Do the sticky floor and glass ceiling phenomena persist in the Indonesian labour force after the pandemic?

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Submitted: 28 September 2024 — Revised: 24 June 2025 — Accepted: 30 July 2025

Abstract

Our study aims to examine the evolution of gender wage gaps and their decomposition by employment status in Indonesia during the pre-pandemic, pandemic, and post-pandemic periods, using SAKERNAS data from 2018 to 2023. The OLS and RIF-OLS regression estimations reveal that gender wage gaps remained substantial throughout these periods. On average, female employees earned about 30 percent less than their male counterparts, which decreased to 23 percent after controlling for other wage-related characteristics. Notably, the gap is particularly pronounced among underemployed and low-paid workers, where female employees earn approximately 40 percent to 50 percent less than their male counterparts. Decomposition results using Blinder-Oaxaca and RIF-Oaxaca methods, both at the mean and across the wage distribution, pointed out that most of the gap is due to unexplained factors, confirming the persistence of the sticky floor and glass ceiling phenomena. This suggests ongoing negative discrimination against female employees in the Indonesian labor market. Among observable characteristics, working experience, tenure, and working hours significantly contributed to the wage gap, with women generally lagging behind men in these areas. However, women's higher educational attainment, greater participation in the formal sector, access to training, and prevalence in white-collar jobs significantly helped reduce the wage gaps.

Keywords: pandemic; post-pandemic; gender; wage gap; decomposition

JEL Classification: J31; J71

Recommended Citation
Ruslan, K., & Sukma, W. L. (2025). Do the sticky floor and glass ceiling phenomena persist in the Indonesian labour force after the pandemic?. *Jurnal Ekonomi Indonesia*, 14(2), 125-144. DOI: https://doi.org/10.52813/jei.v14i2.567

Available at: https://jurnal.isei.or.id/index.php/isei

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1. Introduction

Progress toward wage equality between men and women has been slow over the past few decades (ILO, 2018). This ongoing gender wage gap could hinder efforts to achieve Target 8 of the Sustainable Development Goals (SDGs), which focuses on decent wages and gender equality. This issue is also evident in Indonesia, where the gender wage gap remains around 20 percent based on official data (BPS, 2024).

During the 2019-2021 period, the gender wage gap in Indonesia decreased (BPS, 2020, 2023, 2022, 2024, 2021). However, this reduction was due to economic instability caused by COVID-19, where a decline in men's earnings primarily drove the narrowing gap (Panjaitan, 2023) leading more women to enter the labour market to supplement household income (Halim et al., 2023). As the economy gradually recovered, the gender wage gap widened again, reaching higher levels in 2023. Although the COVID-19 pandemic has officially ended, its long-term effects on the labour market persist, including high rates of underemployment, a prevalence of informal work, reduced working hours, declining productivity, and wages that remain inadequate (Doleschel & Manu, 2021; ILO, 2023, 2024).

This trend is not unique to Indonesia. Among 22 countries, nine experienced an increase in the gender wage gap in 2021/2022 compared to 2019, with the highest increase reaching 6.3 percentage points (ILO, 2022). The increase in the gender wage gap in several countries is attributed to labour market disruptions caused by COVID-19 (Alon et al., 2020; da Costa Silva & Shinkoda, 2021; Doorley, O'donoghue & Sologon, 2021; Botello-Peñaloza, 2022).

The gender wage gap arises from a combination of explained and unexplained factors. According to the ILO (2020), disparities in wages can be linked to differences in education, job tenure, working hours, and career interruptions, as well as stigma-based limitations that influence women's access to managerial roles. While factors such as age, education, training, and formal sector employment are associated with higher wages, marital status often hurts women's earnings (da Costa Silva & Shinkoda, 2021; Kafabih & Ridwan, 2022; Olcan, 2022; Panjaitan, 2023). These dynamics contribute to the persistence of two well-documented phenomena in labor economics: the sticky floor, which refers to structural and institutional barriers that trap women in low-wage, low-mobility jobs, and the glass ceiling, which represents invisible barriers that prevent qualified women from reaching top-level positions (Arulampalam et al., 2007; Cotter et al., 2001).

The presence of the sticky floor and glass ceiling phenomena in the labor market can be explained by labor market segmentation and gender discrimination theories. The sticky floor effect, whereby women remain concentrated in low-wage, low-mobility jobs, is consistent with segmented labor market theory, which posits that structural barriers limit women's advancement due to occupational segregation, caregiving burdens, and unequal access to career-enhancing resources(Arulampalam et al., 2007). Meanwhile, the glass ceiling reflects institutional and neoclassical theories of discrimination, where gendered norms and organizational biases inhibit women's advancement into top-tier roles, despite equal or superior qualifications (Cotter et al., 2001).

In the Indonesian context, a significant portion of the wage gap remains unexplained by the difference in characteristics between male and female workers. According to Sukma & Kadir (2019), nearly 80 percent of the wage gap in Indonesia in 2016 was due to unexplained factors. Even in the health sector, considered a feminist job, more than 22 percent of the wage gap remains unexplained (WHO & ILO, 2022). In high-level positions, wage disparities persist, influenced by myths about female workers, such as assumptions that women lack ambition, cannot perform certain tasks, face microaggres-

sions, or are overly demanding (Field et al., 2023). Even highly educated women still face wage disparities compared to men (Botello-Peñaloza, 2022). The largest unexplained wage gap is often seen among women of reproductive age, potentially due to career breaks associated with traditional roles (Alon et al., 2020; da Costa Silva & Shinkoda, 2021).

To effectively narrow the gender wage gap, it is essential to understand the key contributors to both the explained and unexplained portions of the gap. One common approach to analyzing these contributors is the Oaxaca-Blinder decomposition, which breaks down the wage gap into its component factors (Blinder, 1973; Oaxaca, 1973). However, this method only provides a decomposition at the mean, offering a limited perspective on the wage gap.

To gain a more comprehensive understanding, particularly of the wage gap across different points in the wage distribution, alternative decomposition methods such as the Recentered Influence Function (RIF)-Oaxaca can be employed (Firpo et al., 2009). This approach allows for an examination of the wage gap across the entire distribution, revealing insights into the sticky floor and glass ceiling phenomena.

In the Indonesian context, most studies on gender wage decomposition were conducted before the pandemic, either focusing on the mean (e.g., (Pirmana, 2006; Sukma & Kadir, 2019; Suharyono & Digdowiseiso, 2021)) or both the mean and across the wage distribution (e.g., (Potrafke & Ursprung, 2012; Sohn, 2015; Taniguchi & Tuwo, 2014). These studies consistently found that the largest portion of the wage gap was unexplained, which can be attributed to gender discrimination that negatively biases female employees. Observable characteristics contributing to the gap included education, work experience, and occupational segregation.

However, these studies did not examine the wage gap based on employment status (full employment vs. underemployment), which is particularly significant in the context of the pandemic, as it may disproportionately impact fully employed and underemployed workers. Research on the decomposition of gender wage gaps during the pandemic in the Indonesian context remains limited. For example, Panjaitan (2023) only decomposed the gap at the mean and did not investigate the gap based on employment status. Moreover, to the best of our knowledge, well-documented studies on the decomposition of the post-pandemic gender wage gap in Indonesia are not yet available.

