4.846***	-4.989***	-5.040***
McFadden's Adj R² Log Likelihood	0.42	0.43	0.43
Chi-square deviance	8268.71	8017.43	7963.09
Chi-square Wald	2613.51	2694.86	2680.23
Observations	7,223	7,223	7,223
Time FE	No	Yes	Yes
Island FE	No	No	Yes

Robust standard errors in parentheses, *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

study, the Mlogit estimation aims to estimate the probability of transitioning to overeducation in the current job for previously overeducated workers compared to those initially match educated. The hypothesis testing mainly compares the probability magnitudes between the over-over and the over-match groups. Overall, the estimation results yielded an Adjusted R^2 value of 43%,

indicating that the employed model has accounted for 43% of the variation in the match education status of the current job.

The results consistently showed that workers who had become overeducated due to their previous job are more likely to encounter this attribute than those who had a matched education in their previous jobs. This is evident from the positive coefficient of the overeducated at previous job variable, depicting the overeducated experience in previous jobs and a p-value of less than 0.05. These findings are consistent regardless of including control and random effects in the regression equation. The regression results also provide insights into the impact of the control variables used in the analysis. Specifically, the variable years of education has a significant positive coefficient. It simply implies that individuals with a higher level of education are more likely to be overeducated. This finding is consistent with the study conducted by Vela, stating that the increase in educational level, leads to a rise in job expectations (Vela, 2021). The availability of higher-level jobs tends to be limited, resulting in increased competition. Therefore, individuals with higher education levels are more susceptible to becoming overeducated.

The regression results provide insights into the influence of job characteristics. The variables white-collar and grey-collar workers have significant negative coefficients. This indicates that both groups are less likely to be overeducated than blue-collar workers. This implies that blue-collar workers have a higher likelihood of being overeducated. This is consistent with the previous study. According to Sukanti and Sulistyaningrum (2022), the share of overeducated workers is mostly dominated by unskilled workers and cleaning staff (22.24 percent). Workers who work in jobs that require special skills and expertise tend not to be overeducated (Sukanti & Sulistyaningrum, 2022).

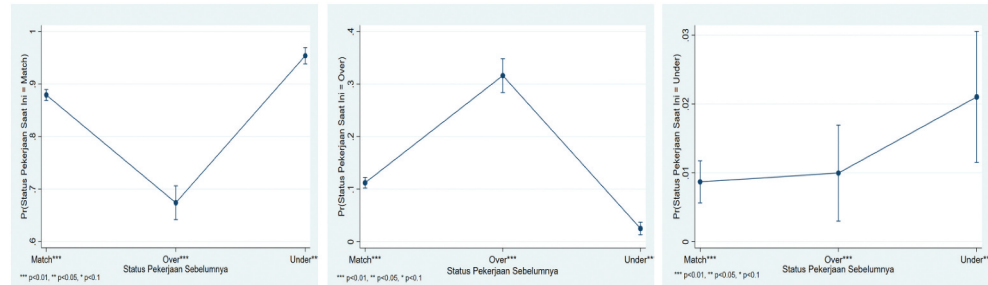
The manufacturing and services sectors also have a significant positive coefficient compared to the agricultural sector. It suggests that the manufacturing and services sectors are more prone to experiencing overeducation compared to the agricultural sector. This finding is consistent with the previous study by Herrera-Idárraga et al. (2012). Then, it is likely that the technological poverty of many EU countries, especially in the Southern area, explains most part of the educational mismatch, especially that in terms of overskilling. This is especially true in those countries, like Italy, where the production system is oriented towards traditional manufacturing sectors and therefore the demand for human capital is expected to remain low and stable (Pastore, 2015).

Occupation mismatch in Indonesia tends to be associated with the low education levels of production workers and agriculture laborers, as well as a large number of clerks that are over-qualified for their jobs. Under-qualification is also a challenge in higher level occupations. High levels of under-qualification and lower levels of over-qualification point towards an issue of skill shortages. This is an important issue, as high levels of skill and qualification mismatch are typically associated with lower levels of labor productivity. The high proportion of underqualified workers may therefore be one reason for weaker labor productivity growth and slow transition to higher value activities throughout the economy (Allen, 2016).

The regression results shed light on the geographical aspects of the analysis. The variables density representing population density and urban status display significant negative coefficients. This suggests that higher population density and urban areas are associated with a reduced likelihood of experiencing overeducation. These findings align with the studies conducted by Kupets (2016) that rural areas and regions with lower population density are more susceptible to experiencing overeducation (Kupets, 2016). This can be attributed to the limited job options and mobility in these areas.

