THE IMPACT OF MIGRATION ON THE WAGE DISTRIBUTION IN INDONESIA

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Abstract

Research on the impact of migration on workers' wages in destination areas has long been debated in the literature. However, studies that link migration to wage rates in different percentiles along the distribution have not been widely implemented, as migration does not have the same impact on wage levels in all groups of workers. By establishing a counterfactual using the semi-parametric DFL method of National Labor Force Survey data, this study found that migration promotes changes in the distribution of wages, especially in the upper and lower percentiles. After controlling the magnitude of in-migration in each percentile group by using the ordinary least square method, this study also proves that migration leads to wage decreasing in percentile groups where migrant workers are overrepresented, which is in the 75th and 90th percentile groups. Meanwhile, no negative impacts were found on wage levels in the lower middle percentile. In fact, migration has proven to encourage an increase in the average wage of workers in the lowest percentile of the distribution.
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1.   INTRODUCTION

The economic impact of labor migration on the wage level in destination area is still being a debate in the literature. Migrants will choose to move to the destination which can provide adequate facilities and greater expected benefits. Pons, Paluzie, Silvestre, & Tirado (2007) and Crozet (2004) reveal that migrants will be concentrated in particular areas that can attract migrant workers by providing a good access to the labor market, such as adequate infrastructure, larger employment opportunities, higher productivity and labor wages, and lower prices for consumer goods due to low transportation costs. The concentration of migrant workers in a particular area will encourage human capital accumulation and knowledge spillover between migrant and non-migrant workers in the destination area. Thus, migrant workers will increase non-migrant workers's productivity and in turn will increase the average wage in the destination area (Jaumotte, Koloskova, & Saxena, 2016). Contrary to the previous theory, classical economic theory reveals that migration can give negative impact on the average wage in the destination area by increasing labor supply in the labor market (Todaro, 1976). The negative impact on the worker's wage in destination area will be even greater when the number of migrants is larger and the elasticity of migrant workers in substituting non-migrant workers is higher (Berker, 2011; Boustan, Fishback, & Kantor, 2010; Friedberg, 2001).

However, recent research no longer looks at the impact of migration on the average wage, considering the magnitude of its impact is not the same for all groups of workers. Assuming the majority of migrant workers are low-skilled, various studies in developed countries reveal that the inflow of migrant workers will encourage a decrease in the average wage of workers through increasing labor supply mechanism. In addition by being able to substitute non-migrant workers with the same skill level, migrant workers can also play a complementary role for non-migrant workers who have different skills, resulting in increased productivity and wages of highly skilled workers (Asali, 2013; Devillanova, 2004).

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Contrary to the previous theory, positive self-selection theory explains that workers with high education and skills will have bigger probability to migrate (Borjas, 1992; Todaro, 1976). The human capital theory also explain that migration is seen as an investment, so that the higher the skill and education the larger worker's chances of moving. Nonetheless, the tight of competition and the lack of experience drive the migrant workers tend to downgrade considerably when arriving in the destination area (Dustmann, Frattini, & Preston, 2013). The lack of network or access to labor market and the asymmetric information from employers also make migrant workers tend to receive lower wage to enter the labor market (Chiswick, 2011; Dustmann et al., 2013; Manacorda, Manning, & Wadsworth, 2012). Thus, migrant workers inflow can actually encourage lower average wages, especially in the group of highly skilled workers.

Meanwhile, low-educated workers who decide to migrate are those who have higher job-transferable skills and higher levels of schooling (Barnum & Sabot, 1977). In the group of low-skilled workers, migrants tend to have a higher bargaining power than non-migrant workers who do not migrate. Low-skilled migrant workers also have a better fighting ability when arriving at the destination than non-migrant workers with same skills level, because migrant workers tend to do the job that is not wanted and cannot be done by non-migrant workers (Constant, 2014). Thus, the inclusion of low-skilled migrant workers will have the opportunity to increase the average wage of low-skilled workers in the destination area.

Over the past three decades, inter-census population survey data (SUPAS) shows that migration flows between provinces in Indonesia has increased sharply by 73.3 percent. However, research that looks at the impact of migration on wages in different groups has never been done in Indonesia. The research that has been conducted in Indonesia only links migration with the average wage level in the destination of migration (Bryan & Morten, 2017; Latifadina, 2015). Bryan & Morten (2017) revealed that migration will have an impact on increasing worker productivity in the destination area. The positive impact will increase if there is a migration barriers reduction such as migration costs namely in areas that have adequate infrastructure facilities. In line with the research of Bryan & Morten (2017), Latifadina (2015) also revealed that migration had a significant impact on the increase of average wage, especially in areas with high Human Development Index (HDI). Nonetheless, both studies have not considered the heterogeneity of workers in the migration destination. Therefore, this study aims to find out how migration affects the wage rates of workers in the destination area, especially in different groups of workers along the distribution.

2. THEORETICAL FRAMEWORK

The theoretical framework used in this study refers to the theory built by Dustmann, et al. (2013). In contrast to other theoretical frameworks, this model not only looks at the impact of migration on one group of workers but on wages in different groups of workers in the economy, where the migration will encourage lower wages for workers in groups with high concentrations of migrant workers. This model uses constant elasticity of substitution (CES) production function and assumes that the economy produces a single output (y) and uses various types of labor derived from various i-percentile groups (i = 1,2, ..., L) and capital (K) in the production process. The price of manufactured goods are assumed to be fixed and are determined in a market mechanism which normalized into one.

$$y = [\beta H^s + (1 - \beta)K^s]^{\frac{1}{s}} \tag{1}$$

$$H = \left[\sum_i \alpha_i l_i^\sigma\right]^{1/\sigma} \tag{2}$$

where H is the aggregate labor input, α_i reflects the productivity of the labor group-i, σ denotes substitution elasticity between groups of workers i ($0 < \sigma < 1$), β is labor productivity relative to capital, and s is the substitution elasticity between labor work

with capital ($0 < s < 1$). In each working group-i, companies can employ non-migrant workers l_i^0 and migrant workers l_i^1, and assuming between migrant and non-migrant workers can substitute each other and have the same productivity, so $l_i = l_i^0 + l_i^1$.

Assuming the market clear for each group of workers-i, denoted as $l_i = n_i$ where n_i is the supply of group labor-i which also comes from the supply of non-migrant and migrant workers ($n_i = n_i^0 + n_i^1$). The total supply of non-migrant workers is expressed as $N^0 = \sum_i n_i^0$, so $n_i = N^0(\pi_i^0 + \pi_i^1 m)$, where $\pi_i^0 = n_i^0/N^0$ is the fraction of the group non-migrant-i worker, $\pi_i^1 = n_i^1/\sum_i n_i^1$ is the fraction of the migrant-i group of workers to total migrants and $m = \sum_i n_i^1/N^0$ is the ratio of migrant workers to total non-migrant workers.

