

Trade Openness and Gender Wage Gap: Evidence from Indonesia

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I. Introduction

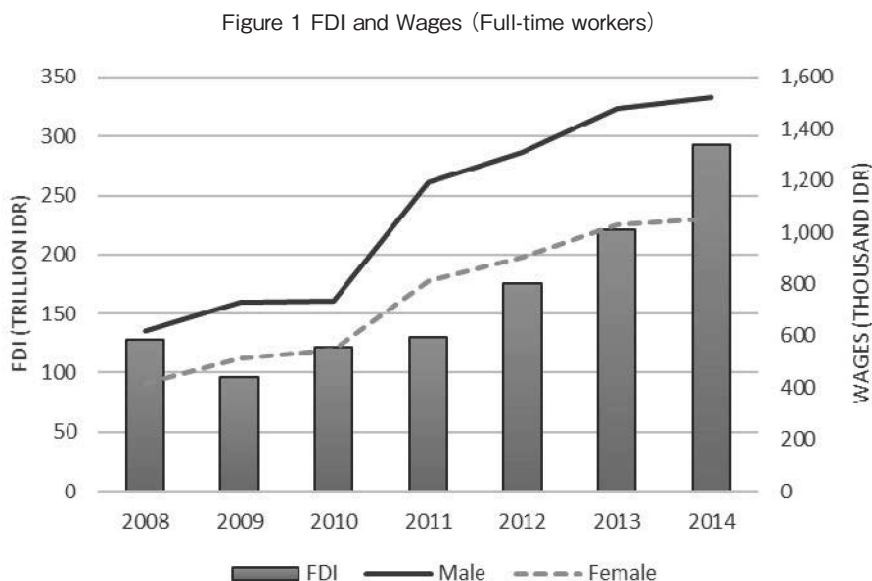
Many developing countries have engaged into the global market since early 1980s. As a country became more integrated to the market, trade volume and attracted many foreign direct investments in that country also increase substantially. As a consequence, this economic condition impacts many sectors including its domestic labor market. According to literatures, trade liberalization will create domestic competition which tends to reduce discrimination in labor market, including gender wage disparity (Becker, 1957).

In past two decades, Indonesia has experienced an increase in total trade and FDI. Moreover, as can be seen in Figure 1, the increasing of FDI volume is also followed by a widening trend on female and male earnings gap from period 2008-2014. Based on the facts, this study investigates the impact of trade openness on gender wage gap and how its impact differs across wage distribution.

Trade liberalization can affect gender wage differentials, both in negative or in positive ways. Firstly, according to Becker (1957), in order to be competitive with foreign companies, local firms are pushed to be more efficient in operating their production. To be more efficient, local companies will eliminate their “taste of discrimination” and pay workers’ wage based on their productivity. Through this mechanism, female-male earning gap is believed to be decreased (Artecona and Cunningham, 2002; Black and Brainerd, 2004). Secondly, in developing countries, international trade will induce their production shift into labor intensive production which used low-skilled labor rather than high-skilled labor. Since female stereotype is attached to low-skilled

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Source: Statistics Indonesia (BPS)

