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REVEALING THE STICKY FLOOR EFFECT OF THE GENDER WAGE GAP IN INDONESIA BY USING AN UNCONDITIONAL QUANTILE REGRESSION WITH RIF-OLS APPROACH

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ABSTRACT

Gender inequality persists as an ongoing challenge, particularly evident in the persistent wage gap which often stems from entrenched societal perceptions that restrict women into subordinate roles. This study aims to investigate factors influencing wage gap and its explained and unexplained contributor. Many studies in Indonesia only measure gender wage gap at one average point. Each point of the wage distribution has different characteristics, so the gender pay gap at one average point cannot be assumed to apply to the entire wage distribution. This study uses a more up-to-date method to examine wage differences between gender. Besides, the use of the internet as part of digitalization is crucial as a factor that has not been widely explored in other researches. Using data from Sakernas February 2023, this study employs UQR with RIF-OLS estimation and Blinder-Oaxaca decomposition. The results show that regional status, secondary education, work experience, internet use, working hours, and union membership affect the wages of both male and female workers across quantiles. Blinder-Oaxaca decomposition shows that women receive 12.25 to 69.37 percent lower wages than men, and the pattern varies across different wage group, confirming a sticky floor effect. Furthermore, education, regional status, marital status, training, internet use, activity status, and union membership are proven to narrow the gap. The differences in worker characteristics by gender affect wage disparities, and the government is expected to address the widening gap, especially at the bottom of the wage distribution.

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1. INTRODUCTION

Equality between women and men is seen as a human rights issue and an indicator of community-centered sustainable development in line with the inclusion of gender equality as the principle of no one being left behind in the implementation of the achievement of Sustainable Development Goals (SDGs) goal 5, namely achieving gender equality and empowering women [1]. Gender equality is a fundamental human right and an essential foundation for achieving a peaceful, prosperous and sustainable world [2]. Thus, gender equality is a condition that all countries must fulfil without exception. However, gender inequality is still an issue that cannot be resolved until now. No country has achieved gender equality [3].

Gender inequality in the economic sector aligns with the gap between women and men, which also targets the labour market [4], [5]. Social scientists also assess the existence of labour market segregation based on gender [6]. According to the International Labour Organization, finding a job is much more difficult for women than men [7]. When women work, they tend to be in low-quality jobs and are vulnerable due to their multiple roles in the household [4]. This phenomenon is related to the strong assumption that the role of women in Indonesia is limited to *"konco wingking"* and disadvantages women even though women and men have the same socio-economic characteristics (endowment) [4].

Furthermore, in the G20 Roadmaps Towards and Beyond the Brisbane Target Italy in 2021, one of the labour targets highlighted is to address the gender wage gap [8]. The gender wage gap is inseparable from the conditions inherent in the labour market in Indonesia. The wage level of workers can illustrate the labour market condition as wages represent a significant part of income. The Central Bureau of Statistics of the Republic of Indonesia reported that the wage gap in Indonesia continued to decline until 2021 but increased in 2022 to 22.41 percent and even to 24.98 percent in 2023. In addition, from 2018 to 2023, there has been a gender wage gap in Indonesia, although the overall average wage tends to increase.

Based on the findings of earlier studies, many factors contribute to the gender pay gap. Researchers have identified women's comparatively lower investment in human capital—such as education, training, and work experience—as a primary factor contributing to the wage gap. In addition, women's preferences in choosing types of work and working hours also impact the differences in wages received due to responsibilities that limit women's mobility in public areas [9], [10]. It can affect work productivity, leading to a wage gap between genders. The wages received by workers depend on the level of productivity that workers have.

Previous research in Indonesia in the last ten years found that the unexplained factors for the gender wage gap ranged from 51 to 93 percent, which means that discrimination is still dominant in the labour market [5], [9], [10], [11], [12]. However, these analyses are still limited to measuring the gap at the average level. Previous research mentions at least two reasons that the gender pay gap at one average point cannot be assumed to apply to the entire wage distribution. First, workers with different characteristics tend to receive different returns based on their position in the wage distribution. Second, variations in the wage gap can also be caused by different levels of discrimination due to different positions in the wage distribution group.

This paper contributes to the literature by analysing the wage gap between genders at various points of the wage distribution to highlight patterns between different wage groups. This study is different from previous research in the following manners. Different from previous research which used the traditional quantile method in estimation, this research work adopts more advanced method of quantile regression as seen in [13] and [14]. Moreover, given the fact that Indonesia already dominates 40% of the market South-East Asia market [15]. This study included the use of internet as part of the digital economy. As suggested in [16], traditional human capital variables do not suffice to explain the gender wage gap; therefore internet usage, which reflects a higher productivity, can be considered elements of human capital [17].