In order to maximize profits, the company will choose optimum input when the wage of worker group-i (w_i) is equal to the marginal product of labor, and the price of capital ρ is equal to the marginal product of capital, so that it is obtained:

$$\ln w_i = \ln \beta \alpha_i + (\sigma - 1)\ln(\pi_i^0 + \pi_i^1 m) + (1 - \sigma)\ln\left(H/N^0\right) +$$
$$(1/s - 1)ln\left[\beta + (1 - \beta)\left(K/H\right)^s\right] \qquad (3)$$

where, $\ln\left(H/N^0\right) = 1/\sigma\, ln(\sum_i \alpha_i(\pi_i^0 + \pi_i^1 m)^\sigma)$.

$$\ln \rho = \ln(1 - \beta) + (s - 1)\ln\left(K/H\right) + (1/s - 1)\ln\left[\beta + (1 - \beta)\left(K/H\right)^s\right] \qquad (4)$$

By assuming θ as the supply elasticity of capital, where $\theta = \frac{d\ln K}{d\ln \rho}$, we can know the change in the wage level equilibrium as a reaction to the change in the ratio of non-migrant workers, expressed as:

$$\frac{d\ln w_i}{dm} = (\sigma - 1)\left(\frac{\pi_i^1}{\pi_i^0} - \emptyset \sum_i \omega_i \frac{\pi_i^1}{\pi_i^0}\right) \qquad (5)$$

where $\omega_i = \frac{\alpha_i(\pi_i^0 + \pi_i^1)^\sigma}{\sum_j \alpha_j\left(\pi_j^0 + \pi_j^1\right)^\sigma}$ is the share of worker-i in the aggregate labor force H^σ, $\varphi = \frac{\beta H^s}{\beta H^s + (1-\beta)K^s}$ is the share of labor in the production process, and $\emptyset = 1 + \left[\frac{(1-s)(1-\varphi)}{1+(1-s)\varphi\theta}\right]\frac{1}{\sigma-1}$ is a parameter whose value depends on capital mobility θ, substitution elasticity between labor and capital s, and share of labor in the production process φ.

Compared to capital mobility between countries, capital tends to have no barriers on moving from one area to another within a country's area. So by assuming that capital is mobile ($\theta = \infty$), then $\emptyset$ will be worth one. Because ($\sigma - 1$) will be negative, then from equation (5) it can be seen that migration will have a negative impact on the wage rate in the i percentile if the ratio of the proportion of migrant workers relative to the non-migrant workers in each i-group is greater compared the weighted average ratio of the proportion of migrant workers to the proportion of non-migrant workers in all percentiles. Meanwhile, if the concentration of migrant workers is the same as the concentration of non-migrant workers in all percentile groups ($\pi_i^1 = \pi_i^0$), then migration will not change the wages of workers in all percentile groups. This theory is in line with classical economic theory that the abundance of labor available in group-i relative to other groups will encourage a decrease in wages in the group. Conversely, the rarer labor supply in group-i relative to other groups will encourage increased wages of workers in the group.

This is also in line with Constant's (2014) theory which reveals that migrant workers tend to have a higher fighting ability when arriving at the destination than non-migrant workers with the same skill level. Migrant workers tend to do work that non-migrant workers cannot and do not want to do. Because of the lack of access to the labor market, and the asymmetric information from employers, migrant workers tend to be willing to receive wages that are lower than the wages that should be received at the level of skills they have in order to enter the labor market. migration destination

areas (Chiswick, 2011; Dustmann et al., 2013; Manacorda et al., 2012). Thus the inflow of migrant workers drives the decline in percentile group's wage where migrant workers are concentrated.

3. METHODS
3.1 Counterfactual Methods

To see the impact of migration on wage levels in different groups in the destination of migration, a method is needed that not only can see the impact of migration on the wages of workers on average but also on the changes in workers' wages to different groups of workers. In literatures, there are at least two methods used to measure wage changes along the distribution. The first approach uses quantile regression (Buchinsky, 1994; Koenker & Bassett, 1978) and the second one uses counterfactual approach (DiNardo, Fortin, & Lemieux, 1996; Machado & Mata, 2000). The counterfactual method is chosen because it can provide more detailed on the wage changes along distribution. By constructing a counterfactual that describes the condition of wage distribution if the workers structure available in the labor market does not change due to migration, making this counterfactual method more attractive because it can provide additional information that cannot be provided by the other methods, namely "what is the wage distribution condition if the workers characteristics do not change due to migration?"

The counterfactual method is constructed by comparing the distribution of worker's wage in an area with the wage distribution if the migration does not occur (counterfactual condition). In constructing this counterfactual condition, it is necessary to identify the workers who categorize as migrant and non-migrant workers. Because the definition of migration used in this study is recent migration, the identification process is carried out by comparing the current residence with the place of residence five years ago. Individuals who have migrant status will be further identified as in-migrant in the destination area, as well as out-migrants in the area of origin. The counterfactual condition in this study is used to look at the distribution of workers' wages due to migration by assuming that the characteristics of individual workers do not change and workers receive wages according to current factual conditions. The counterfactual conditions are built by placing individuals as migrant workers into their home areas before migrating, joined with non-migrant workers.

In constructing the counterfactual density, this study adopted a semiparametric approach introduced by DiNardo, Fortin, & Lemieux (1996). Assuming that each individual in the distribution is denoted as a vector *(w, z, t),* consists of wages (*w*), individual characteristics (*z*), and periods *t*, then the joint distribution of wages and worker characteristics in a given period denoted as the conditional distribution $F(w, z|t)$. Wage density in period t = 1, $f(w|t = 1)$, can be written as an integral of the conditional wage density of individual characteristics and time, $f(w|z, t_w)$, on the distribution of individual characteristics in a period *t*, $F(z|t_z)$.

$$f_t(w) = \int_z dF\big(w, z|t_{w,z} = t\big)$$

$$= \int_z f(w|z, t_w = t) \, dF(z|t_z = t)$$

$$= f(w| \, t_w = t, t_z = t)$$

By assuming t=2 is a factual condition, which describes the characteristics of workers available in an area after migration, the factual wage distribution can be written as:

$$f(w| \, t_w = 2, t_z = 2) = \int_z f(w|z, t_w = 2) \, dF(z|t_z = 2) \tag{6}$$

Meanwhile, to construct counterfactual wage density which describes the wage distribution in factual conditions (t = 2) but the characteristics of workers available in an area do not change due to migration (t = 1), then equation (6) can be modified to:

$$f(w|\ t_w = 2, t_z = 1) = \int_z f(w|z, t_w = 2)\ dF(z|t_z = 1) \tag{7}$$

$$f(w|t_w = 2, t_z = 1) = \int_z f(w|z, t_w = 2)\ \frac{dF(z|t_z = 1)}{dF(z|t_z = 2)}\ dF(z|t_z = 2) \tag{8}$$

$$f(w|t_w = 2, t_z = 1) = \int_z f(w|z, t_w = 2)\ \Psi(z)\ dF(z|t_z = 2) \tag{9}$$