This present study also investigated the trapping and stepping stone hypotheses by examining the relative probabilities of being overeducated, match educated, or undereducated in the current job based on the conditions of the previous one. The predicted probabilities are determined using the mean values of each independent or control variable, allowing for calculations based on the

Figure 4. Predictions of probability of employment status in current employment.



overall average regressor. According to the probability prediction results, workers who were overeducated due to their previous job have a 31.6% probability of encountering this attribute in the current one. Meanwhile, the probability of being matched in the current job is higher, reaching 67.39% (Figure 4). These findings indicate a relatively greater likelihood of transitioning to a matched position rather than becoming overeducated. This supports the notion that the phenomenon of overeducation in Indonesia aligns with the Stepping Stone Hypothesis. It suggests that workers in Indonesia are more inclined to become overeducated in their previous jobs as a means to eventually secure a suitable position (match). Thus, the results reject hypothesis 1.

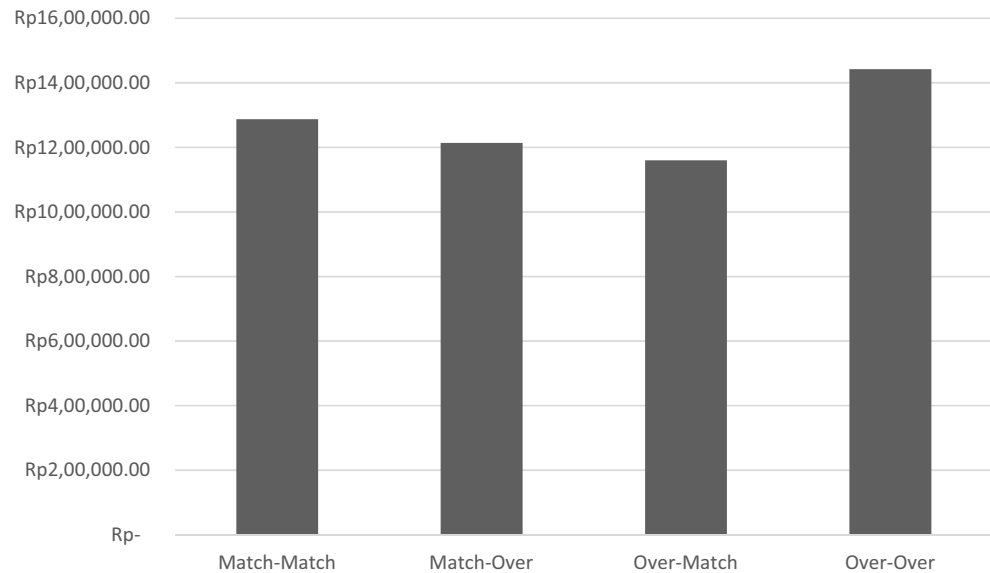
This condition is in line with the theory by Jovanovic (1979) and Sicherman and Galor (1990). According to Sicherman and Galor (1990), the Theory of Career Mobility states that individuals with higher education levels compared to their colleagues tend to experience rapid upward mobility in their careers (Sicherman & Galor, 1990). Additionally, the Job Matching Theory, proposed by Jovanovic (1979), states that overeducation arises due to inaccurate market information and is typically temporary (Jovanovic, 1979). These two conditions contribute to the increased likelihood of workers initially overeducated transitioning to a matched position in their next job rather than encountering these attributes again.

Furthermore, workers with matched status have a higher probability of remaining in such a position (87.92%) compared to becoming overeducated (11.21%) or undereducated (0.87%). This explains the ability of these individuals to retain their job position at the same level when switching workplaces. They tend to be more likely to transition towards overeducation rather than undereducation. This condition indicates that when a worker cannot find a match, they have a higher chance of transitioning to the overeducated status. A similar downward trend applies to undereducated workers, who are more likely to transition to a job that eventually becomes a match.