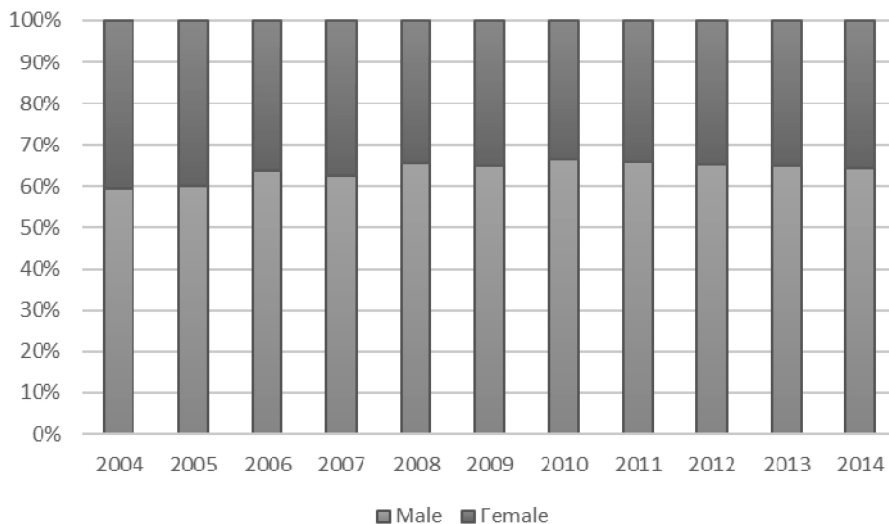
labor, gender wage gap will be reduced through this mechanism (Chen et al., 2013). Another literature suggests that trade openness also creates skilled-biased technical change (STBC) which leads to the increase of demand for high-skilled labors (Berman et al., 1994; Juhn et al., 2014; Lee and Wie, 2015). Since female labors fall into low-skilled labor in most developing countries, as a consequence, this mechanism will decrease relative wage for female workers and widen the earnings disparity.

Gender inequality has been an important issue that should be solved in order to gain a sustainable economic development, and one of dimensions of gender inequality is gender wage disparity. Improvement in gender wage equality is highly correlated with inclusive growth (ILO, 2015). By encouraging women to contribute in economic development, inclusive economic growth can be gained through three channels which are via accumulated physical and human capital, participation in labor market, and increased savings (Arora, 2012). In addition to that, women with higher access to income labor tend to use large proportion of their income for health and education which can increase accumulated human capital in society (Thomas, 1997).

Indonesian government has been already aware the importance of women participation in economic development. To assure an equal participation of women and men in economic development, Indonesian government put gender equality programs as main agenda which

written in National Medium-Term Development Plan (RPJMN 2015–2019). However, according to Human Development Report 2016, Indonesia is still one of ASEAN members with high gender inequality (0.47). In term of wages, female workers still earn less than male labor, with a ratio of about 0.80 (Statistics Indonesia, 2015). In the other words, female workers earn 20% less than their male counterparts for doing the same jobs. This disparity, at the end, leads into another major problem which is the decrease of share to national income. As can be seen in Figure 2, in period 2008–2014, share women to national income still below men's and the gap is getting wider, which is caused by female-male earnings differentials and imbalance proportion between male and female workers in labor force participation (Indonesian Human Development Report Gender-Based, 2014). A simulation conducted by International Poverty Center showed that Indonesia lost potential revenue of US \$ 2.4 billion per year due to the decline of women labor participation rate and disparity in earnings (United Nations, 2007). Looking at major impacts of female-male earnings differentials on economy development, conducting research regarding this issue is important, especially in condition where Indonesia will face a great foreign competition in globalization era.

Figure 2 Female and Male Share to National Income Growth



Source: Indonesia Human Development Report

Furthermore, previous studies related to gender wage disparity is still not abundant. Most of studies tried to identify gender wage gap in Indonesia without take into account the effect of trade liberalization. By conducting Oaxaca-Blinder Decomposition, Feridhanusetyawan, Aswicahyono, and Perdana (2001), Pirmana (2006) and Taniguchi and Tuwo (2014), used different data set, investigate female-male earnings differentials in rural and urban. In addition, applying different decomposition method, Sohn (2015) analyzed the gender wage gap using Indonesia Family Life Survey (IFLS) data across quantile wage distribution in Indonesia. A study conducted by Fitriana (2013) is the first study to attempt to draw the link between the impact of globalization on the gender salary gap, using an alternative measurement (wage level of wage nets), in provincial analysis. Therefore, to contribute to the lack of literature on this issue, this study will focus on the impact of trade openness on gender wage differentials and its impact across quantile wage distribution.