The important point from equation (9) is that the counterfactual distribution equation can be obtained from the factual distribution using the help of the weighing function $\Psi(z)$. However, this method assumes that the wage structure of workers if migration occurs (t = 2) and if migration does not occur (t = 1) does not change, and the important assumption that the wage structure at t = 2 does not depend on the distribution of individual characteristics z . By applying the Bayes' rule, it is obtained:

$$P(z|t = 1) = \frac{P(t = 1|z)\ dF(z)}{\int_z\ P(t = 1|z)\ dF(z)} \tag{10}$$

and

$$P(z|t = 2) = \frac{P(t = 2|z)\ dF(z)}{\int_z\ P(t = 2|z)\ dF(z)} \tag{11}$$

Thus, the weighting function in equation (4) can be transformed into:

$$\Psi(z) = \frac{\Pr(t_1 = 1|z)\ \Pr(t = 2)}{\Pr(t_2 = 1|z)\ \Pr(t = 1)} \tag{12}$$

where $\Pr(t = k)$ is the unconditional probabilities while $\Pr(t_k = 1|z)$ is the conditional probabilities. Dickey (2014) reveals that unconditional probabilities can be estimated by the proportion of individuals in an area, both the conditions of migration occur (t = 2) and if migration does not occur (t = 1). Meanwhile, conditional probabilities can be estimated through individual opportunities in an area at t = 1,2 conditionals on individual characteristics possessed. The standard method used to estimate the unconditional probabilities is a probit model, using explanatory variables in the form of personal characteristics (age, gender, education level and marital status) and job characteristics (hourly wages, hours worked, and employment status).

After obtaining a weighing value for each individual, a description of counterfactual wage distribution can be estimated using the weighted kernel density estimation:

$$\widehat{f_h}(w) = \sum_{i=1}^{n} \frac{\theta_i}{h}\ \psi_i(z)K\left(\frac{w - W_i}{h}\right)$$

where w_i is the observable wage/hour, θ_i is the weighing ($\sum_i \theta_i = 1$), h is the bandwidth, $K(\cdot)$ is the kernel density function, and $\psi_i(z)$ is the reweighting function.

3.2 OLS Method

Although the counterfactual method can provide more detailed information on changes in workers' wages along the distribution due to migration, this method can not provide the magnitude of the marginal effect of migration on the worker's wage level in different groups. In addition, this analysis has not been able to control the proportion of migrants in each group to prove the hypothesis of this study. A particular group with a higher ratio of migrant to non-migrant workers will have a bigger negative impact on

the average wages. So that this study uses a regression analysis tool to determine the magnitude of the marginal effect in each group of workers.

Referring to the theoretical framework in equation (5), empirical equations can be obtained to see the impact of migration on wage levels in the first percentile as follows:

$$ln\, w_{rt}^i = \alpha^i + (\sigma - 1)\left(\frac{\pi_i^1}{\pi_i^0} - 1\right)m_{rt} + \delta X_{rt}^i + \varepsilon_{rt}^i$$

$$ln\, w_{rt}^i = \alpha^i + (\sigma - 1)\left(\frac{n_i^1}{n_i^0} + \frac{\sum n_i^1}{\sum n_i^0}\right)_{rt} + \delta X_{rt}^i + \varepsilon_{rt}^i \tag{13}$$

$$ln\, w_{rt}^i = \alpha^i + \beta^i M_{rt}^i + \delta_i X_{rt}^i + \varepsilon_{rt}^i \tag{14}$$

where *w* is the real wage of the worker in the factual condition, *i* shows the *i*-wage percentile, *r* is the variation between regions, and *t* is the variation between times.

By controlling the estimated capital mobility through the infrastructure level in each region, and controlling the characteristics of workers education in the labor market in the form of the proportion of workers based on education level, and the ratio of skilled and unskilled workers in each *i*-percentile, the equation (14) can be translated into:

$$ln\, w_{rt}^i = \alpha + \beta^i \ln M_{rt}^i + \delta_1^i \ln\left(\frac{Worker_{element\, sch-primary\, high\, sch}}{Total\, Worker}\right)_{rt}$$

$$+ \delta_2^i \ln\left(\frac{Worker_{secondary\, high\, sch}}{Total\, Worker}\right)_{rt}$$

$$+ \delta_3^i \ln\left(\frac{Worker_{Univ}}{Total\, Worker}\right)_{rt}^i + \delta_4^i \ln Infrastr_{rt} + \delta_5^i Dummy\, Year$$

$$+ \varepsilon_{irt} \tag{15}$$

In the above equation, worker characteristics need to be controlled because the changes in workers' characteristics available in labor market will also influence workers' wage in that area (Glaeser, 1999; Lucas, 1988). The difference of workers proportion based on education level will give different effects on wage levels in each percentile. The infrastructure availability also needs to be controlled in equation (15), because the condition of infrastructure will also affect worker's wages from demand and supply side. The infrastructure availability will reduce migration costs, so that it will attract the inflow of migrant workers to the areas with good infrastructure facilities. The availability of infrastructure can also illustrates capital mobility in the area, so that it will affect the wage level in terms of labor demand. The better infrastructure facilities will make it easier for companies to enter the market and do the production process in that area. This condition will encourage the creation of clustering and economic agglomeration that affects the demand for production factors and affects the wages offered by the company (Krugman, 1991; Rahman & Fujita, 1990).

This study uses micro data source from the 2016 and 2017 National Labor Force Survey (Sakernas) published by the Central Statistics Agency (BPS). The selection of 2016 and 2017 as the year of observation of this study is driven by the data availability and data actuality, where the 2016 Sakernas is the first employment survey that provides recent migration data equipped with comprehensive employment information. Because this study focus on labor migration, the sample used in this analysis is limited to individuals who are in the working age, based on the concept from ILO (15 years above), which are as many as 536,970 samples. In addition, this study also focuses on the impact of migration on worker's wage in destination areas through the labor availability changes mechanism. Therefore 174,240 individuals must be excluded from the sample because these individuals are not included in the workforce, such as housewives and are in school. Thus, the number of samples used in this study were 369,833 individuals.