In socio-economic studies related to inequality, conditional quantile regression (CQR) has been widely used. However, the CQR method has limitations in interpretation when the rank preserving condition is not controlled. An alternative method, later known as unconditional quantile regression (UQR), using the concept of the influence function (IF), which has been extensively applied in calculating robust statistical or econometric estimates [18]. This method is powerful for capturing wage gap phenomena at various points in the wage distribution, unlike most gender wage gap studies in Indonesia that use multiple linear regression or robust regression, which can only capture gender wage gap phenomena at the average level.

Given the current economic context, gender wage inequality in Indonesia remains an important issue for further exploration. This study aims to analyze gender wage disparities across different points of the wage

distribution thereby capturing variations among worker groups. Specifically, the research seeks to provide an overview of gender wage inequality in Indonesia in 2023 in relation to worker characteristics and to identify and analyze the factors influencing wages while decomposing the explained and unexplained components of the gender wage gap using RIF-OLS UQR approach in combination with the Blinder-Oaxaca decomposition.

2. RESEARCH METHODS

2.1 Data Sources

This study utilised secondary data from Sakernas in February 2023. The whole study sample included 50,597 respondents after being limited to respondents in the working-age population (15 years and older) with employment status as labourers/employees and casual workers in agriculture/non-agriculture. From the same data source, this study also utilised other control variables as follows:

Table 1. Summary of Variables Used

Variables	Scale/Categories	Dummy
Wage	Continuous variable	-
Regional status	Rural*	0
	Urban	1
Marital status	Never Married*	0
	Married	1
Household status	Not household head*	0
	Household head	1
Education	Minimum graduated from JHS*	0
	Highschool or equivalent	1
	University graduates	1
Job training	Not involved*	0
	Involved in training	1
Working experience	Continuous variable	-
Square of working experience	Continuous variable	-
Internet use	Not use*	0
	Use internet in main job	1
Working hours	Part-time worker*	0
	Full-time worker	1
Activity status	Informal*	0
	Formal	1
Employment field	Other*	0
	Agriculture	1
	Industry	1
Union membership	Not involved*	0
	Involved in union membership	1

Notes: *The parameters written (*) in the table are the reference categories (with code 0) of the categorical variables used in the study*

2.2 Data Analysis

The authors use applied tables, line charts, and bar charts to describe the wage gap and workers' characteristics in this study. Furthermore, an unconditional quantile regression with Recentered Influence Function Ordinary Least Square (RIF-OLS) approach and Blinder-Oaxaca decomposition with male-based average counterfactual wage decomposition was employed to examine the effect of covariates on gender wage gap at each five quantile points (10,25,50,75,90).

Quantile regression, which includes UQR and CQR, has a fundamental advantage over ordinary least squares (OLS) estimation because it can estimate the effects of the independent variables on the various percentiles, i.e., the entire distribution of the dependent variable, not only it is mean [18], [19]. When a set of independent variables characterizes a model, UQR is a more appropriate estimation technique, as conditional and unconditional relationships are not necessarily equivalent and may differ significantly [18]. In addition, UQR does not interpret individual or conditional effects as in CQR [20]. It is also robust toward outliers as CQR.

Regression with RIF was part of a simple strategy to analyse the effects of changes in the distribution of explanatory characteristics on unstandardized quantiles. Later, it was extended to analyse the effects on other distributional statistics [21]. The approach used in UQR utilises the concept of influence function (IF), which is widely used in the computation of robust statistical or econometric estimates.

The effect function $IF\ (Y; v, F_Y)$ of distributional statistics $v(F_Y)$ describes the influence of an observation on a distributional statistic—such as a quantile—and by adding back $v(F_Y)$ to the initial influence function, the recentered influence function (RIF) is obtained. A modified influence function is obtained through the RIF, which allows the analysis to be more centred on a particular distributional statistic. In addition, the expected value of RIF will be equal $v(F_Y)$, so it is more flexible when used to measure distributional statistics such as quantiles. The key idea of UQR is based on RIF, which is the sum of a given distributional statistic and the influence function:

$$IF(y, q_\tau, F_y) = \frac{\tau - I[y \leq q_\tau]}{f_y(q_\tau)}, \tag{1}$$

$$RIF(y; q_\tau; F_y) = q_\tau + IF(y, q_\tau, F_y), \tag{2}$$

$$E[RIF(y; q_\tau; F_y)] = E_X[X] = E(X)\beta_\tau, \tag{3}$$

$$RIF(lnWage_M, q_\tau, F_{lnWage}) = \beta_{0\tau} gender + X\beta_{1\tau} + \varepsilon_\tau, \tag{4}$$

where lnWage is the natural logarithm of average monthly wage of each worker. Gender is a dummy variable reflecting male and female as the gender of each worker. Moreover, X is a set of other regressors (including the constant), β_τ is the corresponding estimated coefficient, and ε_τ is the corresponding error term at the τ_{th} quantile.