To investigate the effect of trade openness and gendered wages, this study follows the same methodology by Braunstein and Brenner (2009), which conducted analysis by combining micro-data level and macro-data level. In this paper, micro-data level is drawn from National Labor Survey (SAKERNAS) from Statistics Indonesia, while, macro-level which consists of FDI, trade volume and GRDP per province level is also gain from Statistics Indonesia. The hypothesis in this research is that trade openness exposure will affect wages for men and women workers differently and the larger impact will be gained by male workers. The data used in this research is pooling cross-sectional data covers 34 provinces in Indonesia in the period 2008–2014.

The rest of this paper composes four sections. Section II is a literature review about trade openness and gender wage gap. In section III, methodology including model specification and data description is presented. Section IV is discussion of the regression results. Finally, section V will present the conclusion and limitation of study.

II. Literature Reviews

1. Empirical Evidence on Trade Openness and Female-Male Earnings Differentials

Since the discrimination theory was proposed by Gary Becker in 1957, many researchers attempted to examine trade and gender wage inequality. There are several studies showed that trade liberalization exposure brings a narrowing impact on the gender wage gap. Artecona and Cunningham (2002) and Black and Brainerd (2004) tried to test Becker's Discrimination

Theorem by comparing competitive and non-competitive (concentrated) firms. Artecona and Cunningham (2002) used difference in female-male mean log hourly wages as a measurement for the gender wage gap and found that, in Brazil, women workers experienced wage increases especially there who worked in concentrated industries. Similarly, Black and Brainerd (2004) also discovered that as import share is increased, the gender wage gap tends to decline in U.S. manufacturing industries. In India, Reilly and Dutta (2005) also did not find supporting evidence that trade liberalization is associated with higher gender pay gaps. Moreover, a study by Chen et al. (2013) which used industry-level data has conducted to examine the impact of globalization on the Chinese labor market in 2004. They found that foreign and exporting firms employ more female workers than domestic non-exporters, which significantly encouraged female employment and reduced the gender wage gap in the manufacturing sector. Moreover, Oosterndorp (2009) analyzed the gender wage gap using large cross-country dataset by introducing a new measurement of the gender wage gap, which is occupational gender wage gap. He discovered that trade openness lowers the gender wage gap in upper middle income countries, while there is a little evidence found in lower middle income countries.

On the other hand, in several developing countries, trade liberalization increases female-male earnings differentials. Seguino (1997) conducted a study in South Korea and found that women's relatively lower wages and wage discrimination are associated with weaker women's fallback position in labor markets. In addition, Berik et al. (2004) compared the impact of international trade on gender wage gap in Taiwan and South Korea. It appears that, in contrast to neoclassical theory, rising import share is positively associated with wage discrimination against women in concentrated industries. Moreover, Menon and Meulen-Rodgers (2009) applied a different approach by replacing cross-sectional long-differenced observations with panel dataset of 28 industries with a 3-digit level. Interestingly, they found an opposite result from Reilly and Dutta's study, an increase in trade openness even worsened the gender wage differentials in the industrial sector.

Most of previous studies above were more focusing on the effect of trade openness on gender earnings differentials within manufacturing industries or firms directly affected by trade reforms. These kind of studies were typically ignoring the contribution of individuals' characteristics, which usually embodied in microdata level, that can provide more scope for discover the mechanisms through which trade liberalization affects gender inequality. There are several studies that attempted to combine macro-data level and micro-data level. Hazarika and

Otero (2004) conducted a research to compare gender differential wages between maquiladora and non-maquiladora workers in urban Mexico¹. Using the Mincerian earnings function and added interaction terms between dummy female and dummy for maquiladora sector, they found that gender wage differential decreased more significant in non-maquiladora than in maquiladora. In addition, Braunstein and Brenner (2007) examined the impact of FDI on earnings between female and male workers in China between year 1995 and 2002 by combining individual-data level with FDI and trade per provinces. The results were that women experienced larger gains from FDI than men in 1995, while men experienced larger wage gains from FDI than women because of industrial upgrading and gender-based employment segregation in 2002. Moreover, a recent study conducted by Han et al. (2012) also applied the same methodology as two previous studies above to see the impact of trade reforms on wage inequality on China. They found that the WTO accession was significantly associated with rising wage inequality and more importantly also rising the return of education to college among China workers. By combining microdata and macro data level, it is expected that investigating the impact of trade openness on gender wage gap can be more specifically and comprehensive.