4. RESULTS AND DISCUSSION

Before looking at the impact of migration on the wages distribution in the destination areas, information regarding the characteristics of migrant and non-migrant workers is needed. The proportion of migrant workers who have Diploma/University education is greater than the proportion of non-migrant workers with same education level (Table 1). Meanwhile, the proportion of non-migrant workers who have junior high school education is much greater than the proportion of migrant workers. From the table 1, it can also be seen that the decision to migrate is mostly carried out by the workers in productive age. This is in line with Greenwood's (1975) study which revealed that workers who have higher education and are of productive age will have wider access to enter the labor market in the destination area.

Compared to women, most migrant workers in Indonesia are male. Wajdi, Mulder, & Adioetomo (2017) revealed that migration mostly was driven by economic reasons so that men as the backbone of the family would have a bigger motivation to migrate to get higher wages in the destination area. Refer to Table 1, it can also be seen that most migrant workers in Indonesia work in the formal sector. Although migrant workers have limited access and tend to enter the informal sector at the beginning of arrival, the opportunity to get a job in formal sector will also be increasingly open along with the increase in work experiences and skills. (Manning & Pratomo, 2013).

Table 1 The proportion of Migrant and Non-Migrant Workers Based on Characteristics

		Worker Status (%)		The proportion of Migrant / Proportion of Non-Migrant
		Proportion of Non-Migrant	Proportion of Migrant	
Education	Junior High School Below	59.16	44.01	0.74
	Senior High School	28.94	35.70	1.23
	Diploma/University	11.90	20.29	1.71
Age	15-24	15.65	24.27	1.55
	25-34	22.77	35.90	1.58
	35-44	25.13	25.13	1.00
	45-59	27.18	12.88	0.47
	60+	9.27	1.82	0.20
Gender	Male	61.69	65.58	1.06
	Female	38.31	34.42	0.90
Occupation	Formal	49.26	65.87	1.34
	Informal	50.74	34.13	0.67
Wage Group	Top 25%	25.14	20.61	0.82
	25% lowest	24.07	33.05	1.37

Source: Sakernas (2017)

If we look more detail at the proportion of migrant workers than the proportion of non-migrant workers in each percentile group, it can be seen that migrant workers are concentrated in the top-wage group (Figure 1). By looking at the conceptual framework used in this study, where migration will encourage a decrease in wages of workers in groups with high concentrations of migrant workers, it can be concluded that migration will encourage a decrease in workers wages in the top percentile of the distribution. Meanwhile, the worker's wages in the median area were allegedly unchanged, because the proportion of migrants did not change the proportion of non-migrant workers on that percentile.
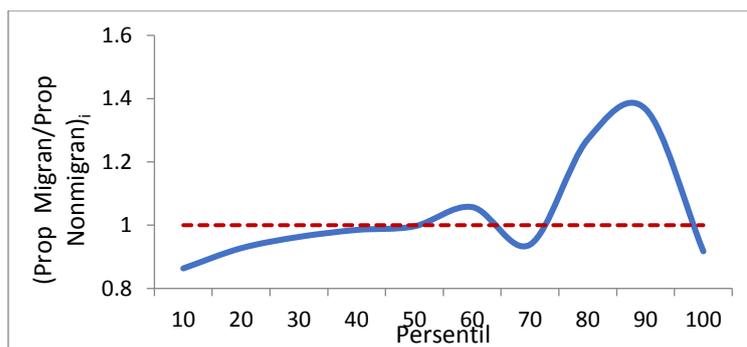
Figure 1   Ratio (Proportion of Migrant Workers / Proportion of Non-Migrant Workers) According to the Percentile Group

To analyze the impact of migration on wage distribution using the counterfactual method, the analysis was carried out by comparing density curve of counterfactual conditions, where migration does not occur, with factual density curve conditions, where migration has occurred. From the graph of Appendix 1, it can be seen that the impact of migration on wage distribution through the counterfactual approach shows different results between provinces. Nevertheless, there are three large patterns that can be taken to illustrate the impact of migration on changes in wage distribution in 34 provinces in Indonesia. The first pattern illustrates that migration flows are driving down wages for workers who are in the top 25 percent of the distribution. However, the wages in the lowest 25 percent are not significantly affected, which means that migration does not change the characteristics of workers in the destination of migration. This pattern occurs in most provinces in Indonesia, such as Aceh, West Sumatra, Lampung, Bangka Belitung, NTB, NTT, Central Kalimantan, South Kalimantan, Central Sulawesi, West Sulawesi, North Maluku, West Papua. Skilled workers who decide to migrate to these provinces tend to be overeducated because economic characteristics in these provinces are more supported by the traditional sector which requires more unskilled workers than skilled workers. Thus, migration will encourage a decrease in the worker's wages in the top distribution.
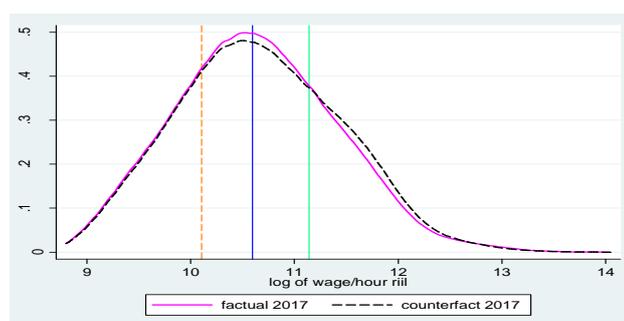
Figure 2   Changes in Wage Density Factual and Counterfactual due to Migration, Aceh Province (Pattern 1)

Meanwhile, the second pattern illustrates that migration flows actually increase the wages in the 25 percent lowest of the distribution. This second pattern occurs in several provinces, such as North Sumatra, Riau, Jambi, Bengkulu, Banten, South Sulawesi, Southeast Sulawesi, Maluku, and Papua. In these provinces the wage rates in the low-skilled group, which consist of workers with junior high school education and below, are higher than the average low-skilled wages in national level. Though they have the same low skill, migrant workers tend to have higher skills and productivity than non-migrant workers. Thus, the inflow of migrant workers will increase the average wage in the low-skilled group.
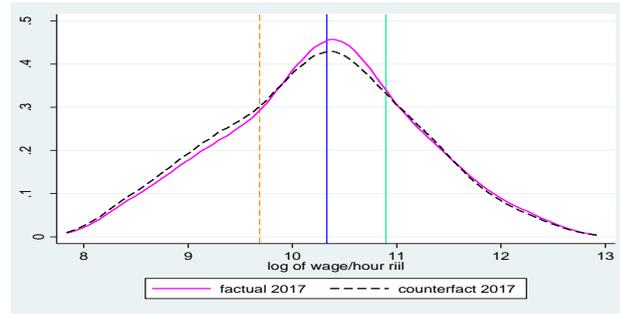
Figure 3   Changes in Wage Density Factual and Counterfactual due to Migration, South Sulawesi Province (Pattern 2)

