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ROLE OF COMMUTING TIME ON EXPLAINING GENDER WAGE GAP IN INDONESIA

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Abstract

Purpose
This research aims to identify the role of commuting time on explaining gender wage gap in Indonesia
Design/methodology/approach
Using dataset from National Labor Survey (Sakernas) 2019, this research estimated 33.6% wage gap between men and women.
Findings
The inclusion of commuting characteristics showed an increase of explained gender wage gap proportion from 14.2% to 22.6%. The commuting time variable contributes to 14.6% of the explained wage gap.
Research limitations/implications
From the results it can be identified that the increase of women's commuting time has the potential to reduce gender wage gap in Indonesia.
Originality/value
Gender wage gap is a labor market discrimination issue that persists worldwide, including Indonesia. Previous researches pointed out that the gender wage gap in Indonesia is mainly composed of parts unexplained by demographic, human capital, and job characteristics. While the commuting characteristics have the potential to explain more of the gender wage gap, it is still underexplored in Indonesia.

Keywords: Gender wage gap, comutting, labor market, Indonesia

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1. INTRODUCTION

Gender wage gap is an issue related to labor market discrimination that persists worldwide. UN Women (2018) estimated that globally, women earn 23% less than men. Some researchers have also proven the existence of gender wage gap in both developed and developing countries (Blau & Kahn, 2017; Paweenawat & Liao, 2022).

Several researches have identified the existence of gender wage gap in Indonesia (Hennigusnia, 2014; Sohn, 2015; Sukma & Kadir, 2019). The common finding among the results is the high proportion of unexplained wage gap between men and women, which indicates a large part of discrimination. Sohn (2015) argues that the high proportion of unexplained part can be caused by the lack of observed characteristics. The addition of explanatory variable related to wage is expected to improve the explained part of gender wage gap in Indonesia.

Commuting is argued to be able to explain a portion of gender wage gap. Troncoso et al. (2021) found that commuting time accounts for 9% to 47% of explained gender wage gap depending on the estimation method. French et al. (2020) also pointed that commuting time is positively related to wage. Considering the empirical evidences, this paper aims to identify whether commuting time is able to explain the gender wage gap that persists in Indonesia through the inclusion of commuting time.

2. LITERATURE REVIEW

2.1 Gender Wage Gap

Gender wage gap occurs when men and women with equal productivity characteristics are paid with different amount of wages (Ehrenberg & Smith, 2018). Most studies found that women are disadvantaged in terms of wage compared to men. The wage gap itself is usually identified through the decomposition of wage estimation with the method proposed by Blinder, (1973) and Oaxaca (1973). The method decomposes estimated wage gap into part explained by observable characteristics and the unobservable part. Referring to Ehrenberg & Smith (2018), the observable characteristic can include personal characteristics and job characteristics. On the other hand, the unexplained part of gender wage gap is usually interpreted as discrimination.

Empirical evidences have shown that gender wage gap also persists in Indonesia. Hennigusnia (2014) found that between the year of 2008 and 2012, the gender wage gap in Indonesia ranged from 20.8% - 26.1% where women had the lesser wage and the majority of gap being composed of unexplained part. With dataset from 2016, Sukma & Kadir (2019) estimated that there is approximately 30% wage gap between men and women in Indonesia in which the unexplained gap accounts for around 70% of the total wage gap.

2.2 Commuting

The phenomenon of commuting can be explained as the intersection between labor economics and urban economics, in which labor makes a decision to work based on offered wage and work location. French et al. (2020) found that commuting time is positively correlated to wage. This phenomenon can be described as competitive workers willing to commute longer in exchange for higher wages.

The argument of commuting being able to affect gender wage gap is supported by the empirical evidences that found the difference between men's and women's commuting pattern. Kwon & Akar (2021) found that women have shorter commuting distance compared to men and the commuting gap increases when the household has a child with the age range of 6 to 15. In line with the previous evidence, Hanson & Pratt

(1996) argues that women are spatially restricted in choosing job due to their household responsibilities, thus limiting their opportunity to get a job that offers higher wages. Additionally, women also perceive a larger cost in the form of the loss of psychological health from longer commutes (Roberts et al., 2011). From the literatures, it can be recognized that women face a greater cost when commuting thus making them unable to do longer commutes. This condition limits women to get higher wages.

3. RESEARCH METHODS

This research uses the dataset from Indonesian Labor Force Survey (SAKERNAS) 2019. The dataset is considered because it includes information related to labor characteristics and commuting characteristics. The year 2019 is chosen because it is the last year before Covid-19 pandemic emerges, in which it greatly affects overall commuting pattern.