2. Indonesia-specific Research Studies on Trade Openness and Female-Male Earnings Differentials

Previous studies in Indonesia related to trade liberalization and the gender wage gap are not abundant. Feridhanusetyawan et al. (2001), investigated the gender wage gap in Indonesia using micro-level data from 1986-1997, the results showed that the gender wage gap still exists in Indonesia even though the trend is declining. Pirmana (2006) uses a new dataset 1996-2004, found result contradicting with previous studies. He reported that there is an increase in gender earnings inequalities in Indonesia, which is attributed 41.6% to endowment differences and 58.4% to unobserved and unexplained factors. In addition, Taniguchi and Tuwo (2014), found new evidence that the urban gender wage gap is less than the gap in rural areas, moreover, unlike in rural areas, the urban gender wage gap is wider among younger age cohorts. Another study was conducted by Sohn (2015) using 2007 Indonesia Family Life Survey (IFLS) data across quantile wage distribution in Indonesia. By applying quantile regression, he pointed out that the explained gap remains similar across wage distribution, while, unexplained factors decrease in the total gap.

A study by Fitriana (2013) is the only research that tried to draw a relationship between globalization and the gender wage gap across provinces in Indonesia. Following the

same method as Oosterndrop (2009), she used the occupational gender wage gap and classified provinces into low-and high income provinces and occupations into low-skill and high-skill occupations. She drew the conclusion that in a developing country like Indonesia, globalization mainly reduces the gender wage gap in low-skill occupations.

3. Research Contribution

Since the literature on gender wage inequality and trade liberalization is still not abundant in Indonesia, this study attempts to contribute to this field. There are two apparent differences between this study and other previous studies. First, following Braunstein and Brenner (2009) and Hazarika and Otero (2004), this research focuses on the impact of trade openness at a household-level perspective by combining macro-data and micro-data level. According to Braunstein and Brenner (2009), by merging macro-data and micro-data levels, the effects of FDI on female-male earnings disparity can be examined as a whole without abandoning the individual's characteristic variables, which can impair a purely macroeconomic approach. Secondly, since many other previous studies only focus on examining gender pay gap on averages without taking into account the inequality across wage distribution, this paper go beyond averages to see a complete understanding about the different effect of trade liberalization on gender earnings differentials across wage distribution using the same method as Han et al. (2012).

III. Methodology and Data

1. Econometric Model and Estimation Methods

Following Hazarika and Otero (2004) and Han et al. (2012), this research uses extended Micherian wage model by adding interaction term between dummy variable gender and variable trade openness. The baseline specification as expressed as follows:

$$\ln w_{irt} = \beta_0 + \beta_1 openness_{rt} + \beta_2 female_{irt} + \beta_3 openness_{rt} \cdot female_{irt} + \sum_k \beta_{4,k} x_{irt,k} + \varepsilon_{irt}$$

Where:

i = individual; r = province; t = time period (year).

$\ln w_{irt}$ is a natural logarithm of real hourly wage for each worker.

$openness_{rt}$ is a variable to measure trade openness exposure in each province.

$female_{irt}$ is a female dummy.

x_{irt} is control variables that capture individual characteristics and the economic environment.

Following previous studies by Hazarika and Otero (2004), Braunstein and Brenner (2007) and Han et al. (2012), the model specification above is estimated using Ordinary Least Square (OLS) estimation method. Furthermore, quantile regression is also applied in this study to investigate the impact of trade openness across wage distribution.