This research will use the RIF-OLS because its estimators are the simplest to estimate RIF regressions that focus on average modelling and are widely used in studies related to workers' wages. In the first step, we will run RIF regression for men and women, respectively. The functions are following as:

$$RIF(lnWage_M, q_\tau, F_{lnWage}) = X_M\beta_{M,\tau} + \varepsilon_{M,\tau}, \tag{5}$$

$$RIF(lnWage_F, q_\tau, F_{lnWage}) = X_F\beta_{F,\tau} + \varepsilon_{F,\tau}. \tag{6}$$

An expression illustrating wage as a function of a set of independent variables can be written as follows:

$$lnWage_i, q_\tau = f(X_i, R|\beta) + e_i, \tag{7}$$

where R denotes the fixed effect capturing the unobservable factors that may affect the wage and other control variables for the ith respondent, respectively, β is the conformable vector of the coefficients to be estimated, and e_i is an error term.

The linear function form of Eqs. (5) and (6) used in our data analyses can be written as follows:

$$\begin{aligned} lnWage_i, q_\tau = {} & \beta_0 + \beta_{Urban} Urban_i + \beta_{Married} Married_i + \beta_{Householdhead} Householdhead_i + \\ & \beta_{Highschool} Highschool_i + \beta_{University} University_i + \beta_{Jobtraining} Jobtraining_I + \\ & \beta_{Experience} Experience_i + \beta_{Sqexperience} Sqexperience_i + \beta_{Internet} Internet_i + \\ & \beta_{Fulltime} Fulltime_i + \beta_{Formal} Formal_i + \beta_{Agriculture} Agriculture_i + \\ & \beta_{Industry} Industry_i + \beta_{Unionmembership} Unionmembership_i \end{aligned} \tag{8}$$

The coefficient estimates of the UQR model specified in Eq. (5) for male workers' and Eq. (6) for female workers were obtained using RIF regression at the quantiles of the wage distribution. The coefficient estimates for a specific variable e.g. regional status, which can be interpreted as the effect of a unit change of the variable on the wage distribution, keeping all other independent variables constant in quantile q_τ.

In the second step, as described by [22], the Blinder-Oaxaca decomposition at the τ_{th} quantile is:

$$\hat{\Delta}_\tau = \underline{X}(\hat{\beta}_{M,\tau} - \hat{\beta}_{F,\tau}) + (\underline{X}_M - \underline{X}_F)\hat{\beta}_{F,\tau}, \tag{9}$$

$$\hat{\Delta}_\tau = \hat{\Delta}_U^\tau + \hat{\Delta}_E^\tau. \tag{10}$$

The results of this decomposition analysis are divided into two parts, namely $\hat{\Delta}_E^\tau$, which denotes the differences in characteristics or part of the independent variables used in the study (composition effect) [23].

Meanwhile, the second part $\hat{\Delta}_U^{\tau}$, denotes the difference returns to those characteristics, which is a factor that cannot be explained by the independent variables in the study or is often indicated as discrimination (structural effect) [14].

RIF-OLS can be used to estimate the unconditional effects of covariates of interest on distributional statistics, but it is not sufficient to identify disparities between groups, such as gender. It is necessary to combine RIF-OLS with the standard Blinder-Oaxaca decomposition technique [24]. The Blinder-Oaxaca decomposition is particularly interesting for policy evaluation because it estimates the impact of regressors on the entire (unconditional) wage distribution. Thus, RIF-OLS with the Blinder-Oaxaca decomposition can be applied by maintaining unconditional interpretation.

3. RESULTS AND DISCUSSION

3.1 Overview of the Gender Wage Gap in Indonesia

Table 2 shows that the average wage of female workers is lower than that of male workers. The unadjusted gender wage gap results in a wage differential of 23.31 percent. This value means that female workers receive an average wage 23.31 percent lower than male workers. In simple terms, the average female worker only receives IDR 76,690 for every IDR 100,000 received by male workers.

Table 2. Numerical Summary of Monthly Workers' Wages by Gender in Indonesia 2023 (in IDR)

Descriptive Statistics	Gender	
	Male	Female
Mean	2,924,264	2,242,620
Median	2,400,000	1,500,000
Minimum	25,000	30,000
Maximum	120,000,000	45,000,000
Standard deviation	2,745,679	2,155,813

Notes : *According to the concept and definition used by BPS, wages refer to the income/compensation/remuneration received by a worker during the past month from their main job, either in cash or in kind, paid by the company/office/employer.*