The last pattern illustrates the migration flow shifts the wage distribution to the right. This indicates that migration will increase the wage rates of workers in both the low-skilled and high-skilled groups. This pattern occurs in some provinces, such as South Sumatra, Riau Islands, North Sulawesi, West Java, Yogyakarta, and Bali. This condition occurs because these provinces have economic characteristics that are concentrated in the manufacturing industry and the service sector. As in West Java, the occurrence of industrial agglomerations encouraged workers to come. The concentration of migrant workers in agglomeration areas will create knowledge spillovers, thus influencing the workers productivity, both low-skilled and high-skilled workers. From the three large patterns, conclusions can be drawn that migration tends to increase the wages of workers in the lower percentile. Meanwhile, most regions indicated that migration reduced the wages of the top distribution.
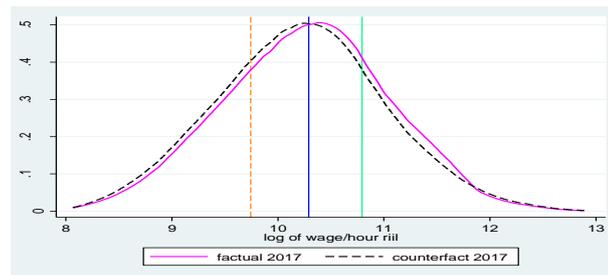
Figure 4   Changes in Wage Density Factual and Counterfactual due to Migration, South Sulawesi Province (Pattern 3)

Although counterfactual analysis can provide more detailed information regarding the wage changes along distributions and provide information about wage distribution when migration occurs and if migration does not occur. However, the counterfactual analysis can not control the ratio of migrant and non-migrant workers at each group. So this analysis tool is not enough to prove the research hypothesis, where migration will encourage a decrease in wages in groups with a high concentration of migrant workers. This analysis also has not been able to provide information on the magnitude of the marginal effect of migration on the wages in each percentile along the distribution. Therefore, this study carried out further analysis through a regression equation to explain the magnitude of the impact of migration on workers' wages in different percentile groups.

Table 2. The Impacts of Migration on Wages Based on Percentile Groups

Ln (Wage Real/Hour)	Percentile 10	Percentile 25	Percentile 50	Percentile 75	Percentile 90	Percentile 100
	(1)	(2)	(3)	(4)	(5)	(6)
Ln Migration (i)	0.592**	0.544	0.220	-0.337**	-0.224*	0.051
	(0.277)	(0.358)	(0.341)	(0.13)	(0.118)	(0.094)
	-0.359**	-0.383	-0.127	0.108	0.075	0.138

9

Ln prop. Elmntary & Junior HSc	(0.17)	(0.238)	(0.2046)	(0.1158)	(0.1017)	(0.1059)
Ln prop. Elmntary & Senior HSc	0.031	0.088	0.077	0.194	0.166	-0.008
	(0.172)	(0.167)	(0.191)	(0.125)	(0.126)	(0.108)
Ln prop. University	0.210	0.181	0.211	0.334***	0.285***	0.181**
	(0.156)	(0.161)	(0.148)	(0.11)	(0.102)	(0.088)
Ln Infrastructure	0.130***	0.131***	0.112***	0.064*	0.056*	0.064**
	(0.045)	(0.043)	(0.041)	(0.036)	(0.031)	(0.031)
Dummy Year	-0.088	-0.050	-0.018	-0.008	-0.005	-0.003
Const	5.855***	6.530***	7.567***	9.403***	10.077***	10.622***
N	68	68	68	68	68	68
Adj-R squared	0.2649	0.2348	0.1906	0.2638	0.2093	0.2237

Note: The equation use dummy year (2017=1, 2016=0); Standard error are presented in parentheses;
*Significance level 10%; ** Significance level 5%; *** Significance level 1%

The estimation results in Table 2 shows that migration significantly affects the wage rates in the 75th and 90th percentiles. The parameter coefficients show that migration in the 75th and 90th percentiles, measured by the ratio of overall migrant workers to the non-migrant worker's ratio in each percentile, has a negative impact on the wage reduction in both percentiles, which are -0.333 and -0.224 respectively. We can conclude that in the condition of ceteris paribus, every one percent increase of migration in the 75th percentile will reduce the average wage in the 75th percentile group by 0.34 percent. Likewise, an increase of one percent of migration in the 90th percentile will reduce the average wage on that percentile by 0.22 percent in the condition of ceteris paribus. Significant impacts on the 75th and 90th percentile are in accordance with the conditions of migrant workers in Indonesia, where migrant workers are more concentrated in groups of workers with high skill levels so that the negative impact on the wage level of workers will occur in high skill groups.

The decrease in this group's wage occurs because migrant tends to accept lower wages than non-migrant workers with the same level of skills upon arrival in the destination to enter the labor market (Constant, 2014; Dustmann et al., 2013; Manacorda et al., 2012). Migrants tend to discount themselves due to lack of network and limited access on entering the labor market. Thus, the high concentration of high-skilled migrants who experience a downgrade in the destination area will encourage a decrease in the average wage of top percentiles.

This condition is also in line with Harris-Todaro's theory which reveals that high-skilled workers will have higher chance to move to other areas in order to obtain higher expected income at the destination area (Todaro, 1976). Meanwhile, high-skilled non-migrant workers who decide to stay in the area of origin are those who have higher productivity and higher wages than the wages received in other regions. When compared to migrant workers with same skill level, high-skilled non-migrant workers who decide to stay in their home areas will tend to be more productive than newly arrived migrant workers. Thus, the high number of migrant workers will have negative impact on the average wage of top percentiles.

The opposite results occurred in the 10th percentile group, where migration will have a positive impact on the average wage of the 10th percentile. From the estimation results, it is known that every 1 percent increase in migrant workers in the 10th percentile will increase the average wages of workers in that group by 0.59 percent, ceteris paribus. Although migration has a high chance for high-skilled workers, Barnum & Sabot (1977) revealed that low-educated workers who decided to migrate are workers who had higher job-transferable skills and higher levels of schooling. Thus,

when arriving at the destination, low-skilled migrant workers have higher specifications and bargaining power in the labor market than non-migrant workers in the 10th percentile, considering that workers in the lowest percentile of the distribution are closely related to the conditions of uneducated and unskilled workers. Migrant workers tend to do jobs that non-migrant workers don't want to do (Constant, 2014). Thus, the inflow of low-skilled migrant workers will increase the average wages in the lower percentile group. The results of this study are in line with the Foged & Peri (2015), where the inflow of low-skilled migrant workers will encourage low-skilled non-migrant workers to move to less-manual intensive jobs, thereby increasing worker productivity and increasing average wages.