In Indonesia, one of the critical challenges' workers face is limited access to job information, making it difficult for them to find suitable employment that aligns with their skills and qualifications. This finding is consistent with the study conducted by Gatningsih and Sutrisno (2017) that approximately 60% of young workers in Indonesia still rely on information from family or acquaintances for job search purposes (Gatningsih & Sutrisno, 2017). However, this phenomenon is further reinforced by the scarring effect or the harm caused by unemployment (Pritadrajati et al., 2021). The scarring effect refers to the negative consequences experienced by individuals due to prolonged unemployment, leading to a decline in job quality and income (Pritadrajati et al., 2021). In line with the job matching theory, overeducated workers tend to accept such jobs while actively searching for other employment opportunities to mitigate the adverse effects of unemployment. However, a study from Palczyńska (2021) revealed that, among younger workers, agreeable individuals are more likely to be overeducated (Palczyńska, 2021).

Furthermore, Sicherman and Galor (1990) reported the phenomenon associated with faster internal and external promotion for overeducated workers. Sicherman and Galor (1990) stated that individuals with a higher education level than their colleagues stood out in terms of performance, and accelerated career advancements. This concept, known as the theory of career

Figure 5. Comparison of average real wage levels per group of workers.(in thousand Indonesian Rupiah)



mobility, is relevant to labor market conditions in Indonesia (Sicherman & Galor, 1990). According to Sakinah (2017), close relationships, connections, or loyalty between workers and their superiors often influence external promotions (Sakinah, 2017). As a result, these individuals may willingly become overeducated to be promoted by their superiors.

Based on these studies, the phenomenon of Stepping Stones is largely influenced by inaccurate market information and strategies workers employ to attain their desired level of employment (Adjei & Baah-Boateng, 2023). It was also reported that as the time spent on work preparation increased, the likelihood of working in an overeducated position decreased while the probability of finding a job that matches the qualifications of an individual increased. This reinforces the notion that individuals become overeducated to enhance their prospects of securing a suitable job. Furthermore, Adjei & Baah-Boateng stated that workers who dedicated more than six months to work preparation had a 25.1% lower probability of being overeducated. It was reported that during this extended preparation period, workers often improved their skills through various means such as courses, competency tests, apprenticeships, or even taking up overeducated roles. This process ultimately increased their chances of being accepted for jobs in accordance with their qualifications (Adjei & Baah-Boateng, 2023).

4.3. Analysis of the effect of previous overeducation on pay levels in current jobs

Descriptive analysis examined the average real wage levels per worker group. The results, shown in Figure 5, indicate noticeable wage disparities among these groups. Specifically, workers who became overeducated in both their previous and current jobs were found to have higher wage levels compared to those who were matched in their previous job but became overeducated in their current position (IDR. 1,442,475 vs. IDR. 1,213,922). This initial finding suggested that workers who were initially overeducated received higher wage than those previously matched due to their qualifications.

In contrast, a different pattern emerges when examining workers whose current job status is a match. Workers who were initially overeducated but currently have a matched job experienced lower real wage rates than those whose status matched their previous job (IDR 1,159,790 vs IDR 1,287,259). This study also revealed that the match-over group earned an average of IDR 1,213,922, while the match-match group received higher wage, averaging IDR 1,287,259. The difference of IDR 73,337 between these two groups provides a rough estimate of the wage penalty associated with selecting a current job with an overeducated status rather than a matched job.

Table 5. Estimated results of Fixed effect model coefficients (Fixed effect model)

Fixed effect regression (dependent variable: Natural Logarithm of Wages)

Variables	General (1)	Over (2)	Match (3)
Independent variables			
Overeducated at previous job	−0.0757***	−0.0266	−0.162***
Individual characteristics			
Waiting time for work	0.00267	0.00276	−0.000521
Working experience	0.156***	0.207***	0.154***
Working experience (in squared)	−0.0108***	−0.0146***	−0.0105***
Undereducated at previous job	0.108***	0.145	0.112***
Sex (male)	0.543***	0.577***	0.528***
School years	0.0436***	0.0268**	0.0401***
Marriage status (married)	0.157***	0.111**	0.151***
Age	0.0276***	0.0306**	0.0340***
Age (in squared)	−0.000350***	−0.000359*	−0.000462***
Participated training	0.0554*	0.109**	0.0444
Industry Characteristics			
White collar	0.167***	0.403***	0.159***
Grey collar	0.0954***	0.371***	0.0599*
Manufacture sector	0.317***	0.264***	0.344***
Service sector	0.195***	0.0209	0.245***
Geographic Characteristics			
Density	4.22e-06	8.07e-06	9.14e-06**
Urban area	0.0560***	0.0482	0.0557**
Natural logarithm Gross Regional Domestic Product	0.0501***	0.0349*	0.0485***
Time Fixed Effect			
August 2017	−0.214***	−0.308***	−0.161***
February 2018	−0.361***	0.111	−0.380***
August 2018	−0.106***	−0.139**	−0.0618
Island Fixed Effect			
Java/Bali	−0.0955***	−0.0280	−0.106***
Kalimantan	0.0272	−0.0239	0.0696
Sulawesi	0.0680**	−0.0326	0.0565
Nusa Tenggara	−0.132***	−0.124*	−0.0724
Maluku	−0.00450	0.162	−0.0887
Papua	0.425***	0.260*	0.482***
Constant	11.30***	11.51***	11.24***
Observations	7,223	1,589	4,128
R-squared	0.197	0.261	0.194
Time FE	Yes	Yes	Yes
IslandFE	Yes	Yes	Yes