Data source: *Author's calculation*

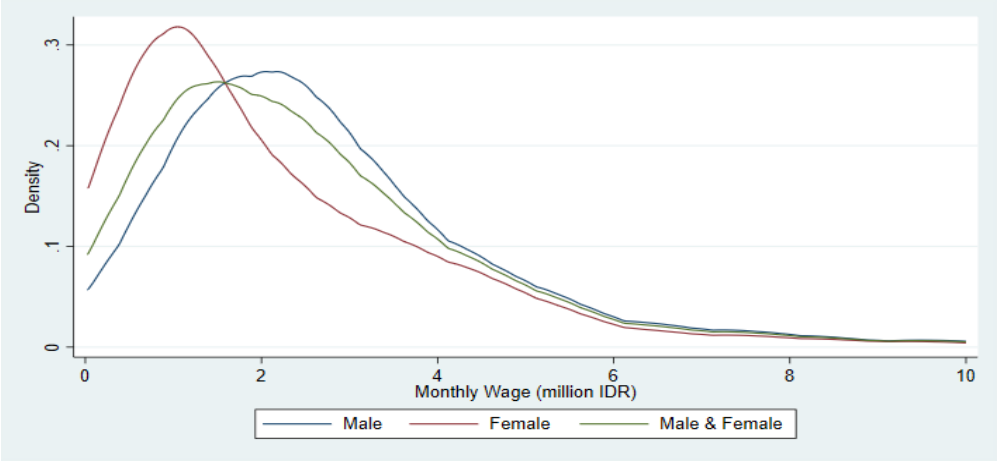

Figure 1. Wage Density Based on Gender
Source: STATA output

Figure 1, using density with bandwidth 0.5 and only the wages of less than 10 million IDR included, shows that wage inequality occurs for each gender group where the wage distribution for each gender group has a heavy right tail. Furthermore, Figure 2 shows an early indication that the gender wage gap in Indonesia in 2023 has a different pattern across quantiles. Thus, measuring the gap at one average point cannot capture this condition. Therefore, further statistical calculations to capture the phenomenon of the gender wage gap that varies across quantiles, such as quantile regression, are needed.

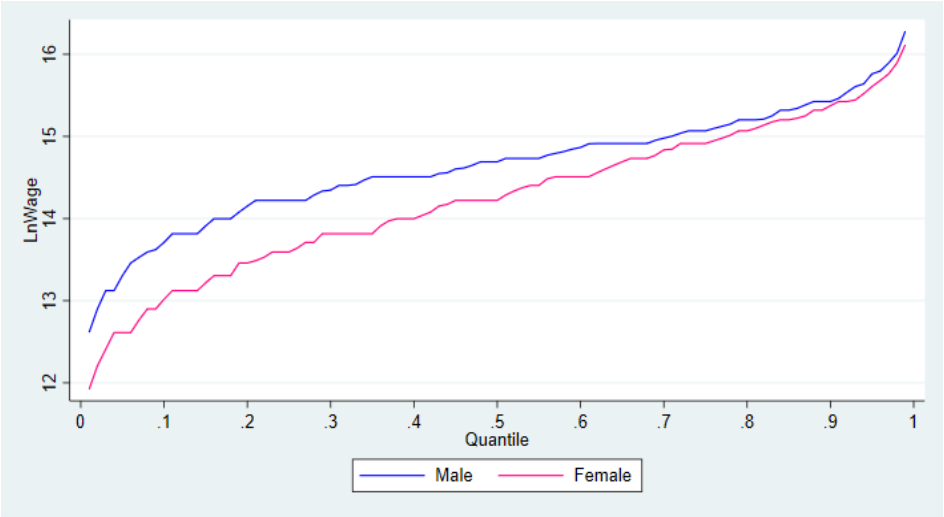

Figure 2. The Raw Gender Wage Gap Across Quantiles of the Wage Distribution
Source: STATA output

3.2 Overview of the Gender Wage Gap and Worker Characteristics in Indonesia

The following analysis uses RIF-OLS to determine the effect of worker characteristics on worker wages based on gender for each quantile. The processing results obtained ten estimation equations. Factors affecting the worker wages can be seen in the results of the analysis presented in Table 3 and 4

Table 3. RIF-OLS Quantile Regression Estimates of the Wage Equation for Male Workers