The dataset contains a total of 728,789 samples. For this research, the sample is restricted to: respondents in productive age (15 – 65 years old); formal workers; and respondents who do commuting on a daily basis. After the restrictions, the remaining counts of sample became 174,414. The sample is restricted to formal workers due to the distinct characteristic of informal workers in terms of commuting.

To address the aim of this research, the wage decomposition method by Blinder (1973) and Oaxaca (1973) is utilized. The analysis is initially done by estimating wage on male sample group and female sample group respectively. The estimation is done through Ordinary Least Square (OLS) method with the following specifications:

$$lnW_M = X_M\beta_M + \mu_M \quad (1)$$

$$lnW_F = X_F\beta_F + \mu_F \quad (2)$$

The subindex M and F represents male and female respectively. On the left side of equation, the variable log wage (lnW) is the dependent variable. On the right side of equation, X consists of a vector that includes explanatory variables. In addition to commuting time as explanatory variable of interest, the control variables include demographic characteristics (age, age squared, marriage, presence of child, city structure); human capital characteristics (educational attainment, training, work experience); and job characteristics (industry sector, work type, work hours, work days, union membership). The variable of "using private vehicle" is also used as a control variable due to its relation with commuting time.

The gender wage gap decomposition is expressed as the difference between male's average wages and female's average wages. According to Oaxaca (1973), the wage gap decomposition is expressed as follows:

$$\overline{lnW_M} - \overline{lnW_F} = (\bar{X}_M - \bar{X}_F)\hat{\beta}_M + \bar{X}_F(\hat{\beta}_M - \hat{\beta}_F) \quad (3)$$

The term $\overline{lnW}$, $\bar{X}$, and $\hat{\beta}$ represent average log wage, average of explanatory variable, and coefficient respectively. From equation (3) the average gender wage gap can be inferred from the left side of equation. Meanwhile on the right side, the component of $(\bar{X}_M - \bar{X}_F)\hat{\beta}_M$ represents the gender wage gap explained by explanatory variables and

$\bar{X}_F(\hat{\beta}_M - \hat{\beta}_F)$ represents the unexplained portion of the wage gap. In other words, the explained gap is the difference of men and women's characteristics which are measured by male's wage structure. The unexplained gap is measured by multiplying female's average characteristic with the difference of male and female's wage structure, thus representing the wage difference which is not caused by the difference in observable characteristics.

4. FINDINGS

Descriptive analysis shows that women's average wage is 15% less than men. Density plot of log wage between men and women as shown by picture 1 also shows that men's graph is more skewed to the right compared to women's graph. From the density plot, it can be interpreted that men have more distribution in higher wage compared to women.

Table 1. Descriptive Statistics on Wage, Log Wage, and Commuting Time

Variable	Men	Women
	Mean	
Wage	2.746.799	2.337.027
Log Wage	14,65	14,31
Commuting Time	Percentage (%)	
<30 minutes	76.57	84.04
30 – 60 minutes	17.62	13.25
60 – 90 minutes	3.78	2.08
>90 minutes	2.02	0.64

Source: Analyzed from Sakernas 2019

Picture 1. Density Plot of log Wage for Men and Women

Source: Analyzed from Sakernas 2019

Meanwhile, on commuting time variable, it is shown that women's distribution on <30 minutes commuting time category is greater than men, suggesting that women commute shorter than men.

The result of wage estimation using OLS is shown by table 2 below. In commuting time variable, the category of <30 minutes is used as the reference group. The variable of commuting time shows a significantly positive correlation with log wage on each category of commuting time. From the results it can be interpreted that compared to workers with <30 commuting time, workers with more commuting time have higher wage on both men and women. Comparing the results of men sample group and women sample group, it can be seen that women have higher return to commuting compared to men.

This finding is consistent with French et al. (2020) which stated that commuting time is positively correlated with wage. However, the magnitude on >90 minutes commuting time category shows lesser magnitude compared to 60 – 90 minutes category. This indicates that the wage return on commuting time is decreasing after 90 minutes of commuting.