Our study aimed to address those practical gaps by investigating and decomposing the gender wage gaps during the pandemic and post-pandemic, both at the mean and across the wage distribution for the total employees and by segregation based on employment status. It will seek the answers to the following three research questions: 1) How does the gender wage gap change at the mean and along the wage distribution during the period before the pandemic, the pandemic, and after the pandemic by the status of employment (full employment and underemployment)? 2) What are the contributing factors to the development of the gender wage gap at the mean and along the wage distribution during the period before the pandemic, the pandemic, and after the pandemic, by the status of employment? 3) Do the glass ceiling and sticky floor phenomena exist in the Indonesian labour market and persist after the pandemic?

2. Methodology

2.1 Data and Variable

Our research utilizes microdata from the Indonesian National Labour Force Survey (SAKERNAS), conducted annually in August from 2018 to 2023 by Statistics Indonesia (BPS), which encompasses a sample of 300,000 households. Given that the microdata for

each year is cross-sectional, we combined observations from all years into one pooled dataset. Each sample household from SAKERNAS will account for all individuals living within it, averaging 4 to 5 members, with variations across different regions. For the employment analysis, the study will focus on individuals aged 15 and older who are employed in their primary job.

The study aims to answer three key research questions by analyzing data from 1,186,269 individuals categorized as employees, including laborers/ employees and casual workers in both the agriculture and non-agriculture sectors. By doing so, our estimation of the total gender wage gap differed from BPS's official figures (Figure 1), which were calculated by excluding casual workers. The sample includes 362,169 individuals from the pre-pandemic period (2018-2019), 618,848 from the pandemic period (2020-2022), and 205,252 from the post-pandemic period (2023), with the pandemic period defined according to the official timeline set by the Indonesian government.

Individuals were further categorized based on their average weekly working hours into three groups: severe underemployment (less than 15 hours per week), underemployment (less than 35 hours per week), and full employment (at least 35 hours per week). A detailed description of all research variables is provided in Appendix 1. The variables used in this study are those available in the Sakernas dataset only. Other variables that may influence the model were not included due to limitations in the Sakernas data.

2.2 Empirical Methods

Using SAKERNAS data for the period 2018 to 2023, we estimated the gender wage gaps for each employment status category by estimating Equation (1) below:

$$Y_i = \alpha G_i + X'_i \beta + \varepsilon_i \quad (1)$$

is the natural logarithmic of the nominal wages. Therefore, the regression coefficient of gender variable (0= if an individual is male, 1= if an individual is female) measures by how much the wage of female employees on average is lower or higher than their male counterparts, which is calculated using the formula: $(e^{\alpha}-1)\times 100\%$, and the existence the wage gender gap can be checked by testing the significance of α.

The vector of covariates X_i contains wage determinants as well as pandemic, industry, and provincial dummies in Table 1, and ε_i is an error term that is assumed to be independently and identically distributed with mean zero and constant variance. We acknowledge the concern regarding potential endogeneity in Equation (1), particularly due to omitted variable bias arising from unobserved factors such as individual ability, as emphasized in the Mincerian model. To address this issue, we took several measures aimed at reducing the bias in our estimates.

First, we enriched the set of explanatory variables in our regression model to capture as many relevant wage-determining factors as possible. These variables include standard human capital indicators such as education level and proxies for work experience, along with job-related characteristics like employment status, occupation, and industry. We also included regional and time-specific controls, such as provincial and pandemic-related dummies, to account for contextual variation. By incorporating a broad range of covariates, we aim to minimize the influence of omitted variables that could bias our estimates.

Second, while instrumental variable (IV) regression is a potential solution for endogeneity, we were limited by the absence of valid and strong instruments in the SAKERNAS dataset. Employing weak or inappropriate instruments could exacerbate the bias rather than correct it. Given this constraint, we opted not to implement an IV approach

and instead acknowledged this limitation transparently in our analysis.

Lastly, the primary focus of this study is to decompose gender wage differentials and identify contributing factors using the Blinder-Oaxaca decomposition framework. While we recognize the limitation posed by potential endogeneity, our approach remains consistent with the standard practice in the empirical wage gap literature, such as Sohn (2015).

To decompose the contributing factors of the gap, we conducted the Blinder-Oaxaca decomposition to decompose the gender wage gap at the mean into its possible contributing factors. Then, we started by estimating Equation (1) separately for the female group and the male group.

The decomposition of the gender wage difference into two components, or the two-fold decomposition, explained and unexplained components as in Equation (2).

$$\Delta Y = (X_M - X_F)' \beta_M + X_F' (\beta_M - \beta_F) \quad (2)$$

The first component on the right-hand side of Equation (2) refers to the explained component of the wage gap that is contributed by the gender differences in the levels of observable characteristics (endowment effect), while the second component measures the unexplained part of the wage gap that is contributed by the gender differences in returns to the same set of observable characteristics (structural effect) (Blinder, 1973; Oaxaca, 1973; Jann, 2008).

To estimate the total gap across the wage distribution, we applied so-called Recentered Influence functions (RIF)-Regression or RIF-OLS, popularized by Firpo, Fortin, and Lemieux (2009). It allows us to analyse the effects of location changes in the distribution of the independent variables on the distribution of the dependent variable (Rios-Avila & de New, 2022). Simply, we just replaced the dependent variable with the RIF of the relevant distributional statistic, which is the unconditional quantile (Firpo et al., 2009). Specifically, if we consider the τ^{th} quantile of the wage distribution, the method defines an Influence Function $IF(y;q_\tau)$ as a dichotomous variable that takes on the value $-(1-\tau)/f_y(q_\tau)$ when the dependent variable is smaller than or equal to the quantile q_τ and $\tau/(f_y(q_r))$ otherwise. Thus, the function can be written as

$$RIF(y; q_r) = q_r + IF(y; q_\tau) = q_r + \frac{\tau - \mathbf{1}(y \leq q_r)}{f_y(q_r)} \quad (3)$$

where $1(y \leq q_\tau)$ is an indicator function; $f_y(q_r)$ is the marginal density distribution of the dependent variable; and $q_\tau = Q_\tau(y)$ is the population -quantile of the unconditional distribution of the dependent variable.

The gap decomposition across the wage distribution was conducted by implementing the RIF-Decomposition method. The method applies the quantile regression procedure to produce the Blinder-Oaxaca decomposition at each specified percentile of the yield distribution (Rios-Avila, 2020).

3. Results and Discussion

The statistical summary (Appendix 2) indicates that the majority of employees, irrespective of employment status were characterized by low education (junior high school or less), younger age (under 45 years), lack of training, blue-collar roles, non-casual employment (laborers), full-time work, employment in the formal sector and services industry, and residence in urban areas.