2. Data Description

This study uses secondary data from National Labor Survey (SAKERNAS) published by Statistics Indonesia. SAKERNAS covers 200,000 households and only includes family members over 10 years old. This study uses the data of individuals who are between 15 and 65 years old and who earned wage in 2008–2014. Furthermore, this study also uses macroeconomic data, which are provincial trade openness and the related variables. These data are drawn from Investment Coordinating Board (BKPM) and Statistics Indonesia. Finally, we conduct all the data into pooling cross-sectional data.

This study uses logarithm form of real hourly wage as a dependent variable. It is because hourly wage gives an appropriate comparable unit of analysis for wage since female workers usually work shorter than male worker in Indonesia. SAKERNAS provides only monthly wage data, so we converted monthly nominal wage into hourly real wage. Moreover, this study uses two types of measurement for trade openness: the ratio of trade to GRDP and the ratio of FDI to GRDP, for each province. It is expected that trade liberalization does structurally impact labor markets in ways beyond individual characteristics of workers (Braunstein and Brenner, 2007).

Table 1 shows each variable description and Table 2 shows the summary statistics, respectivelyⁱⁱ.

Table 1 Variable Description

Variable	Descriptions
wage	Real wage per hour in IDR
trade	Ratio of trade to GRDP in province
FDI	Ratio of FDI to GRDP in province
female	=1 if female, 0 otherwise

age	Worker's age
tenure	Working years in current job
work hours (per week)	Working hours per week
urban	=1 if urban, 0 otherwise
married	=1 if married, 0 otherwise
educ_elementary	=1 if finished elementary school, 0 otherwise
educ_junior	=1 if finished junior-high school, 0 otherwise
educ_senior	=1 if finished senior-high school, 0 otherwise
educ_college	=1 if finished college and more, 0 otherwise
sector_manufacture	=1 if working at manufacturing, 0 otherwise
sector_service	=1 if working at service, 0 otherwise
GRDP	Provincial GDP (trillion IDR)

Table 2 Summary Statistics

Variable	Mean	S.D.	Min	Max
wage (hourly)	7,440	11,627	36	2,010,417
trade	0.331	0.374	0.001	3.060
FDI	0.025	0.035	0.000	0.414
female	0.344	0.475	0	1
age	36.641	11.408	15	65
tenure	8.122	8.632	0	60
work hours (per week)	43.826	15.538	1	98
urban	0.589	0.492	0	1
married	0.712	0.453	0	1
educ_elementary	0.195	0.396	0	1
educ_junior	0.170	0.376	0	1
educ_senior	0.340	0.474	0	1
educ_college	0.189	0.391	0	1
sector_manufacture	0.139	0.346	0	1
sector_nonmanufacture	0.701	0.458	0	1
GRDP (trillion IDR)	345	478	4	5,920

n=971,044

IV. Results and Discussion

The regression results are presented in Table 3. Most of the estimated coefficients of key variables, such as *trade*, *FDI*, *female* and the interaction terms, have similar and consistent signs with the previous studies.

The estimated coefficient of trade from OLS result is positive and significant, while the value of the estimated coefficient of trade is bigger in high quantile wage group than in low quantile wage group. Assuming that workers in high quantile wage group are workers with high-skilled occupations, it indicates that trade share of GRDP increases wages for high-skilled labor more than low-skilled labor. This finding is in line with a previous study by Lee and Wie (2015). They found that in Indonesia, trade caused demand to shift toward more skilled labor and increased their wages.

The estimated coefficients of FDI, from OLS result and quantile regression results, are positive and significant. Moreover, the values are quite larger than the values of trade and are almost the same among all quantile wage groups, unlike the estimated coefficients of trade. The result of FDI is not in line with previous studies by Lee and Wie (2015) and Feenstra and Hanson (1997) focusing on Mexico during the 1980s.

From overall results, dummy variable *female* are negative and significant. In column OLS, the coefficient is negative and significant with value -0.3094 . In other words, on average, a female worker's hourly wage is 26.6% below a comparable male worker's hourly wageⁱⁱⁱ. This finding is in line with the result of Hazarika and Otero (2004) in the case of Mexico. From quantile regression result, it appears that the value of estimated coefficient of *female* in 10th quantile wage distribution is lower than in 90th quantile wage distribution. It implies that female-male wage differentials are larger in lower wage group than in higher wage group.