Robust standard errors in parentheses, *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

This finding further strengthens the argument that overeducation can lead to reduced productivity and diminished worker quality, consequently impacting wage in the current job setting (Verhaest et al., 2015). In the circumstances where workers transition from a previously matched job to a current one that requires educational roles, they tend to face a wage penalty (reduced wage) compared to those who remain in matched jobs.

This study used the Fixed Effects Model as the analytical method to estimate the influence of overeducation in the previous job on wage levels in the current one (Table 5). The estimation is conducted on three data groups, namely the overall analysis of individuals (column 1), those who transitioned to an overeducated job (column 2), and persons who subsequently transitioned to a job that matched their educational qualifications (column 3). An increase was observed, which ranged from 0.19 to 0.27 (general: 0.197, now over: 0.261, now match: 0.194). This implied that the variables incorporated in the model can account for approximately 19 to 27% of the variation in wage changes.

Among the overall sample, workers who became overeducated due to their previous job experience a wage penalty of 7.57% in their current matched job, as reflected in the actual wage. This result has a significance level of less than 0.01. Thus, the results of this test are accepting hypothesis 2. This finding is consistent with the specific estimation conducted for the current match job condition. In this context, individuals transitioning from an overeducated job to a matching one face a wage penalty of 16.2%. It is important to note that these results are not statistically significant for the current overeducated job condition, despite exhibiting a negative coefficient.

These findings complement previous studies focusing only on the wage penalty resulting from overeducated status in the current job (Marioni L da, 2020; Nordin et al., 2010; Robst, 2007a). The phenomenon of this wage penalty can be attributed to factors such as job dissatisfaction (Bédoué & Giret, 2011; Zakariya, 2017), reduced productivity (Pholphirul, 2017) and the perception of lower worker quality. These same factors can also contribute to the wage penalty resulting from overeducation in the previous job. Therefore, it is important to consider these aspects when examining the impact of overeducation on wage.

However, the current overeducated job condition results do not exhibit statistical significance, despite displaying a negative coefficient. According to Green and McIntosh (2007), vertical mismatch status was often due to disparities in the abilities of the workers compared to their colleagues (Green & McIntosh, 2007). This implies that individuals transitioning from a matched to an overeducated condition possess less competitive skills at the matched level, prompting their shift to overeducated jobs. Consequently, compared to previously overeducated workers, these two groups do not exhibit significant differences in their abilities. The experience of being matched does not significantly impact wage levels when transitioning to an overeducated job (Gough & Noonan, 2013).

The analysis of control variables indicates that married workers have a higher wage level, with an increase of 15.7% compared to the unmarried ones. This finding aligns with previous studies conducted by Ahituv and Lerman (Ahituv & Lerman, 2007). Moreover, the results also showed that male workers had a significantly higher wage level, with increase of 54.3% compared to their female counterparts. This reinforces the existence of a wage penalty due to gender in Indonesia, as evidenced by various other studies with different sub-sample characteristics (Sohn, 2015; Sugiharti et al., 2018; Taniguchi & Tuwo, 2014). A study by MULYANINGSIH et al. (2019) revealed that female workers are a close substitute of unskilled male workers. Therefore, human capital investment is also required to shift female workers from undertaking unskilled jobs to skilled jobs and to reduce the earning gap between unskilled and skilled workers (MULYANINGSIH et al., 2019).