Significant differences in employment characteristics between male and female employees were observed throughout the period from 2018 to 2023, regardless of employment status. Generally, female employees outperformed their male counterparts in terms of higher participation rates in higher education, job training, white-collar jobs, the formal sector, and non-casual employment. Additionally, women had higher participation rates in the manufacturing and services industries, which are typically better paid than in agriculture. However, female employees lagged behind men in terms of experience, tenure, working hours, and participation rates in full employment.

The statistical summary in Appendix 2 further shows that the mean wage for male employees was significantly higher than that for female employees. The wage difference was most pronounced among severely underemployed employees and least pronounced among fully employed workers. During the pandemic, women in this category encountered significant challenges, especially in juggling domestic duties—including household and childcare responsibilities—with formal employment and engagement in community social relationships (Miranti et al., 2022).

Over the period from 2018 to 2023, the data also suggest that the widest wage gaps occurred among employees in low-paying jobs. The wage distribution plots in Appendix 3 reveal that the gender wage gap is evident not only at the mean but also across the entire wage distribution, particularly in the lower end, indicating the presence of a "sticky floor" phenomenon. The wage distribution for male employees is more centred, while the distribution for female employees is left-skewed, regardless of full employment status.

The mean wage differences shown in Appendix 2, along with the wage distribution plots in Appendix 3, provide an initial overview but do not account for other variables that could influence wage differentials between male and female employees. Thus, further analysis is necessary to quantify the actual wage gaps by controlling for other wage determinants, such as employee characteristics.

As expected, the wage equation estimates (both uncontrolled and controlled) reveal substantial gender wage gaps from 2018 to 2023, regardless of employment status (as shown in Table 1). On average, the gap is particularly pronounced among underemployed and low-paid workers, where female employees earn approximately 40 percent to 50 percent less than their male counterparts.

Moreover, the differences in the returns on earning determinants between the two groups, as depicted in Figure 2, suggest that a portion of the wage gap remains unexplained, pointing to factors beyond measurable characteristics contributing to the gender wage disparity. As expected, decomposition results using Blinder-Oaxaca and RIF-Oaxaca methods, both at the mean and across the wage distribution, confirmed that most of the gap is due to unexplained factors.

Table 1. Development of the wage gaps by full employment status, 2018-2023

Pandemic period	Severely Underemployment		Underemployment		Full Employment	
	Total	Controlled	Total	Controlled	Total	Controlled
Pre-	-0.649***	-0.417***	-0.419***	-0.399***	-0.220***	-0.202***
pandemic	(0.0270)	(0.0217)	(0.0100)	(0.0098)	(0.0044)	(0.0040)
Pandemic	-0.479***	-0.427***	-0.326***	-0.341***	-0.210***	-0.210***
	(0.0195)	(0.0225)	(0.0116)	(0.0078)	(0.0054)	(0.0033)
Post-	-0.746***	-0.521***	-0.438***	-0.388***	-0.235***	-0.213***
pandemic	(0.0296)	(0.0308)	(0.0149)	(0.0152)	(0.0088)	(0.0057)

Note: Survey weights were used in estimation,* Statistically significant at 5 percent. ** Significant at 10 percent, Significant at 1 percent, robust standard error in the parentheses

Table 2. Oaxaca-Blinder Decomposition of Wage Gaps during Pre-pandemic by Full Employment Status

	Severely Underemployment (n=20,484)		Underemployment (n=60,319)		Full Employment (n=281,366)	
1. Gender differential						
Mean male	13.780***		14.060***		14.660***	
log(wage)	(0.027)		(0.014)		(0.011)	
Mean female	13.130***		13.640***		14.440***	
log(wage)	(0.023)		(0.018)		(0.015)	
Log (wage)	0.649***		0.419***		0.220***	
difference	(0.023)		(0.010)		(0.006)	
2. Aggregate decomposition						
	Endowment	Structural	Endowment	Structural	Endowment	Structural
Total	0.232***	0.417***	0.0202**	0.399***	0.0185***	0.202***
	(0.018)	(0.019)	(0.008)	(0.010)	(0.003)	(0.004)
Share of the total gap (%)	35.750	64.250	4.820	95.180	8.410	91.590
3. Detailed decomposition (for selected variables)						
	Endowment	Structural	Endowment	Structural	Endowment	Structural
Education	-0.096***	-0.088***	-0.099***	-0.056***	-0.104***	-0.080***
	(0.003)	(0.010)	(0.006)	(0.017)	(0.003)	(0.012)
Age Groups	0.005***	-0.061***	0.000	-0.051	0.012***	-0.043***
	(0.001)	(0.001)	(0.003)	(0.031)	(0.001)	(0.009)
Experience &	0.038***	-0.031*	0.002	-0.110**	0.036***	-0.045**
Tenure	(0.001)	(0.018)	(0.003)	(0.052)	(0.002)	(0.019)
Working Hours	0.030***	-0.087***	0.016***	-0.144***	0.011***	-0.081***
	(0.001)	(0.012)	(0.002)	(0.043)	(0.000)	(0.016)
Trained	0.041***	-0.107***	-0.011***	-0.002	-0.005***	0.001
	(0.001)	(0.024)	(0.001)	(0.004)	(0.000)	(0.001)
White collar	-0.006***	4.42e-05	-0.034***	-0.024	-0.025***	-0.010**
	(0.000)	(0.001)	(0.004)	(0.016)	(0.001)	(0.004)
Laborer	-0.025***	-0.007*	-0.0027	-0.278***	-0.022***	0.294***
	(0.001)	(0.004)	(0.003)	(0.097)	(0.002)	(0.078)
Formal	-0.011***	0.133**	-0.023***	0.108**	-0.002	-0.263***
	(0.001)	(0.066)	(0.004)	(0.042)	(0.002)	(0.039)
Industry	-0.008***	-0.156***	0.169***	0.109***	0.118***	0.104***
	(0.001)	(0.029)	(0.009)	(0.025)	(0.002)	(0.019)

Note: Standard errors in the parentheses; *** statistically significant at 1 percent level of significance. ** statistically significant at the 5 percent level of significance. * statistically significant at the 10 percent level of significance; the weight of the survey was used for estimation

Before the pandemic (2018-2019), the gender wage gap is particularly pronounced among underemployed employees, highlighting that the wage disparity in Indonesia is largely an underemployment issue. Specifically, women earned 64.9 percent less than men on average among severely underemployed employees, and 41.7 percent less after controlling for other wage determinants (Table 1). Among underemployed employees, the gap was somewhat smaller, with female employees earning 39.9 percent less than their male counterparts after adjusting for other variables. This significant wage disparity among underemployed workers may be attributed to several factors, including occupational segregation in low-wage sectors, part-time and precarious employment, limited bargaining power, caregiving responsibilities, discrimination, and gaps in edu-

cation and skills.