Parameters	Quantile				
	10	**25**	**50**	**75**	**90**
Intercept	11.834***	13.035***	13.413***	13.870***	14.430***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Urban	0.049*	0.037***	0.067***	0.086***	0.118***
	(0.012)	(0.000)	(0.000)	(0.000)	(0.000)
Married	0.180***	0.124***	0.094***	0.046**	0.005
	(0.000)	(0.000)	(0.000)	(0.001)	(0.736)
Household head	0.146***	0.112***	0.143***	0.142***	0.118***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
High school or equivalent	0.086***	0.103***	0.192***	0.261***	0.219***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
University	0.021	0.111***	0.334***	0.566***	0.673***
	(0.480)	(0.000)	(0.000)	(0.000)	(0.000)
Involved in training	0.032	0.041***	0.100***	0.155***	0.188***
	(0.090)	(0.000)	(0.000)	(0.000)	(0.000)
Working experience	0.025***	0.015***	0.016***	0.016***	0.017***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Square of working experience	-5.8×10^{-4}***	-3.2×10^{-4}***	-2.8×10^{-4}***	-2.4×10^{-4}***	-2.2×10^{-4}***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Use internet in main job	0.218***	0.172***	0.188***	0.184***	0.158***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Full-time worker	1.016***	0.571***	0.369***	0.224***	0.145***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Formal	0.456***	0.287***	0.262***	0.207***	0.106***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Agriculture	-0.039	0.023	0.119***	0.164***	0.141***
	(0.282)	(0.188)	(0.000)	(0.000)	(0.000)
Industry	0.259***	0.223***	0.255***	0.172***	0.147***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Involved in union membership	0.175***	0.179***	0.375***	0.587***	0.582***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)

Notes : *p-value are in parentheses; * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$*
Data Source: *Author's calculation*

Table 4. RIF-OLS Quantile Regression Estimates of the Wage Equation for Female Workers

Parameters	Quantile				
	10	**25**	**50**	**75**	**90**
Intercept	11.408*** (0.000)	11.798*** (0.000)	12.319*** (0.000)	13.159*** (0.000)	14.255*** (0.000)
Urban	0.135*** (0.000)	0.144*** (0.000)	0.170*** (0.000)	0.169*** (0.000)	0.155*** (0.000)
Married	-0.100** (0.002)	-0.102*** (0.000)	-0.042 (0.069)	-0.060** (0.004)	-0.088*** (0.000)
Household head	0.020 (0.615)	0.021 (0.517)	0.054 (0.054)	-0.017 (0.483)	-0.023 (0.392)
High school or equivalent	0.083* (0.026)	0.159*** (0.000)	0.416*** (0.000)	0.410*** (0.000)	0.238*** (0.000)
University	0.120** (0.004)	0.179*** (0.000)	0.617*** (0.000)	0.882*** (0.000)	0.623*** (0.000)
Involved in training	-0.003 (0.898)	0.039 (0.065)	0.041* (0.037)	0.126*** (0.000)	0.116*** (0.000)
Working experience	0.020*** (0.000)	0.025*** (0.000)	0.029*** (0.000)	0.041*** (0.000)	0.030*** (0.000)
Square of working experience	-3.5×10^{-4}*** (0.000)	-4.6×10^{-4}*** (0.000)	-4.9×10^{-4}*** (0.000)	-5.3×10^{-4}*** (0.000)	-3.4×10^{-4}*** (0.000)
Use internet in main job	0.172*** (0.000)	0.234*** (0.000)	0.281*** (0.000)	0.211*** (0.000)	0.102*** (0.000)
Full-time worker	0.963*** (0.000)	1.037*** (0.000)	0.807*** (0.000)	0.408*** (0.000)	0.218*** (0.000)
Formal	0.575*** (0.000)	0.600*** (0.000)	0.425*** (0.000)	0.131*** (0.000)	-0.013 (0.232)
Agriculture	0.332*** (0.000)	0.240*** (0.000)	0.398*** (0.000)	0.268*** (0.000)	0.089*** (0.000)
Industry	-0.001 (0.980)	0.104*** (0.000)	0.263*** (0.000)	0.214*** (0.000)	0.105*** (0.000)
Involved in union membership	0.237*** (0.000)	0.363*** (0.000)	0.609*** (0.000)	0.937*** (0.000)	0.536*** (0.000)

Notes : *p-value are in parentheses; * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$*
Data Source: *Author's calculation*

Regional status positively affects the wages of both male and female workers across all quantiles of the wage distribution. When the proportion of male workers in urban areas increases by 10 percentage points, the average wage of male workers at the top of the wage distribution will increase faster than the bottom of the wage distribution, namely 0.49 percent at the 10th quantile and further increases until the 90th quantile by 1.18 percent. At the same time, the same condition for women has an effect from 1.35 to 1.70 percent with a pattern that tends to vary between quantiles. This result is in line with the research of [11] that there are differences in labour market patterns between rural and urban areas and found that the average wage for those living in urban areas is greater than in rural areas. Higher wage groups are usually associated with jobs with higher skills and education, resulting in better productivity.

The positive relationship between marital status and wages is called the marriage premium. Men are freed from household chores due to the traditional division of labour. Meanwhile, the marital status variable negatively and significantly affects female workers' wages except in the 50th quantile. It is in line with Becker's theory of marriage, which shows an inverse effect of marriage on the wages of female workers because married women will generally enter low-wage jobs that do not require certain requirements.