Table 1. OLS Wage Estimates on Men and Women

Dependent Variable: log Wage		
Explanatory Variables	**Men**	**Women**
Commuting Time		
30 – 60 minutes	0.122*** (0.005)	0.225*** (0.008)
60 – 90 minutes	0.201*** (0.009)	0.323*** (0.019)
>90 minutes	0.197*** (0.014)	0.359*** (0.035)
Using private vehicle	0.138*** (0.005)	0.155*** (0.006)
Age	0.026*** (0.001)	0.021*** (0.002)
Age squared	-0.0003*** (1.49e-05)	-0.0002*** (2.40e-05)
Married	0.137*** (0.006)	0.042*** (0.007)
Child/children	-0.015*** (0.004)	-0.029*** (0.007)
Spatial Structure		
Urban metropolitan	0.347*** (0.006)	0.483*** (0.008)

Urban non metropolitan	0.099*** (0.0044)	0.146*** (0.007)
Rural metropolitan	0.077*** (0.009)	0.117*** (0.015)
Education		
Elementary	0.087*** (0.009)	0.118*** (0.015)
Junior High	0.160*** (0.009)	0.261*** (0.016)
Senior High	0.361*** (0.008)	0.496*** (0.016)
Diploma	0.503*** (0.013)	0.739*** (0.019)
Bachelor or higher	0.615*** (0.010)	0.825*** (0.017)
Training	0.149*** (0.005)	0.143*** (0.007)
Experience	0.015*** (0.0003)	0.021*** (0.0005)
Industry sector		
Mining/quarrying	0.315*** (0.0123)	0.197*** (0.0498)
Manufacturing	-0.038*** (0.009)	-0.184*** (0.018)
Electricity, gas, and water	0.019 (0.017)	-0.155*** (0.047)
Construction	0.018** (0.009)	-0.028 (0.038)
Retail, restaurant, or accommodation	-0.098*** (0.009)	-0.235*** (0.019)
Transportation, storage, communication	-0.034*** (0.010)	-0.096*** (0.028)

Table 2 Cont.

Financial services	0.050*** (0.013)	0.005 (0.024)
Public or social services	-0.171*** (0.008)	-0.420*** (0.017)
Work type		
Manager	0.382***	0.412***

	(0.011)	(0.020)
Professional	-0.087***	-0.083***
	(0.009)	(0.013)
Technician	0.141***	0.126***
	(0.009)	(0.016)
Clerical support	0.027***	0.139***
	(0.008)	(0.013)
Service and sales workers	-0.078***	-0.013
	(0.007)	(0.013)
Skilled agricultural workers	-0.061***	0.012
	(0.012)	(0.026)
Craft related trade workers and	0.034***	0.057***
plant/machinery operators	(0.006)	(0.014)
Work hours	0.010***	0.019***
	(0.0002)	(0.0003)
Work days	0.009***	0.007***
	(0.0005)	(0.0007)
Union membership	0.347***	0.522***
	(0.005)	(0.007)
Constant	12.65***	11.99***
	(0.025)	(0.04)
Observation	102,618	61,653
R-Squared	0.358	0.465

Standard error in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Source: Analyzed from Sakernas 2019

However, the result of commuting time coefficient on wage in this paper differs from the finding of Troncoso et al., (2021). They found that commuting time has negative correlation with wage. Levinson (1998) explains that people with higher wages have more access to better mobility options hence shortening their commuting distance. Another plausible explanation would be that people with higher wages are able to afford housing located closer to their workplace.

The results of wage decomposition analysis is displayed on table 3. The specification of the decomposition is based on the OLS method used previously. On this case, the specification is compared to the specification that does not include commuting variables which consist of commuting time and private vehicle usage.

From table 3, the estimated gap shows the value of 0.336 log points which can also be interpreted as 33,6% gap between men and women. The positive number of the gap means that men's average wage is greater than women's. Compared to other researches that measures gender wage gap in Indonesia, the result is similar with the finding of Sukma & Kadir (2019) with total gap ranging between 30% and 20%. Hennigusnia (2014) found less amount of total wage gap with the range between 20.8% and 26.1%. Considering that both Hennigusnia (2014) as well as Sukma & Kadir (2019) utilize Sakernas dataset from the years prior to 2019, the result of estimated total wage gap in this paper suggests that the gender wage gap in Indonesia has been increasing over time.

Table 2. Gender Wage Gap Decomposition

	Without Commuting	With Commuting
Total Wage Gap	**0.336*** (0.004)**	**0.336*** (0.004)**
Explained Portion		
Total explained gap	0.048*** (0.003)	0.076*** (0.003)
Commuting time	-	0.011*** (0.0004)
Using private vehicle	-	0.016*** (0.0006)
Demographic characteristics	0.010*** (0.0009)	0.009*** (0.0009)
Human capital characteristics	-0.089*** (0.002)	-0.082*** (0.002)
Job characteristics	0.127*** (0.002)	0.121*** (0.002)
Unexplained Portion		
Total unexplained gap	0.288*** (0.004)	0.260*** (0.004)
Commuting time	-	-0.173*** (0.001)
Using private vehicle	-	-0.012 (0.005)
Demographic characteristics	0.049 (0.392)	0.0001 (0.039)
Human capital characteristics	-0.216*** (0.016)	-0.196*** (0.016)
Job characteristics	-0.157*** (0.026)	-0.174*** (0.026)
Constant	0.612*** (0.048)	0.659*** (0.047)
Observation	164,181	164,181
Standard error in parentheses *** p<0.01, ** p<0.05, * p<0.1		