Many underemployed women in Indonesia are engaged in roles traditionally seen as "women's jobs," which tend to be lower-paid than male-dominated roles. Women are also more likely to work part-time due to caregiving responsibilities and other factors. Part-time work often offers lower wages, and women may accept these positions to gain flexibility or due to limited job options, particularly when balancing work with caregiving duties such as caring for children or elderly relatives. These responsibilities can reduce job mobility and limit opportunities for higher-paying, full-time positions. This context explains why female employees, on average, have fewer working hours than their male counterparts and why the proportions of severely underemployed and underemployed workers are higher among women in Indonesia.

Interestingly, among underemployed employees, women have a higher proportion of higher education (university) than men. This suggests a mismatch between educational qualifications and job roles, as underemployment often involves workers in jobs that do not fully utilize their skills or education. This mismatch may occur when women return to the workforce after caregiving breaks and find themselves in roles that do not match their qualifications.

The gender wage gap is narrower among fully employed employees, with a differential of around 22.0 percent that decreases to 20.2 percent after controlling for other wage-related factors. This may be because fully employed women have better job security, benefits, and opportunities for advancement. They are also more likely to receive equal pay and promotion opportunities, as they are in occupations less segregated by gender. Additionally, more than 92 percent of fully employed female workers were laborers with greater negotiating power, and their higher education levels allow them to command better wages.

A substantial portion of the wage differentials remains unexplained, particularly in the full-employment status group, where almost all of the wage gap is attributed to structural factors, indicating gender discrimination. Among severely underemployed workers, 35.75 percent of the wage gap could be explained by observable characteristics, mainly industrial dummies reflecting differences in the distribution of male and female employees across industries with varying wage structures. This suggests the existence of occupational segregation, with women more concentrated in lower-paying industries and men in higher-paying ones. Other factors significantly contributing to the explained portion of the gap include differences in work experience, tenure, full employment status, and average working hours, consistent with the patterns shown in Appendix 2, where female employees generally lag behind their male counterparts.

The negative sign of the education coefficient in the explained part of the wage regression indicates that excluding education would increase the gender wage gap. This suggests that education has played a significant role in reducing the overall wage gap, as women in Indonesia tend to have higher educational attainment than men, enabling them to secure higher-paying jobs. Similarly, factors such as job training, women's participation in formal and white-collar jobs contributed to narrowing the wage gap. This explained portion drops significantly among underemployed (4.82 percent) and fully employed workers (8.41 percent), highlighting the persistent structural barriers that prevent women from achieving equal pay despite having similar qualifications as men.

The decomposition across the wage distribution shows that the largest wage differentials occur at the lower end of the wage scale, with the gap narrowing towards the top. This pattern suggests that the gender wage gap is predominantly an issue among low-paid workers, driven by factors such as occupational segregation, caregiving responsibilities, and limited bargaining power. Women in Indonesia are overrepresented in low-paying, traditionally undervalued sectors like caregiving, retail, and hospitality,

which offer limited opportunities for upward mobility. Conversely, men are more likely to be in better-paying low-wage jobs, such as manufacturing and construction.

Table 3. Oaxaca-Blinder Decomposition of Wage Gaps During Pandemic by Full Employment Status

	Severely Underemployment (n=51,371)		Underemployment (n=132,264)		Full Employment (n=435,213)	
1. Gender differential						
Mean male	13.690***		14.190***		14.660***	
log(wage)	(0.024)		(0.015)		(0.010)	
Mean female	13.210***		13.860***		14.450***	
log(wage)	(0.023)		(0.022)		(0.013)	
Log (wage)	0.479***		0.326***		0.210***	
difference	(0.022)		(0.011)		(0.005)	
2. Aggregate decomposition	Endowment	Structural	Endowment	Structural	Endowment	Structural
Total	0.052***	0.427***	-0.015**	0.341***	0.000	0.210***
	(0.016)	(0.023)	(0.006)	(0.008)	(0.003)	(0.004)
Share of the total gap	10.840	89.160	-4.690	104.690	0.140	99.860
3. Detailed decomposition (for selected variable)						
Education	-0.128***	-0.037	-0.137***	-0.115***	-0.103***	-0.091***
	(0.011)	(0.061)	(0.005)	(0.020)	(0.002)	(0.011)
Age Groups	0.008***	-0.094	7.40e-05	-0.080***	0.006***	-0.033***
	(0.002)	(0.074)	(0.001)	(0.023)	(0.001)	(0.009)
Experience &	0.024***	0.111	0.020***	-0.042	0.042***	-0.047***
Tenure	(0.006)	(0.142)	(0.002)	(0.044)	(0.002)	(0.016)
Working Hours	-0.026***	-0.032	0.024***	-0.090***	0.001***	-0.087***
	(0.004)	(0.026)	(0.001)	(0.028)	(0.000)	(0.018)
Trained	-0.012***	0.012	-0.014***	-0.008**	-0.008***	0.002
	(0.002)	(0.010)	(0.001)	(0.003)	(0.000)	(0.001)
White collar	-0.027***	-0.012	-0.050***	-0.012	-0.026***	-0.013***
	(0.009)	(0.038)	(0.003)	(0.013)	(0.001)	(0.003)
Laborer	-0.006*	-0.197	-0.004	-0.168*	-0.025***	0.340***
	(0.003)	(0.311)	(0.003)	(0.092)	(0.002)	(0.081)
Formal	-0.003	0.138	-0.027***	0.070*	-0.006***	-0.285***
	(0.002)	(0.109)	(0.004)	(0.037)	(0.002)	(0.040)
Industry	0.217***	0.004	0.161***	0.101***	0.103***	0.055***
	(0.015)	(0.126)	(0.005)	(0.019)	(0.002)	(0.017)

Note: Standard errors in the parentheses; *** statistically significant at 1 percent level of significance. ** statistically significant at the 5 percent level of significance. * statistically significant at the 10 percent level of significance; the weight of the survey was used for estimation

At the top of the wage distribution, nearly all the wage gap is unexplained, with negative signs in the unexplained part indicating that even with better qualifications, women earn less than men in high-paying jobs. This reflects both the ”sticky floor” and ”glass ceiling” phenomena, where women are confined to the lower end of the wage scale and are unable to break into higher-paying roles, regardless of their qualifications.

The estimation results in Table 1 indicate that the wage gap decreased during the pandemic. This decline in the overall gap can be attributed to several factors, including job losses in lower-wage sectors, government support measures, the shift to remote work, and reductions in high-income bonuses and overtime pay.

The pandemic disproportionately affected lower-wage sectors, which tend to have a higher concentration of women employees. As job losses in these sectors occurred, the overall wage gap narrowed slightly because those who remained employed, both men and women, were more likely to be in higher-paying sectors. The Indonesian government's wage subsidies, provided to approximately 12,1 million employees in December 2022 (Liputan6.com, 2022), also may help reduce income disparities during this period.

Furthermore, the shift to remote work during the pandemic offered greater flexibility, allowing women to remain in the workforce or avoid taking lower-paying jobs due to caregiving responsibilities, including the opportunity to contribute to the MSME sector. This flexibility helped women maintain or even improve their earnings relative to men. Moreover, a considerable number of women entered the labor force to compensate for the loss of income caused by their husbands' job losses during the COVID-19 pandemic (Miranti et al., 2022). This shift may have played a role in narrowing the gender wage gap.