Wage gaps often occur due to unobservable characteristics (Castagnetti et al., 2018; Livanos & Núñez, 2012). This phenomenon has also been observed in Indonesia, where 90% of the gender wage penalty is attributed to unexplained factors (Hennigusnia, 2017). Several worker characteristic factors exacerbate the wage gap resulting from these unobservable characteristics. Furthermore, Livanos & Nunez stated that females often faced discrimination due to limited information about their commitment to professional work (Livanos & Núñez, 2012). One aspect of this information is the division of time between household responsibilities and work (Castagnetti et al., 2018). Female workers are often associated with greater demands for household and childcare duties, leading to lower perceived productivity signals for women.

According to Sugiharti et al. (2018), one of the causes of wage penalties between genders in Indonesia is the low substitutability of unskilled workers (Sugiharti et al., 2018). This characteristic is often associated with blue-collar jobs that are perceived as not requiring specific skills. As a result, the absence of comparative advantages that can mitigate the impact of unexplained factors possessed by female workers leads to a preference for the males. This is then compensated by offering lower wage to female workers. Due to the fact that worker mobility occurs within blue-collar jobs, it is reasonable to expect such transitions to have a greater impact on wage penalties for female workers. Castagnetti et al. (2018), stated that there is a wage penalty of 15% for females due to experiencing overeducation (Castagnetti et al., 2018). This value is higher than the 5.99% observed for males and in accordance with the research by Castagnetti et al. (2018), that there is a wage penalty of 15% for overeducated females, which is higher than the 5.99% observed for males (Castagnetti et al., 2018).

Upon further analysis of the control variables, namely years of education and participation in certified training, it is clear that both variables exhibit a significant positive relationship with real wage levels. The findings indicate that for each additional year of schooling, there is an average increase of 4.36% in the real wage level. The real wage level is likely to increase by 4.01%, assuming the current job is a match. This aligns with the study conducted by Safuan & Nazara, that higher levels of schooling lead to increased productivity and higher real wage levels (Safuan & Nazara, 2005). Interestingly, in the case of overeducation, the increase in real wage resulting from additional years of schooling tends to diminish to 2.68%. This can be attributed to the fact that overeducated workers have already exceeded the educational requirements of their current positions. As a result, further education only leads to a smaller percentage increase in wage. In addition to years of schooling, certified training also demonstrated a positive relationship with real wage levels. Workers who have undergone certified training experience higher real wage levels, with an increase of 5.54%. This relationship aligns with the findings of the previous study (Konings & Vanormelingen, 2011).

One individual characteristic variable that also has a significant coefficient is age. Increasing age is associated with higher real wage, albeit with a diminishing marginal effect. This finding aligns with the age-earning model developed by Mincer (1958) (Mincer, 1958). In terms of industry aspects, workers in the agricultural and blue-collar sectors tend to receive lower wage levels. This can be observed from the significant positive coefficients of white-collar, grey-collar, manufacturing, and services in the model. These results are consistent with other studies (Adjei & Baah-Boateng, 2023; Manning, 2004). The agricultural sector is characterized by low real value-added, resulting in lower wage levels in that particular industry. Additionally, blue-collar workers tend to receive lower real wage due to the physical nature of their job.

Finally, geographical factors such as Gross Regional Domestic Product (GRDP) and urban status influence the real wage level. Urban areas, for instance, earn wage that is approximately 5.6% higher compared to rural regions. This correlation is consistent with the GRDP findings, which indicate a 1% increase in regional production corresponds to a 4.5% increase in wage. Both indicators reflect the economic development and availability of infrastructure and facilities. Regions with better economic conditions tend to have higher minimum wage levels (Hasibuan &

Handayani, 2021). Moreover, regions with stronger economic performance tend to foster heightened labor competition, ultimately leading to higher wage levels (Autor et al., 2023; Berg, 2015; Büchel & Battu, 2002). This pattern of wage growth suggests that increased competition has led to a reallocation of jobs from low-wage to higher-wage employers (Berg, 2015).

The findings of this study align with the one conducted by Clark et al. (2017) in the United States (Clark et al., 2017). Clark et al. (2017) reported that overeducated workers would experience a wage penalty of relatively 2.6% to 4.2% in future jobs, regardless of whether they switch occupations or remain in their current occupation. The phenomenon can be explained as the scarring effect resulting from overeducation, which refers to the lasting impact of previous jobs on current employment. This can be attributed to a decrease in productivity (Pholpirul, 2017) and reduced job satisfaction (Bédwé & Giret, 2011). Pholpirul (2017) further stated that the decrease in productivity occurred when individuals are unable to effectively apply the specific skills acquired through their education.