Source: Analyzed from Sakernas 2019

Without considering commuting characteristics, the total explained portion of the gap resulted in 0.048 log points which contributes to 14.2% of the total gap. The introduction of commuting characteristics in the model proved to improve the explained

portion of the gap to 0.076 log points which contributes to 22.6% of total gap. From the explained gap, the contribution of commuting time to the total explained gap is 14.4%.

Having a positive sign, the explained wage gap by commuting time means that men have higher commuting time averages compared to women. This evidence can be related to women having greater cost of commuting. As explained by Roberts et al. (2011), women face disutility in the form of psychological health from having a longer commute. Additionally, it might also be related to the household responsibility that burdens women more than men (Hanson & Pratt, 1996).

In comparison, Troncoso et al. (2021) found the contribution of commuting time to the explained gap to be around 10% if OLS estimation method is being used. Although the result is similar with this paper, Troncoso et al. (2021) also estimated the gender wage gap using Two Staged Least Square (2SLS) method which resulted in 47% proportion of commuting time to the explained wage gap. The large portion of commuting time contribution on explained gap in Troncoso et al. (2021) is likely a result from commuting time variable being instrumented with industry sector, occupation, and district of residence.

The are also other insights that can be inferred from the decomposition result. The result on demographic characteristic and job characteristic show that men are advantaged on the both factors. Interestingly the explained gap contributed by human capital characteristic shows negative sign which implies that women has better human capital characteristics than men. According to this paper the human characteristics include educational attainment, training, and experience. Among the explained wage gap, job characteristics account for the largest part of the explained gap, consisting 36% of the total explained gap. Since the job characteristics incorporate industry sector, work type, work hour, work days, and union membership; it indicates the existence of gender segregation in Indonesian labor market.

According to equation 3, the unexplained part of gender wage gap is the product of women's average characteristics and the difference between men's and women's return on explanatory variables. From the unexplained portion of the gap, it can be identified that commuting time has negative sign, which means that women have higher commuting coefficient than men. In other words, women could have gotten more wages if they were able to commute longer. Overall, The findings of commuting time's contribution towards the explained and unexplained wage gap point that gender wage gap can be minimized by giving women more opportunity to have longer commutes.

5. CONCLUSION(S)

Empirical evidences suggest that the gender wage gap in Indonesia is mostly composed of the portion which is not explained by explanatory variables. Researches by Hennigusnia (2014) as well as Sukma & Kadir (2019) have tried to explain the wage gap by considering demographic; human capital; and job characteristics. On the other hand, researches with case study from other countries show that commuting time is able to explain more portion of existing gender wage gap (French et al., 2020; Troncoso et al., 2021).

In this paper, the result of wage estimation using OLS shows that commuting time is positively correlated with wage. This indicates the competitiveness of Indonesian labor market where workers are willing to have longer commute in order to get higher wages. The estimated wage is later decomposed with the method proposed by Blinder (1973) and Oaxaca (1973).

The wage decomposition analysis shows that there is 33,6% wage gap between men and women in Indonesia. Comparing the result to the previous studies by Hennigusnia

(2014) and Sukma & Kadir (2019), it can be found that the magnitude of gender wage gap is higher in this study.

Without commuting time and private vehicle usage included as explanatory variables, the explained wage gap contributes to 14.2% of the total wage gap. After both variables were included in the estimation model, the portion of explained wage gap to the total wage gap increased to 22.6%. The commuting time variable contributes to 14.4% of the explained wage gap. The interpretation of wage decomposition result can indicate that overall gender wage gap can be minimized by improving women's commuting time. Considering the explanation from Roberts et al. (2011) and Hanson & Pratt (1996), the effort can be done by reducing women's larger perceived cost on commuting due to stress or household responsibility.

From the finding, it can be recognized that commuting time contributes on explaining gender wage gap in Indonesia. However further research still needs to be done considering that the unexplained part of the gap still dominates the portion of total gender wage gap. Keep in mind that this research also possesses some limitation in terms of data. The commuting time variable in this research is in the form of categorical data which limits the variation that can occur within the range of commuting time in each category. The sample is also limited to formal workers, thus further research on informal workers is suggested. There are also possible biases due to unobserved characteristics that might be correlated to commuting time variable.

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