Additionally, reductions in bonuses, commissions, and overtime pay—often more prevalent among high-income, male-dominated roles—may have contributed to the decreased wage gap during the pandemic.

The decrease in the wage gap during the pandemic was most pronounced among severely underemployed employees, where the overall wage gap reduced from 64.9 percent pre-pandemic to 47.9 percent (Table 1). This decline can be attributed to disproportionate job losses in low-wage sectors, which employ a higher proportion of women, as well as government wage subsidies provided during the pandemic. Additionally, the narrowing of differences in working hours between men and women in underemployed roles likely contributed to this reduction. Notably, the decrease was observed at the mean and across the wage distribution (Figure 2).

However, despite the slight decrease in the wage gap during the pandemic, the pattern by full employment status remained consistent with pre-pandemic trends. The decomposition analysis also revealed that the unexplained component continued to dominate the overall wage gap, both at the mean and across the wage distribution, confirming the persistence of the "sticky floor" and "glass ceiling" phenomena.

Moreover, the dominance of unexplained factors in the overall wage gap increased during the pandemic, both at the mean (Table 3) and across the wage distribution (Figure 2). This suggests that gender-based discrimination in the workforce likely intensified during the pandemic, manifesting in forms such as biases in hiring, promotions, and wage decisions. Employers may have made decisions based on stereotypes or perceived risks associated with women, exacerbating the structural inequalities in the labor market.

Overall, labor market conditions have demonstrated a recovery in key indicators following the COVID-19 pandemic. The Indonesia Employment Outlook 2023 and 2024 by the Ministry of Manpower highlights that although the open unemployment rate surged during the early phase of the pandemic, it gradually declined to 5.32 percent by August 2023. However, the recovery remains uneven. Labor informality persists, with 59 percent of workers employed in informal sectors. The unemployed are predominantly male, aged 15–24, high school graduates, and urban residents. The rapid growth of digitalization and the gig economy, while creating new job opportunities, has outpaced regulatory frameworks, particularly in partnership-based work such as ride-hailing, leading to concerns over labor exploitation and the absence of minimum protection (Martawardaya et al., 2023; Muhyiddin, 2023).

This is further confirmed by the findings of this study, which show a renewed widening of the gender wage gap in Indonesia. After the pandemic, the wage gap not only returned to pre-pandemic levels but also worsened. Our estimation results show that the

overall wage gap increased regardless of the employment status (Table 1).

This worsening wage gap may be due to the uneven recovery across industries, with sectors where women are overrepresented recovering more slowly or undergoing long-term changes, while male-dominated sectors rebounded more quickly. Additionally, the long-term career impact on women who took time off or reduced hours for caregiving during the pandemic might have made it harder for them to re-enter the workforce or regain their previous earnings. The increase in the wage gap could also reflect a reinforcement of traditional gender roles, where women took on more caregiving and household responsibilities.

Table 4. Oaxaca-Blinder Decomposition of Wage Gaps during Post-pandemic by Full Employment Status

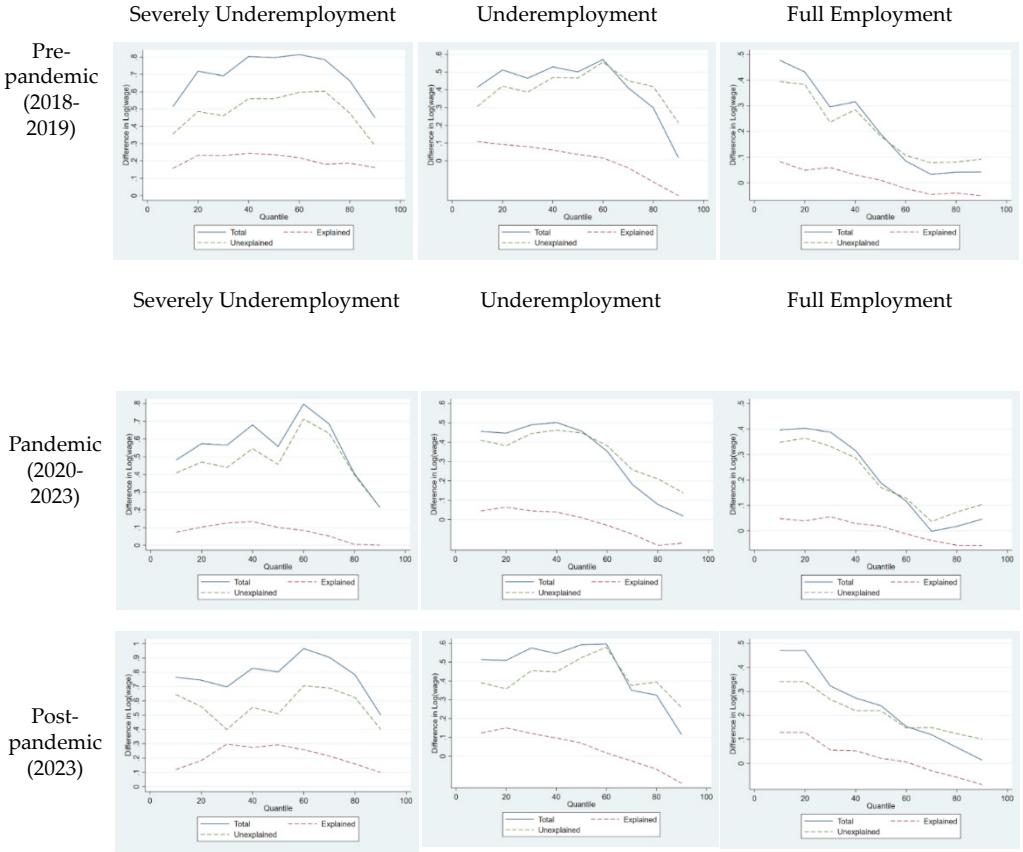
	Severely Underemployment (n=12,177)		Underemployment (n=34,846)		Full Employment (n=158,229)	
1. Gender differential						
Mean male	13.930***		14.230***		14.800***	
log(wage)	(0.022)		(0.016)		(0.010)	
Mean female	13.190***		13.790***		14.560***	
log(wage)	(0.029)		(0.018)		(0.014)	
Log (wage)	0.746***		0.438***		0.235***	
difference	(0.027)		(0.015)		(0.008)	
2. Aggregate decomposition	Endowment	Structural	Endowment	Structural	Endowment	Structural
Total	0.224***	0.521***	0.0502***	0.388***	0.0215***	0.213***
	(0.022)	(0.030)	(0.010)	(0.015)	(0.005)	(0.006)
Share of the total gap	30.030	69.970	11.460	88.540	9.150	90.850
3. Detailed decomposition						
Education	-0.078***	-0.055	-0.116***	-0.065**	-0.115***	-0.080***
	(0.009)	(0.065)	(0.008)	(0.030)	(0.003)	(0.014)
Age Groups	0.004*	-0.087	-0.007*	-0.057	0.005***	-0.027**
	(0.002)	(0.088)	(0.004)	(0.051)	(0.001)	(0.012)
Experience &	0.034***	0.102	0.024***	-0.035	0.041***	-0.064***
Tenure	(0.006)	(0.173)	(0.006)	(0.080)	(0.003)	(0.017)
Working Hours	0.028***	-0.100**	0.020***	-0.301***	0.012***	-0.101***
	(0.006)	(0.040)	(0.003)	(0.052)	(0.000)	(0.023)
Trained	-0.010***	0.015	-0.015***	-0.014*	-0.001***	-0.000
	(0.002)	(0.0126)	(0.002)	(0.007)	(0.000)	(0.003)
White collar	-0.038***	0.019	-0.040***	-0.009	-0.026***	-0.020***
	(0.010)	(0.024)	(0.007)	(0.018)	(0.002)	(0.005)
Laborer	0.002	-0.590	0.011**	-0.140	-0.022***	0.389**
	(0.004)	(0.384)	(0.006)	(0.158)	(0.003)	(0.151)
Formal	-0.008	0.242	-0.045***	0.041	-0.002	-0.264***
	(0.0113)	(0.151)	(0.00)	(0.0670)	(0.003)	(0.072)
Province	0.295***	0.170*	0.210***	0.075*	0.132***	0.076***
	(0.022)	(0.088)	(0.008)	(0.042)	(0.003)	(0.025)