Overeducation negatively affects all three aspects of job satisfaction (intrinsic, extrinsic and social job aspects) (Bedemariam & Ramos, 2021). The evidence indicates that this imposes costs on overeducated workers in the form of lower wages and lower job satisfaction, relative to individuals with equivalent levels of education in matched employment. This lack of job satisfaction results in divided attention between work responsibilities and the search for alternative employment opportunities, known as on-the-job search. This prevents workers from performing optimally in their current job. This skepticism about the skills and suitability of overeducated individuals significantly hampers their ability to signal their value to employers effectively. Consequently, this poor signaling has implications for lower wage levels in subsequent jobs (Mcguinness et al., 2017).

5. Conclusions, implications, and suggestions for further studies

In conclusion, this study reported that overeducation experience does not increase the probability of being overeducated in the next job. Instead, workers are more likely to be appropriately matched in their subsequent employment. Previous overeducated employees have a 67.35 percent chance of being matched. In contrast, these workers have only a 31.64 percent chance of becoming overeducated. These results support the Stepping Stones Hypothesis in the context of overeducated workers in Indonesia. Additionally, this study further reported the presence of wage penalties, resulting in a decrease in real wage for overeducated workers compared to those with match experience. This is evident by the fact that workers with overeducation experience have a lower real wage rate of 7.57 percent compared to workers with comparable experience. In addition, the negative wage differential between workers with over experience and workers with match experience is 16.2% when workers move to current jobs with match experience.

This study is expected to make a valuable contribution to the expanding body of literature in the field of economics literature and serve as a springboard for further discussion on vertical mismatch. The results of this study can also be used as a basis for a worker's decision regarding overeducation work by providing an explanation of the vertical mismatch from previous employment. In addition, the results of this study can be used to determine the short- and long-term policy directions of the government. However, it is important to acknowledge the limitations of this study. One limitation is the lack of consideration given to factors from previous jobs and individual conditions during job transitions when estimating the probability of overeducation occurrence. Unfortunately, these factors could not be included in the analysis due to data limitations. This study may not provide a comprehensive understanding of overeducation. Another limitation is the failure to account for potential inclusion and exclusion errors resulting from data availability. Inclusion errors occur when overeducated individuals are mistakenly categorized as appropriately matched, while exclusion errors occur when individuals with appropriate education are incorrectly classified as overeducated. Although these errors were assumed to be absent, their possibility should be considered. Moreover, this finding might be biased due to the fact that 80% of the subjects in this study were male.

This study provides valuable insights into the phenomenon of stepping stones in Indonesia, particularly for overeducated workers. It suggests that overeducation jobs can serve as temporary alternatives for individuals who have not yet secured an ideal job that aligns with their educational qualifications. Consequently, the government may not need to implement specific measures to facilitate workers in finding employment that matches their educational qualifications, considering that the stepping stone effect may naturally lead to better job matches over time. The government should focus on ensuring swift labor mobility to facilitate the transition of workers into employment. This is crucial because the negative impact of unemployment, resulting in the scarring effect, can be more detrimental than being temporarily overeducated. Policies that promote smooth labor market transitions can help mitigate the adverse consequences of prolonged unemployment.

The government must acknowledge and address the wage penalty that arises from overeducation experience in the current job. In order to mitigate this issue, the government can take proactive measures such as strengthening the Pre-Employment Card program to promote job training. Additionally, the government and privates must implement initiatives requiring companies to provide basic training for new workers, enabling them to enhance their productivity and adapt quickly to the work environment. These initiatives aim to reduce wage penalties and support workers in maximizing their potential in labor market. *In addition, companies and universities can provide basic training to recent graduates and new employees so that they can adapt more quickly to the workplace and avoid wage penalties. Additionally, workers are expected to be able to participate in various training programs prior to entering the workforce. As a result of market competition, workers must seek out positions that require a level of expertise commensurate with their skills. The similarity of a person's skills has no effect on pay rates.*

Further research needs to be conducted using sub-sample analyses based on various characteristics such as city status, education level, working class, age group. A deeper understanding can be gained by examining the effects of overeducation experiences on different worker conditions. Additionally, future studies should consider exploring the impact of horizontal mismatch experience, which refers to a discrepancy between the fields investigated and the actual type of work. This aspect is not within the scope of the current study but holds potential for further investigation.

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