From Table 2 we also conclude that migration did not affect the average wages in the 25th, 50th and 100th percentiles. This condition happened because the proportion of migrant workers is equal to the proportion of non-migrant workers in these percentile groups. Thus, the entry of migrant workers will not change the relative price of production factors in the 25th, 50th and 100th percentiles. In addition, workers in the top percentile of distribution can be described as workers with the highest productivity compared to workers in other groups. Therefore, as workers who do not have strong experience and networks, it will be difficult for newly arrived migrant workers to compete and be in the top percentiles when they arrive at the destination area.

Table 2 also reveals that the variables which control the changes of worker skill composition in the labor market also influence wage rates in different percentiles. Every one percent increase in the proportion of elementary & junior high school workers to total workers will reduce wages in the 10th percentile by 0.35 percent. Conversely, the higher the level of workers education available in the labor market will encourage companies to pay higher wages. So that every one percent increase in the proportion of highly educated workers will increase the average wage in the 75, 90 and 100 percentiles, by 0.33 percent, 0.29 percent, and 0.18 percent, respectively.

Meanwhile, the estimation results on infrastructure variables indicate that infrastructure availability is statistically significant in encouraging the increase of average wages in all groups. The availability of infrastructure will facilitate the labor mobility between regions. Better infrastructure will increasingly attract workers to come, so that affects the labor supply in the destination area. Better infrastructure will also facilitate the inflow of capital into the destination area, where capital can be in the form of physical companies or investments. Capital inflow into the destination area will affect the wage level due to increased demand for labor production factors (Dalenberg & Partridge, 1997). Although infrastructure significantly influences wage increases in all percentiles, the positive impact is bigger for workers in the lower percentile. This can be seen from the highest coefficient values occurring in the 10th percentile and getting smaller in the higher percentile group. Thus, infrastructure development is effectively used as a tool to improve welfare equality in Indonesia.

5. CONCLUSION

This study proves that migration has an unequal impact on different groups of workers. By using counterfactual analysis, this study shows that in general there are three patterns of changes in wage distribution due to migration, but most provinces experience changes in distribution through decreasing wages to the right of the distribution. This shows that in most provinces, migration has an effect on decreasing wages of highly skilled workers.

After controlling the magnitude of the ratio of migrant workers to non-migrant workers in each percentile group, the results of the regression analysis indicate that each one percent increase in migration will have a significant impact on the wage reduction of workers in the 75th and 90th percentiles, 0.34 percent and 0.22 percent respectively. This happens because migrant workers tend to downgrade their ability upon arrival in the destination area, where the migrant workers are willing to receive lower wages in order to enter the labor market. Therefore, the high concentration of

migrant workers in the 75th and 95th percentiles will drive the decline of average wages in those percentiles.

Conversely, migration has a positive impact on the average wage of workers in the 10th percentile, where every one percent increase in migrant workers in the 10th percentile group will increase the average wage of workers by 0.59 percent in that group. Low-educated workers who decided to migrate are workers who had job-transferable skills and higher levels of schooling. Thus, when arriving at the destination, low-skilled migrant workers have higher specifications and bargaining power in the labor market than non-migrant workers in the lower percentile of the distribution. Meanwhile, migrant workers also tend to do work that non-migrant workers do not want to do. Thus, the inclusion of low-skilled migrant workers will increase the average wage of workers in the lower percentile of the distribution. The results of this study do not prove a negative stigma and concern in the wider community that migration will increasingly drive down wages for workers, especially in the lower distribution group.

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Appendix 1   Wage Density of Factual and Counterfactual Conditions from the Occurrence of Migration in the Destination Areas

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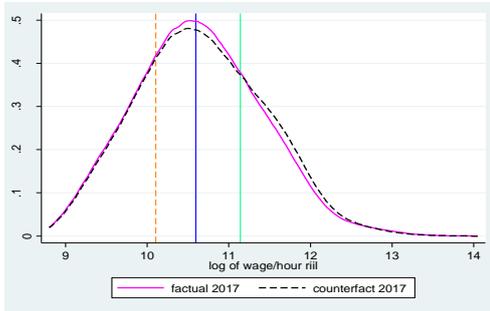
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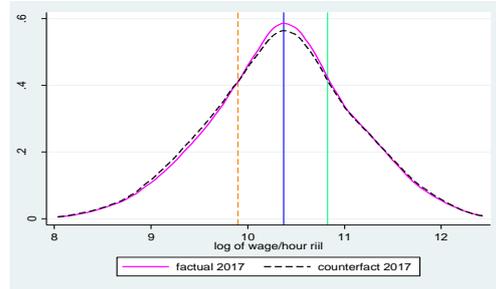
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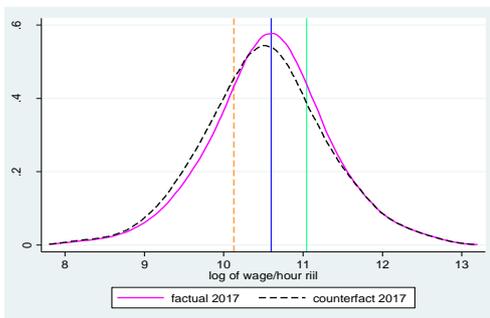
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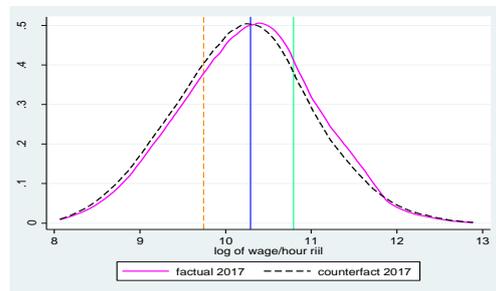
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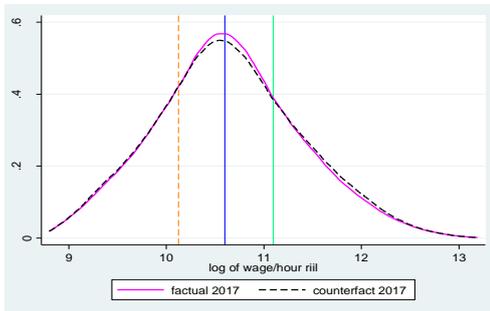
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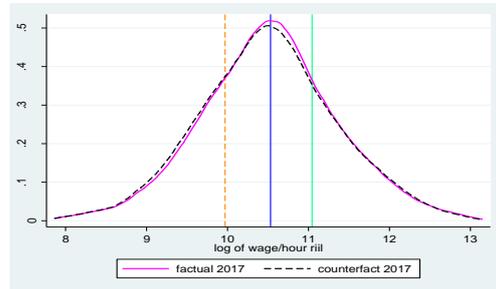
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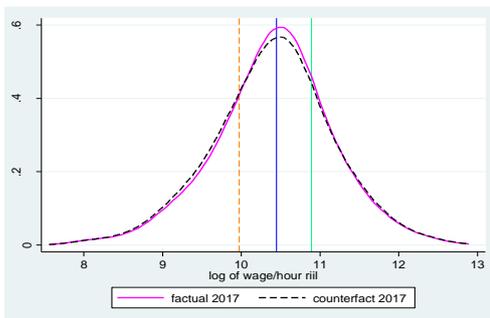
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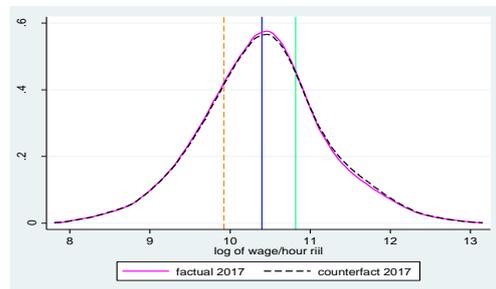
# THE IMPACT OF MIGRATION ON THE WAGE DISTRIBUTION IN INDONESIA