Note: Standard errors in the parentheses; *** statistically significant at 1 percent level of significance. ** statistically significant at 5 percent level of significance. * statistically significant at the 10 percent level of significance; the weight of the survey was used for estimation

The rise in the gender wage gap was more pronounced among severely underemployed employees. Decomposition results indicate that the majority of wage differentials

remained unexplained, regardless of employment status (Table 4). This dominance of unexplained factors persisted across the wage distribution and was particularly significant at the top (Figure 2), where a negative sign in the explained component suggests that women, despite having better qualifications, earned less than their male counterparts. The ”sticky floor” and ”glass ceiling” phenomena also persisted post-pandemic, highlighting the ongoing gender-based discrimination in Indonesia’s workforce. The contribution of the explained part to the total wage gap increased compared to the pre-pandemic period suggesting that while structural discrimination remains a significant issue, differences in observable characteristics between men and women have also grown more influential in contributing to the wage gap.

Figure 2. Development of the decomposition of the wage gaps by full employment status, 2018-2023



Source: Author’s calculationOur estimation of gender wage gaps and their decomposition might be subject to underestimation or overestimation due to potential selection biases. Specifically, our study only includes individuals who are currently employed, potentially underrepresenting women who might leave the labor force for reasons such as childbearing or family care.

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These women, if included, might have lower wages, which could affect our overall estimates. However, when we applied the Heckman Selection Model (Heckman, 1979) to our wage equation, the resulting gender wage gap estimates were close to our original findings (Appendix 4), suggesting that selection biases are minimal in our study. Nonet-

heless, we recommend that future research apply the Heckman Selection Model, especially when estimating wage gaps and their decomposition across the wage distribution, to ensure robust results.

4. Conclusion

Our estimation of gender wage gaps and their decomposition might be subject to underestimation or overestimation due to potential selection biases. Specifically, our study only includes individuals who are currently employed, potentially underrepresenting women who might leave the labor force for reasons such as childbearing or family care. These women, if included, might have lower wages, which could affect our overall estimates. However, when we applied the Heckman Selection Model (Heckman, 1979) to our wage equation, the resulting gender wage gap estimates were close to our original findings (Appendix 4), suggesting that selection biases are minimal in our study.

Nonetheless, we recommend that future research apply the Heckman Selection Model, especially when estimating wage gaps and their decomposition across the wage distribution, to ensure robust results. This study reveals that the effects of the ”sticky floor” and ”glass ceiling” continue to persist in Indonesia even after the pandemic. The ”sticky floor” phenomenon has decreased from the pre-pandemic period to the post-pandemic period solely within the full employment group. However, in the categories of underemployed and severely underemployed individuals, this gap has widened. In contrast, the ”glass ceiling” phenomenon is most pronounced among underemployed individuals.

The study identifies underemployment as a critical factor in the gender wage gap, particularly among severely underemployed workers, where the gap was notably larger compared to fully employed workers. Decomposition analysis indicates that most of the total gap is attributed to unexplained factors, regardless of the pandemic period or employment status, suggesting pervasive negative discrimination against women in the Indonesian labor force. Among the observable characteristics, working experience, tenure, and working hours significantly contributed to the gap, with female employees trailing behind their male counterparts. However, women’s higher educational attainment, greater participation in the formal sector, access to training, and prevalence in white-collar jobs helped reduce the wage gaps. The decomposition results across the wage distribution further confirmed that the wage gap in Indonesia is largely a low-paying job phenomenon, alongside the presence of ”sticky floor” and ”glass ceiling” effects in the labor market that persist after the pandemic.

To narrow the gender wage gap, our study recommends enhancing women’s capabilities through education and workforce training. This should begin during school years or higher education and continue with targeted training for women entering the workforce. Emphasis should be placed on capacity building, moving beyond the stigma of ”what women can and cannot do.” Women should have equal opportunities with men to pursue education and training in STEM fields (Science, Technology, Engineering, and Mathematics). Additionally, business owners and companies must recognize that women are equally capable of holding significant positions, including top managerial roles, beyond traditional administrative or human resources roles.

To further reduce the gender wage gap, it is essential to strengthen regulations related to female employees, such as paid maternity and annual leave policies, to prevent women from exiting the labor market. Support should extend beyond salaries to include adequate facilities that enable women to work effectively. Lastly, promoting gender equality in child-rearing responsibilities is crucial for fostering a balanced and equitable

work environment.

Despite providing robust insights into the persistence of gender wage inequality and the sticky floor and glass ceiling phenomena in the Indonesian labor market, this study is subject to several limitations.

First, the analysis is based solely on cross-sectional data from the SAKERNAS, which limits the ability to observe individual-level changes over time. While the pooled cross-section approach allows for trend analysis across periods, a panel dataset would enable more precise tracking of career trajectories, labor mobility, and wage progression, particularly for female workers.

First, the analysis is based solely on cross-sectional data from the SAKERNAS, which limits the ability to observe individual-level changes over time. While the pooled cross-section approach allows for trend analysis across periods, a panel dataset would enable more precise tracking of career trajectories, labor mobility, and wage progression, particularly for female workers.

Second, the study relies on observable characteristics available in the SAKERNAS dataset. Important unobservable variables, such as individual ability, work motivation, negotiation skills, firm-level characteristics, job performance, and childcare responsibilities, are not captured, potentially leading to omitted variable bias. Although steps were taken to reduce endogeneity (e.g., expanding control variables), the absence of instrumental variables constrains causal inference.

Third, this study focuses only on individuals currently employed in their main job. As such, it may underestimate the overall gender wage gap by excluding discouraged female workers or those who exited the labor force, especially during or after the pandemic, due to caregiving responsibilities or job loss. Although a Heckman Selection Model was applied as a robustness check and showed minimal bias, future studies should incorporate labor force participation dynamics more explicitly.