Household status and wages of male workers have a positive effect in line with the division of responsibilities as the main breadwinner [10]. In contrast, status in the household is not significant in explaining female workers' wages. The status of head of household (breadwinner) for women is not a choice but rather an emergency reaction to the worsening economic situation. Limited preparation, especially from human capital investments such as sufficient work experience, is one of the main obstacles for women as "emergency" household heads to find suitable jobs.

Education is directly proportional to labour wages, except for male workers in the lowest tertiary education group. Education plays an important role in increasing labour wages by improving productivity

through skills and human capital development. This, in turn, can lead to higher wages as workers become more valuable and economies with higher levels of education experience increased competitiveness.

Job training is complementary to the role of education in human capital formation in line with [25] that job training positively influences workers' wages. The insignificant role of job training in the low-wage group is due to limited access to job training financially and in terms of information. In addition to experiencing constraints in business capital, workers in the lower middle group have a very low awareness of the importance of job training to improve workers' skills [26]. Low access to training, especially in women's work, means that opportunities for employment options and improving their living standards are more limited [4].

The potential work experience used has accommodated the age element as formulated by [25]. Age is closely related to productivity levels, so older and more experienced workers are considered to have better skills and productivity levels [27]. The negative squared variable of potential work experience indicates a change in the direction of the effect on wages received when it reaches its maximum point. In line with the theory in the age-earning profile, there is a wage pattern that has a certain limit. Wages will increase with age and be accompanied by a wage decrease when they reach the maximum age limit or peak.

Using the internet as an approach to technology use in the digital economy era significantly and positively influences workers' wages. The effect of the influence of internet usage has a fairly fluctuating pattern in each quantile. This result is in line with the human capital theory that internet usage skills can potentially increase worker productivity and, in turn, the wages received by workers [20]. The findings in this study also align with the results of [28], who state a positive and significant relationship between internet usage and the wages of male workers in China. However, the wages of female workers are not significant.

The positive effect of working hours on workers' wages is in line with research by [5], [10], [11], [12]. Workers with longer working hours can obtain marginal incentives. It means that wages for workers with longer working hours are not automatically received, but the opportunity to receive bonuses or promotions will widen.

Employment status affects workers' wages in all quantiles, except in the 90th quantile for female workers. The uncertainty of the amount received in the informal sector is one of the reasons for the low wages of workers. Formal sector jobs promise work stability for their workers. In contrast, in the informal sector, there needs to be more support or guarantee of work stability, low compensation, and minimal prospects for future growth [4]. In addition, according to the ILO, male workers still dominate the highest positions in companies and institutions worldwide, so it is not surprising that in the 90th quantile, the wage equality of female workers is not significant [29].

Based on employment, workers' wages in the agricultural and industrial sectors are higher than in the service sector. This result also proves that the wages of sectors dominated by female workers- service sectors- are lower than those dominated by men. This condition is also supported by the [29] that women are concentrated in narrow sectors- service sectors- where access to employment is easier, but wages and job security are lower.

The effect of union membership on wages shows an increasing pattern of higher wages for workers, with a maximum value at the 75th quantile. It aligns with research, which found that labor unions tend to raise wages more for low- and medium-wage workers than for higher-wage workers [30]. In their findings, trade unions have an important role in securing protection and enforcing workers' rights in the workplace. However, workers directly involved in trade unions have a clearer and faster flow of information and thus tend to obtain greater benefits, including wages.

3.3 Blinder-Oaxaca Decomposition Analysis

The decomposition of gender wage differentials involves including all characteristics used in estimating the wage equation for male and female workers. This approach uses men's coefficients as the reference group and women's characteristics to estimate women's counterfactual wages, assuming that women experience discrimination in the labour market while men do not.

The Blinder-Oaxaca decomposition results prove the existence of a wage gap (difference) in Indonesia, and the gap decreases as the amount of wages received increases. The large percentage of unexplained factors strongly indicates that wage discrimination against female labour still dominates the wage gap. The dominant unexplained factor also occurs in other quantiles, as shown in Figure 3. Wage discrimination against female

workers continues to occur, one of which is due to the increasing productivity of women, but it is not matched by an increase in women's wages relative to men's wages [31].