Furthermore, the interaction term between trade and female (*trade*female*) is expected to explain the impact of trade liberalization on gender wage gap. From quantile regression results, the estimated coefficient of *trade*female* is positive and significant, except in high quantile wage group. It implies that trade helps to reduce the wage gap between female and male workers in low and middle-quantile wage group. Meanwhile, in high quantile wage group, trade has a widening effect on the gender wage gap. These findings are similar with the results of Fitrania (2013), which found that the impact of globalization on gender pay gap reduction is larger in low-skilled occupation than in high-skilled occupation. The narrowing effect of trade on female-

male earnings differentials in low quantile wage distributions can be explained by the Heckscher-Ohlin (H-O) trade theory that the presence of international trade induces higher demand and increases relative wages for low-skilled workers in most developing countries. On the other hand, a widening impact of trade on gender earnings differential might be caused by the presence of technological changes which affects relative wages by shifting demand for high-skilled labor (Lee and Wie, 2015). An upgrading technology also induces the need to employ better-qualified workers which is more beneficial for male workers. It is because female workers in the same occupation are subject to stereotypes that harm their position in the labor market (Oostendorp, 2009).

Moreover, the estimated coefficient of interaction term between FDI and dummy variable female ($FDI*female$) show the same pattern like variables $trade*female$, which is higher estimated value of low wage group than that of high wage group. These results indicate that both trade and FDI can help to reduce gender wage gap. On the other hand, the apparent difference is that the values of coefficients for $FDI*female$ are higher than the values of $trade*female$. It indicates that the magnitude of FDI's effect on female-male earnings differentials is larger than trade's effect on the gender pay gap.

For the control variables, almost all the signs of the estimated coefficients are in line with theory. Variables, such as age, tenure, urban, married, and education, except work hour, significantly increase individual's wage.

Table 3 OLS and Quantile Regression Results

Dependent Variable: lnwage								
Independent Variables	OLS		Quantile					
	Overall		10th		50th		90th	
trade	0.0491	***	0.0047		0.0430	***	0.1013	***
	(0.0025)		(0.0050)		(0.0026)		(0.0036)	
FDI	1.9604	***	2.1612	***	2.0096	***	2.1892	***
	(0.0268)		(0.0540)		(0.0281)		(0.0385)	
female	-0.3094	***	-0.4169	***	-0.2773	***	-0.2479	***
	(0.0023)		(0.0047)		(0.0025)		(0.0034)	
trade*female	0.0331	***	0.1256	***	0.0201	***	-0.0326	***
	(0.0040)		(0.0082)		(0.0043)		(0.0059)	
FDI*female	0.5334	***	0.6490	***	0.5522	***	0.5409	***
	(0.0475)		(0.0891)		(0.0464)		(0.0636)	
age	0.0399	***	0.0466	***	0.0359	***	0.0329	***
	(0.0005)		(0.0009)		(0.0005)		(0.0007)	