Fourth, the employment status categorization is based solely on weekly hours worked in the main job. Secondary jobs or multiple employment arrangements, more common post-pandemic due to gig work and flexible labor, are not reflected, which may understate total working hours and earnings, particularly among women.

Lastly, the study does not separate wage gaps between the public and private sectors, although these segments may have different compensation standards, job protections, and gender policies. This segmentation could provide further nuance in understanding wage disparities.

Future research should consider employing panel or longitudinal data (if available) to trace individual wage trajectories over time. Incorporating firm-level or household-level data, including family income, number of dependents, and employer characteristics, would offer a more comprehensive picture of gender disparities. Additionally, disaggregating the analysis by public vs. private sector, urban vs. rural areas, or by specific industries may help uncover context-specific barriers and policy implications. Lastly, qualitative studies that explore workplace culture, gender norms, and women's lived experiences in the labor market would complement the quantitative findings and offer deeper insights into the mechanisms sustaining wage inequality in Indonesia.

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Appendix 1. Summary of research variables

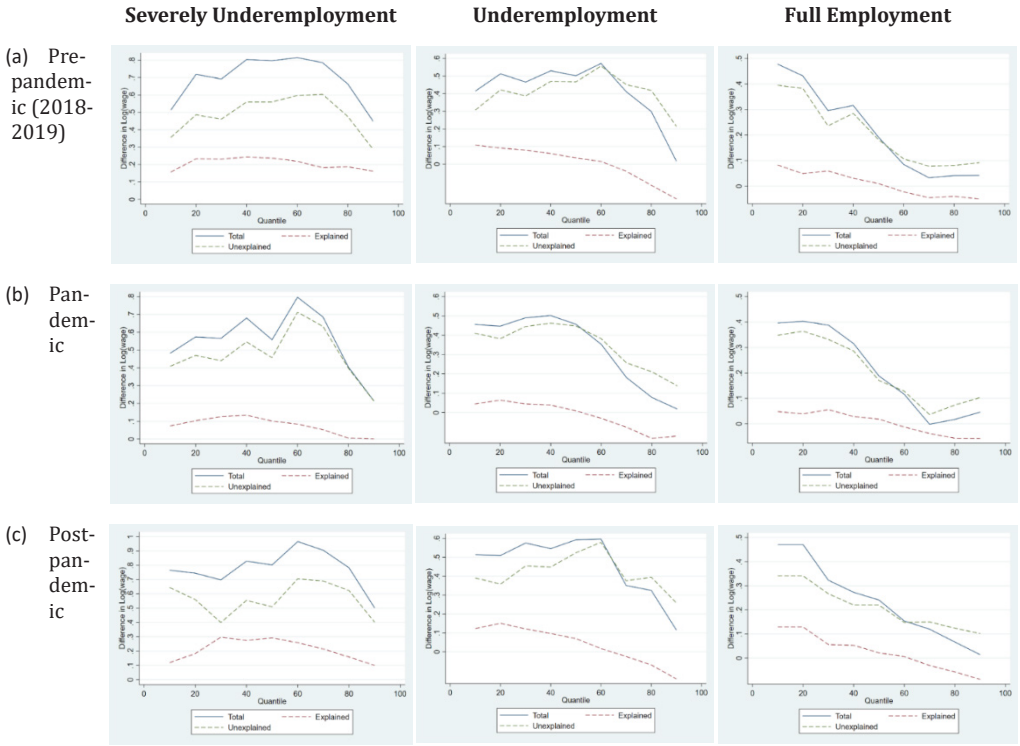
Variable	Definition	Mean	Std. Dev
Lwages	The natural logarithm of the nominal wage per week	14.399	0.92
Female	0 for male (reference category) 1 for female	0.341	0.474
Married	0 unmarried (reference category) 1 married	0.705	0.456
Household members	Number of household members to which an individual belongs (person)	4.099	1.617
Household members 15+	Number of household members who are 15 years old and above, to which an individual belongs (person)	3.056	1.26
Education completed	The highest education level completed by an individual: 1- no education/elementary school (reference category), 2- junior high school, 3- senior high school, 3- vocational, 4- diploma 1/2/3, 5- university	3.092	1.801
Age group	Age of an individual: 1- 15-34 years old (reference category), 2- 35-44 years old, 3- 45-54 years old, 4- 55-64 years old, 65 years old and above	1.043	1.070
Experience	Working experience of an individual (years)	20.917	13.749
Tenure	Working tenure of an individual (years)	9.066	9.566
Working Hours	The average working hours of an individual per week (hours)	39.651	15.790
Full Employment	Employment status of an individual based on average working hours per week: 1- severely underemployed (reference category), 2- underemployed, 3- fully employed	2.666	0.603
Trained	Participation of an individual in work training: 0- untrained (reference category), 1- trained	0.213	0.41
White collar	0-blue-collar (reference category) 1-white-collar	0.311	0.463
Laborer	Type of individual employment: 0- casual workers (reference category) 1- labourer/employee	2.708	0.626
Formal	Formality status of employment: 0- informal (reference category) 1-formal	0.801	0.399
Urban	The residential area of an individual: 0- rural; 1- urban	0.542	0.498
Pandemic	Pandemic periods: 1- pre-pandemic, 2- pandemic, 3- post-pandemic	1.867	0.678
Industry	The economic sector in which an individual works consists of 17 industries (agriculture as the reference category)	-	-
Province	Provincial dummy (Aceh Province as the reference category)	-	-

Appendix 2. Statistical summary of variables by employment status and gender, 2018-2023