Table 5. Numerical Summary of Blinder-Oaxaca Decomposition

Description	Quantiles				
	10	**25**	**50**	**75**	**90**
Wage estimation					
$\hat{y}_{Male}$	13.7456*** (0.000)	14.3123*** (0.000)	14.7255*** (0.000)	15.1125*** (0.000)	15.5017*** (0.000)
$\hat{y}_{Female}$	13.0528*** (0.000)	13.6695*** (0.000)	14.3469*** (0.000)	14.9899*** (0.000)	15.3743*** (0.000)
Difference (D)	0.6937** (0.003)	0.6428*** (0.000)	0.3786*** (0.000)	0.1225*** (0.000)	0.1275*** (0.000)
Decomposition					
Explained (E)	0.0810** (0.003)	0.0843*** (0.000)	0.0423*** (0.000)	-0.0928*** (0.000)	-0.0853*** (0.000)
Unexplained (U)	0.6127*** (0.000)	0.5585*** (0.000)	0.3364*** (0.000)	0.2153*** (0.000)	0.2127*** (0.000)
Contribution					
E/D	0.1168	0.1312	0.1116	-0.7574	-0.6690
U/D	0.8832	0.8688	0.8884	1.7574	1.6690

Notes : *p-value are in parentheses; * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$*
Data Source: *Author's calculation*

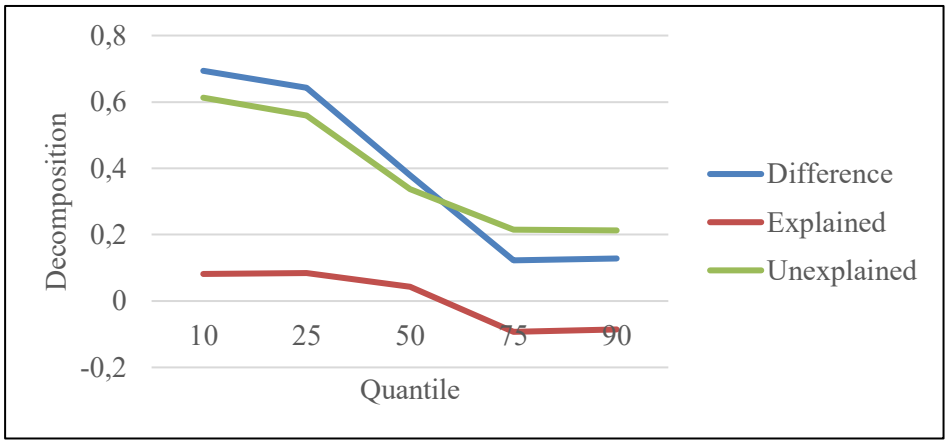

Figure 3. Patterns of Gender Wage Gaps Across Different Quantiles of the Wage Distribution
Source: STATA output

Figure 3 also clarifies the sticky floor effect in Indonesia in line with research [9] related to the wage gap between genders in Indonesia from 2008 to 2012. The sticky floor effect shows that as the wage distribution moves upwards, the wage gap between men and women due to unobserved factors on wage differences that are indicated as discrimination decreases. Thus, women's labour characteristics are somewhat equal to men's. However, it is the return to labour characteristics that causes the gender pay gap to widen, and discrimination is fully responsible for the sticky floor. This result also provides evidence of the sticky floor effect in developing countries [9].

Table 6 shows the sources of the wage gap between genders. A positive coefficient value indicates that male workers have higher characteristics than women, so the difference in characteristics (endowment) will widen the wage gap between genders (advantage for males). Conversely, a negative coefficient value indicates that the level of characteristics of female workers is higher than that of males, which plays a role in narrowing the wage gap between genders (advantage for females). Endowment factors that significantly widen the wage gap between genders include secondary education (senior high school/equivalent), potential work experience, working hours, and agricultural employment for all quantiles of the wage distribution. Meanwhile, the industrial employment variable is only significant for the 25th to 90th quantile of the wage distribution.

Table 6. Result Summary of Blinder-Oaxaca Decomposition

Parameters	Quantiles				
	10	25	50	75	90
Urban	-0.0058***	-0.0058***	-0.0061***	-0.0064***	-0.0061***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Married	-0.0090**	-0.0086***	-0.0032	-0.0048**	-0.0072***
	(0.002)	(0.000)	(0.062)	(0.003)	(0.000)
Household head	0.0122	0.0119	0.0273	-0.0092	-0.0125
	(0.611)	(0.513)	(0.055)	(0.498)	(0.389)
High school or equivalent	0.0091*	0.0165***	0.0384***	0.0402***	0.0239***
	(0.024)	(0.000)	(0.000)	(0.000)	(0.000)
University	-0.0276*	-0.0388***	-0.1187***	-0.1800***	-0.1306***
	(0.050)	(0.000)	(0.000)	(0.000)	(0.000)
Involved in training	0.0003	-0.0034	-0.0032*	-0.0103***	-0.0097***
	(0.906)	(0.085)	(0.039)	(0.000)	(0.000)
Working experience	0.0455***	0.0532***	0.0541***	0.0818***	0.0614***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Square of working experience	-0.0256***	-0.0321***	-0.0299***	-0.0347***	-0.0225***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Use internet in main job	-0.0120***	-0.0153***	-0.0163***	-0.0130***	-0.0064***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Full-time worker	0.1437***	0.1459***	0.1007***	0.0540***	0.0296***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Formal	-0.0494***	-0.0486***	-0.0306***	-0.0100***	0.0010
	(0.000)	(0.000)	(0.000)	(0.000)	(0.682)
Agriculture	0.0140***	0.0095***	0.0140***	0.0100***	0.0034
	(0.000)	(0.000)	(0.000)	(0.000)	(0.009)
Industry	-0.0002	0.0208***	0.0466***	0.0403***	0.0203***
	(0.982)	(0.000)	(0.000)	(0.000)	(0.000)
Involved in union membership	-0.0144***	-0.0209***	-0.0310***	-0.0506***	-0.0298***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)