agesq	-0.0004 (0.0000)	***	-0.0005 (0.0000)	***	-0.0004 (0.0000)	***	-0.0003 (0.0000)	***
tenure	0.0177 (0.0001)	***	0.0183 (0.0002)	***	0.0174 (0.0001)	***	0.0131 (0.0002)	***
lnwork_hour	-0.6084 (0.0020)	***	-0.4777 (0.0036)	***	-0.6336 (0.0019)	***	-0.7581 (0.0025)	***
urban	0.0576 (0.0016)	***	0.0746 (0.0033)	***	0.0350 (0.0017)	***	0.0401 (0.0024)	***
married	0.1281 (0.0020)	***	0.1381 (0.0040)	***	0.1228 (0.0021)	***	0.1152 (0.0028)	***
educ_elementary	0.1307 (0.0027)	***	0.1657 (0.0056)	***	0.1222 (0.0029)	***	0.1006 (0.0040)	***
educ_junior	0.2988 (0.0028)	***	0.3289 (0.0060)	***	0.2804 (0.0031)	***	0.2707 (0.0043)	***
educ_senior	0.4858 (0.0028)	***	0.4940 (0.0058)	***	0.4760 (0.0030)	***	0.4769 (0.0041)	***
educ_college	0.9473 (0.0036)	***	0.9427 (0.0072)	***	0.9318 (0.0038)	***	0.8700 (0.0052)	***
sector_manufacture	-0.0957 (0.0065)	***	-0.1140 (0.0151)	***	-0.0948 (0.0079)	***	-0.0902 (0.0108)	***
sector_service	-0.1259 (0.0063)	***	-0.2038 (0.0146)	***	-0.1133 (0.0076)	***	-0.0652 (0.0104)	***
lnGRDP	0.0535 (0.0007)	***	0.0612 (0.0015)	***	0.0505 (0.0008)	***	0.0607 (0.0011)	***
_cons	9.1046 (0.0188)	***	7.7397 (0.0391)	***	9.4274 (0.0203)	***	10.2288 (0.0279)	***
region dummies	yes		yes		yes		yes	
occupation dummies	yes		yes		yes		yes	
obs.	971,044		971,044		971,044		971,044	
R-squared	0.3996							
Pseudo R-sq.			0.1521		0.263		0.2889	

Robust standard errors in parentheses (Clustered on province).

*** 1% significance

V. Conclusion

The purpose of this study is to investigate the impact of trade openness on gender wage gap across wage distribution in Indonesia. Using the Indonesian Household Survey data for 2008–2014, we examine the impact by quantile regression analysis with an extended Mincer model.

The regression results indicate that female workers in Indonesia still earn less than male workers, on average, especially in lower wage classes. Moreover, it is found that trade openness

contributes to reducing gender wage gap as the lower wage level, and that the impact of FDI on wage is larger than that of trade.

From the findings above, it showed that trade openness can change the dynamic of gender wage in local labor market. The results indicate the possibility a policy intervention can reduce gender wage gap. Namely, if the government and policy makers can formulate the appropriate social and labor policies and link them with policies that promote international trade and investment, gender wage gap can be reduced. This issue also indicates that there is room for policy intervention. In other words, governments and policy makers can encourage companies to provide equal vocational training and vocational education programs in order to reduce the gap between the skills of women and men's workers. Ultimately, this policy can increase the chances of developing women's ability to acquire broad employment and raising women's relative wage.

As a limitation of the study, there may be a reverse causality between FDI and wages in spite that FDI is used as a measurement of trade openness in this study. One of the methods for this problem is Instrumental Variable (IV) approach. Braunstein and Brenner (2007) suggested infrastructure or geography factors as several potential instrument variables. However, due to the lack of data availability of those variables, IV approach does not address in this study. This point is for further research.

Appendix:

Table A1 Variable Description for Region and Occupation Dummy

Variable	Description
region dummies	
reg_sumatera	=1 if Sumatera, 0 otherwise
reg_kalimantan	=1 if Kalimantan, 0 otherwise
reg_sulawesi	=1 if Sulawesi, 0 otherwise
reg_maluku	=1 if Maluku, 0 otherwise
reg_java	=1 if Java, 0 otherwise
occupation dummies	
j_prof	=1 if professional, 1 otherwise
j_manager	=1 if manager, 0 otherwise
j_admin	=1 if administration staff, 0 otherwise
j_sales	=1 if sales clerk, 0 otherwise
j_services	=1 if services, 0 otherwise
j_farmer	=1 if farmer, 0 otherwise
j_prod	=1 if production, 0 otherwise

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Notes

- i Maquiladora industry is an industry for export specialized manufacturing units in Mexico which established under the agreement with United States called Bracero Program.
- ii See also variable description for region and occupation dummy in Table A1 in Appendix.
- iii $(e^{-0.3094} - 1) \times 100\% = -26.6\%$