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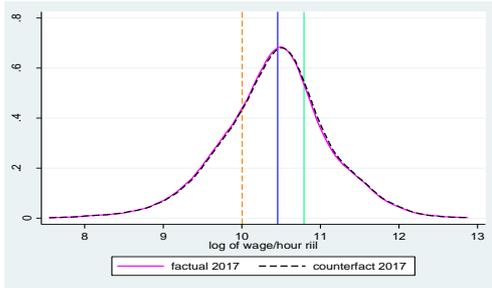
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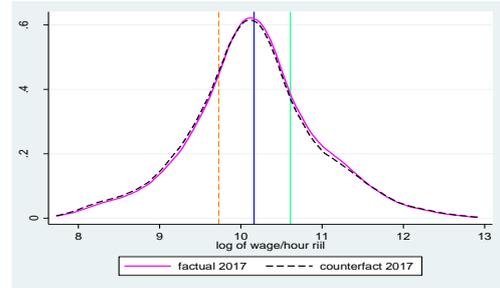
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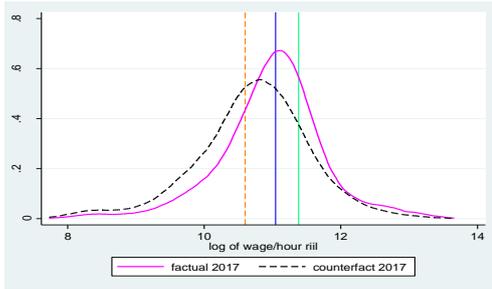
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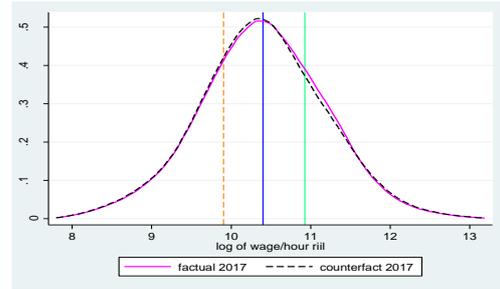
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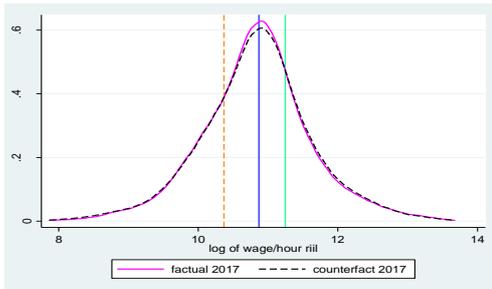
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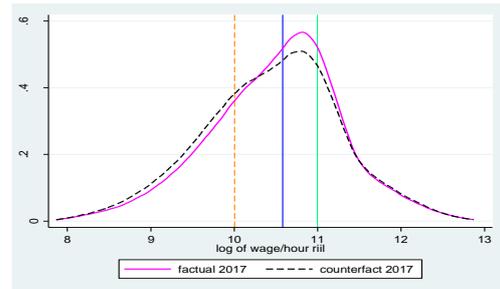
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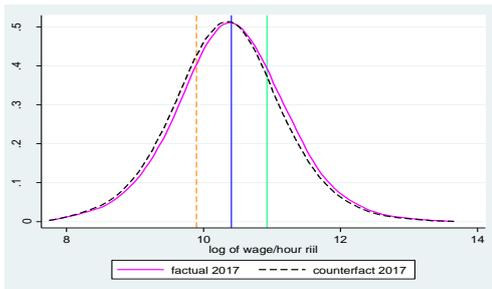
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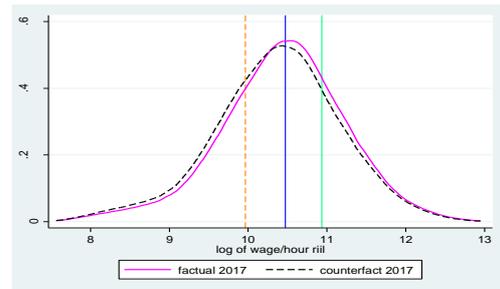
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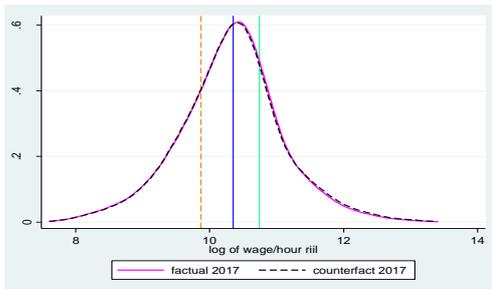
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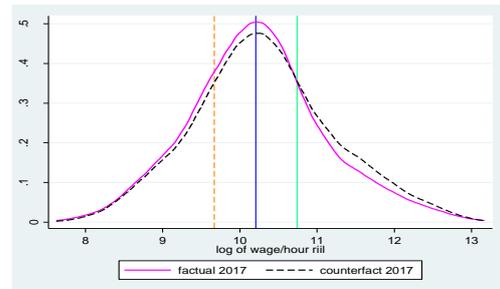
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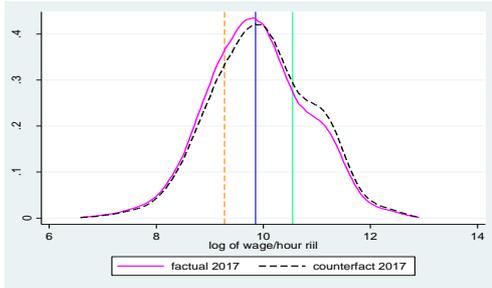