Notes : *p-value are in parentheses; * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$*
Data Source: *Author's calculation*

Working hours contribute dominantly to widening the wage gap between genders, especially in the low-wage group. This finding aligns with [11], which states that working hours are the biggest contributor to widening the income gap between genders. This condition aligns with the fact that male and female workers have different working hours structures. Women who are married and have children generally have to divide their time between work and childcare, so they tend to choose more flexible working hours [32].

Based on [11], the employment variable is one factor that strengthens the wage gap between genders. The household's division of roles and responsibilities limits women's access to jobs that provide better wages [4]. Most female workers who are absorbed in the agricultural sector tend to be family workers or unpaid workers. Research by [33] also proves that the manufacturing industry sector increases the wage gap between genders.

In terms of the contribution of the variables of work experience and high school education, this is in line with the fact that there is a link between the length of time a person has been in a job and the level of productivity, which in turn has an impact on the amount of wages received [25]. In addition, women's work experience tends to be shorter due to interrupted careers in line with women's reproductive nature, which requires time for maternity leave, menstrual leave, and so on [4]. In addition, if women with low education get a job, they will be positioned in parts that do not require skills, such as labourers or hired workers with low wages [29].

On the other hand, some variables significantly narrow the gender wage gap. These variables include regional status, marital status, higher education, internet usage, and union participation, which are significant across all quantiles of the wage distribution. Meanwhile, other variables significantly narrowing the wage gap between genders are job training for the 50th, 75th and 90th quantiles and employment status for the 10th to 75th quantiles.

The variable that has the largest contribution to narrowing the wage gap between genders is higher education. In terms of higher education, like university graduates, the educational attainment of female labourers in developing countries has increased [34]. Female workers will benefit from their status as higher

education graduates and other unobserved factors. However, it is difficult for women to get promoted in positions despite having high degrees and knowledge, unlike men. Stereotypes stating that women are more irrational and emotional make women often considered inappropriate to be appointed as leaders and have less important positions [4]. Thus, Table 6 also confirms the vital role of higher education in reducing the gender pay gap.

Internet usage is another variable that contributes to reducing the wage gap between genders. This result aligns with research by [35] and [12] that internet usage positively impacts overall wage levels and significantly reduces wage differences between genders. The internet provides flexible job opportunities, such as work that can be done remotely. Such flexibility is particularly beneficial for female workers who are faced with the choice between entering the labour force or taking care of the household.

4. CONCLUSION

This study reveals a clear and persistent gender wage gap in Indonesia, with female workers earning on average 23 percent less than males. Beyond averages, Unconditional Quantile Regression (UQR) shows that disparities are uneven across the wage distribution, most severe at the bottom, confirming the 'sticky floor' effect. Blinder-Oaxaca decomposition further highlights that while some of the gap is due to observable factors like education or sector, a large unexplained share points to systemic discrimination. These findings imply that policy responses must be targeted: protecting low-wage female workers through stronger law enforcement and training, expanding access to education and digital skills for women in the middle of the distribution, and ensuring equal pay enforcement for higher-income segments. Tailoring policies to these distinct wage groups is crucial for effectively narrowing gender wage inequality.

Future research should examine the heterogeneity of wage determinants across different income groups, incorporate firm- or demand-side data, and employ advanced distributional methods, such as Quantile Treatment Effects (QTE), to capture policy-relevant impacts more comprehensively.

Author Contributions

Aisyah 'Azizah Nur Rahmah: Methodology, Data Curation, Software, Formal Analysis, and Original Draft. Wahyuni Andriana Sofa: Conceptualization, Validation, Project Administration and Writing—Review and Editing. All authors discussed the results together and contributed to the final version of the manuscript.

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Declarations

The authors declare that they have no conflicts of interest related to this study.

Declaration of Generative AI and AI-assisted Technologies

The authors used generative AI (ChatGPT) only to assist with language polishing and formatting consistency (e.g., improving wording and ensuring uniform terminology). No AI was used to generate research content, perform analyses, or create/modify figures and tables. The authors reviewed the manuscript in full and remain responsible for its content.

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