Variable	Severely Underemployment (5.88% of total employees)				Underemployment (16.50% of total employees)				Full employment (77.62% of total employees)			
	Total	Male	Female	Difference	Total	Male	Female	Difference	Total	Male	Female	Difference
Ln(wages)	13.469	13.783	13.134	0.649*	14.044	14.186	13.86	0.326	14.728	14.796	14.561	0.235*
Married (%)												
Not Married/ever married	32.653	36.289	28.762	7.527*	30.059	28.734	31.778	-3.044	33.732	29.269	44.56	-15.291*
Married	67.347	63.711	71.238	-7.527*	69.941	71.266	68.222	3.044	66.268	70.731	55.44	15.291*
Household Member (person)	4.116	4.192	4.035	0.157*	3.894	3.948	3.824	0.124	3.881	3.909	3.813	0.096*
Household Member 15+ (person)	3.089	3.193	2.977	0.216*	2.961	2.991	2.923	0.068	2.938	2.914	2.995	-0.081*
Completed Education (%)												
Elementary School and less	41.254	40.141	42.445	-2.304*	33.805	35.21	31.981	3.229	22.316	24.467	17.097	7.37*
Junior High School	17.938	20.778	14.898	5.88*	14.146	17.203	10.179	7.024	15.349	17.025	11.283	5.742*
Senior High School	17.458	17.532	17.379	0.153*	15.933	17.887	13.397	4.490	23.055	24.052	20.637	3.415*
Vocational	8.709	10.169	7.147	3.022*	9.968	11.97	7.369	4.601	18.354	19.127	16.478	2.649*
Diploma 1/2/3	2.666	1.954	3.427	-1.473*	3.636	2.368	5.282	-2.914	3.854	2.597	6.904	-4.307*
University	11.975	9.426	14.704	-5.278*	22.512	15.362	31.793	-16.431	17.071	12.732	27.601	-14.869*
Age Groups (%)												
15-34	43.971	46.063	41.732	4.331*	39.610	41.100	37.676	3.424	47.73	45.478	53.195	-7.717*
35-44	22.729	21.093	24.479	-3.386*	24.371	23.684	25.262	-1.578	25.521	26.758	22.519	4.239*
45-54	17.48	16.828	18.178	-1.350*	20.193	19.404	21.217	-1.813	17.879	18.601	16.128	2.473*
55-64	10.921	11.101	10.729	0.372*	11.437	11.237	11.696	-0.459	7.303	7.537	6.736	0.801*
65+	4.899	4.915	4.882	0.033*	4.390	4.575	4.149	0.426	1.567	1.627	1.421	0.206*
Experience (year)	22.846	22.54	23.173	-0.633*	22.522	22.996	21.908	1.088	19.188	20.344	16.385	3.959*
Tenure (year)	7.222	7.598	6.819	0.779*	10.294	10.23	10.377	-0.147	8.953	9.400	7.867	1.533*
Working Hours (hours/week)	6.561	5.725	7.457	-1.732*	25.345	25.717	24.862	0.855	46.797	47.424	45.275	2.149*
Trained (%)												
Not trained	87.448	88.33	86.504	1.826*	79.661	83.560	74.600	8.96	76.281	78.563	70.744	7.819*
Trained	12.552	11.670	13.496	-1.826*	20.339	16.440	25.400	-8.96	23.719	21.437	29.256	-7.819*
White Collar (%)												
Blue collar	73.889	81.059	66.216	14.843*	66.565	75.943	54.393	21.55	74.443	80.818	58.976	21.842*
White collar	26.111	18.941	33.784	-14.843*	33.435	24.057	45.607	-21.55	25.557	19.182	41.024	-21.842*
Laborer (%)												
Agri casual worker	14.606	12.457	16.905	-4.448*	19.524	21.260	17.272	3.988	5.448	5.900	4.351	1.549*
Non-agriculture casual worker	14.045	14.588	13.464	1.124*	12.354	15.703	8.009	7.694	10.645	13.528	3.650	9.878*
Labourer/employee	71.349	72.956	69.63	3.326*	68.121	63.038	74.719	-11.681	83.907	80.572	91.999	-11.427*
Informality (%)												
Informal	28.651	27.044	30.37	-3.326*	31.879	36.962	25.281	11.681	16.093	19.428	8.001	11.427*
Formal	71.349	72.956	69.63	3.326*	68.121	63.038	74.719	-11.681	83.907	80.572	91.999	-11.427*
Urban (%)												
Rural	45.815	46.146	45.461	0.685*	43.104	44.566	41.207	3.359	30.697	32.579	26.133	6.446*
Urban	54.185	53.854	54.539	-0.685*	56.896	55.434	58.793	-3.359	69.303	67.421	73.867	-6.446*
Industry (%)												
Agriculture	22.436	23.406	21.399	2.007*	25.245	28.887	20.518	8.369	10.451	11.947	6.821	5.126*
Mining	1.944	3.453	0.328	3.125*	1.157	1.907	0.184	1.723	2.015	2.710	0.328	2.382*
Manufacture	12.282	10.620	14.060	-3.440*	12.314	11.339	13.579	-2.240	19.353	18.033	22.556	-4.523*
Services	63.339	62.522	64.213	-1.691*	61.284	57.867	65.719	-7.852	68.181	67.310	70.295	-2.985*

Note: the survey weights were used in the estimation. * significant at 5 percent.

Appendix 3. Development of wage distributions by gender and full employment status, 2018-2023
Development of the decomposition of the wage gaps by full employment status, 2018-2023



Source: Author's calculation

Appendix 4. Heckman Selection Model estimation for all samples

Dependent variable: log(wage)	Total (2018-2023)			
	Raw	Select	Controlled	Select
Female	-0.344***		-0.259***	
	(0.005)		(0.003)	
Married		0.237***	0.0526***	0.291***
		(0.003)	(0.002)	(0.005)
Household Number		-0.0275***	-0.004***	-0.047***
		(0.0014)	(0.0011)	(0.0016)
Household Member 15+		0.000	-0.006***	0.0074***
		(0.0020)	(0.0018)	(0.002)
Completed Education				
Junior High School		-0.0131**	0.0817***	-0.252***
		(0.005)	(0.004)	(0.006)
Senior High School		0.315***	0.298***	0.0631***
		(0.005)	(0.006)	(0.006)
Vocational		0.477***	0.347***	0.386***
		(0.005)	(0.006)	(0.007)
Diploma 1/2/3		0.726***	0.603***	0.456***
		(0.007)	(0.010)	(0.010)
University		1.004***	0.858***	0.763***
		(0.009)	(0.009)	(0.008)

Dependent variable: log(wage)	Total (2018-2023)			
	Raw	Select	Controlled	Select
Age Groups				
35-44		0.224***	0.0007	0.385***
		(0.004)	(0.003)	(0.004)
45-54		0.217***	0.126***	0.323***
		(0.004)	(0.006)	(0.005)
55-65		-0.081***	0.320***	-0.214***
		(0.003)	(0.011)	(0.010)
65+		-0.670***	0.568***	-1.019***
		(0.012)	(0.017)	(0.018)
Experience			0.028***	
			(0.000)	
Experience2/100			-0.070***	
			(0.001)	
Tenure			0.023***	
			(0.000)	
Tenure2/100			-0.033***	
			(0.000)	
Working Hours			0.006***	
			(0.000)	
Full Employment				
Underemployment			0.331***	
			(0.010)	
Full employment			0.582***	
			(0.012)	
Trained		0.195***	0.142***	0.234***
		(0.004)	(0.004)	(0.007)
White collar			0.142***	
			(0.003)	
Laborer			0.124***	
			(0.010)	
Formal			0.113***	
			(0.013)	
Urban		0.126***	0.103***	-0.0117**
		(0.006)	(0.005)	(0.005)
Pandemic period				
Province and Industry Fixed Effect				
Athrho		-1.762***		0.049***
		(0.0122)		(0.00)
Lnsigma		0.150***		-0.389***
		(0.005)		(0.008)
Constant			12.440***	

Dependent variable: log(wage)	Total (2018-2023)			
	Raw	Select	Controlled	Select
			(0.019)	
Number of observations	2,695,039	2,695,039	2,695,039	2,695,039

Note: Survey weights were used in estimation,* Statistically significant at 5 percent. ** Significant at 10 percent, Significant at 1 percent, robust standard error in the parentheses