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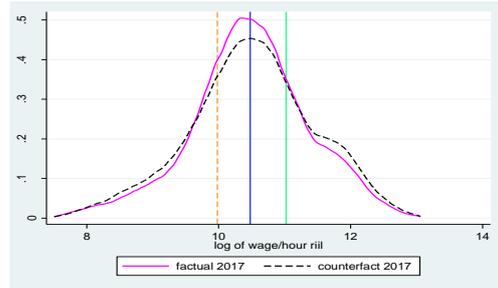
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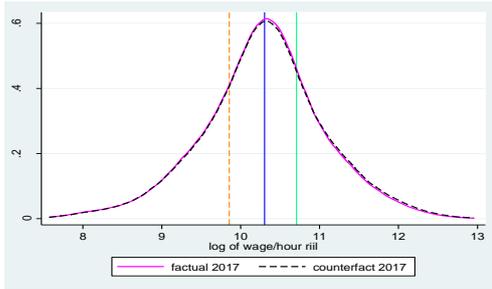
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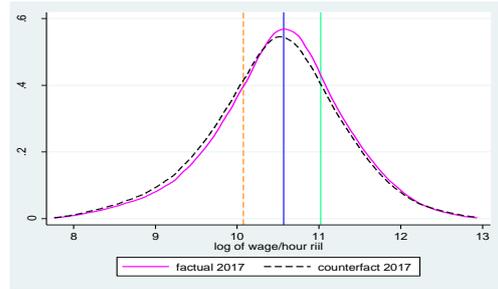
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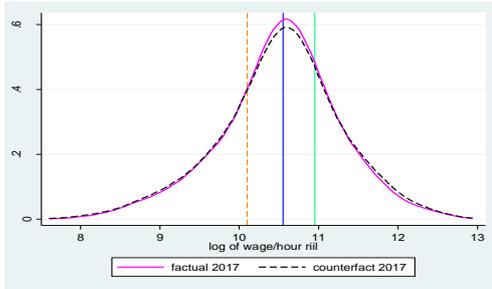
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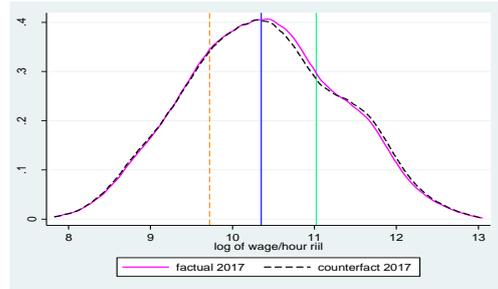
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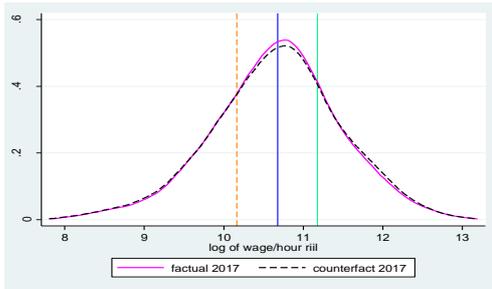
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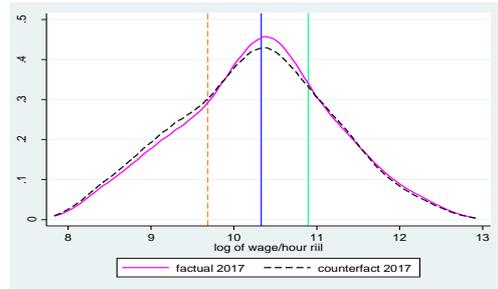
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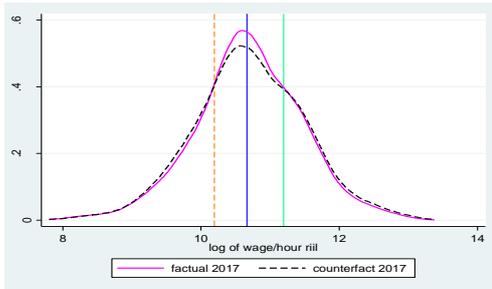
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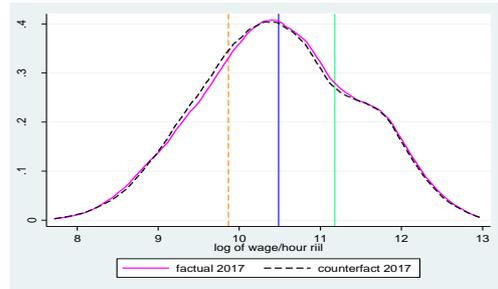
THE IMPACT OF MIGRATION ON THE WAGE DISTRIBUTION IN INDONESIA

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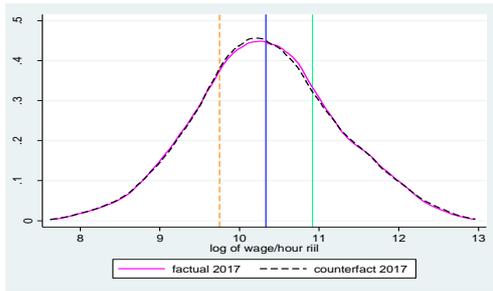
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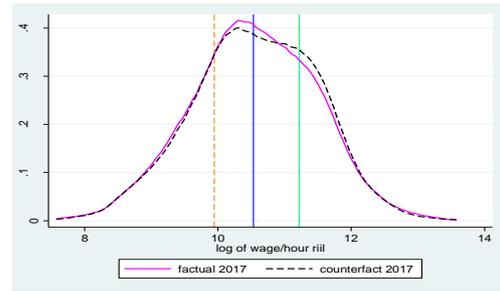
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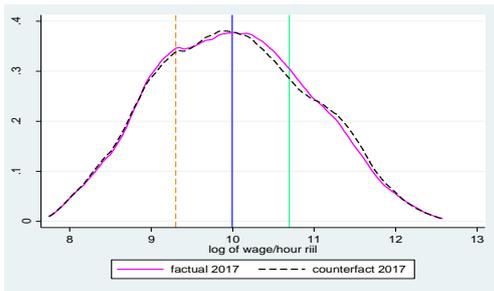
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81. MALUKU

94. PAPUA