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# Investigating wage bargaining power, wage inequality and industrial structure in Indonesia

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**Abstract**

This study aims to investigate the labor bargaining power over wages and the wage inequality among industries based on the industrial structure in Indonesia. In this study, Panel Data Model is used and supported by secondary data from 2008-2015. This study argues that wage inequality really matters among the industries and tends enlarge among them although the bargaining power of labor over wage probably exists. **Findings/Originality**: This study has also shown a critical point for government's industrial policies in the developing countries which are highly concerned with the labor wage bargaining power and wage inequality issues, particularly in Indonesia. It suggests that the government plays important role in making better and in making equal fair wage level between industries, particularly demand for labor (demand side) and supply of labor (supply side) of each industrial classification is highly needed. More educational strategies aimed at increasing labor capacities through specialization programs can potentially help establish a superior state of labor bargaining power over wage and the fair wage level of the industries in the labor market, particularly in S and M Industries.

## Introduction

Issues of wage bargaining and wage inequality of labor in this present study is highly rely on the theoretical framework of labor demand and labor supply in the labor market. In the labor market, interaction between labor demand and supply is connected with some significant variables, namely nominal wage of labor, prices, expected price, education level of labor, labor expertise, and labor experiences (Dunlop & Higgins, 1942; Lindblom, 1948; Svejnar, 1986; Altman, 1995; Cerda, 2003; Pater, 2017; and Kampelmann et al., 2018). The changes in these variables in the labor market tend to create a disequilibrium situation. This may lead to undesired societal reactions and demonstrations in terms of the assertion of a better comfortable working conditions (supply side), termination of unilateral labor job by the firm (demand side), and maybe the possible conflicts of interests between firms and labor. At the end, these issues generates the negative effects on the economy as a whole (Audretsch, 2018; Grubb & Tremblay, 2015), particularly wage inequality. Coles and Mortensen (2011) underlined that the increasing labor recruitment cost is proportional to the labor of a firm and labor wage does not depend on the firm size, but the higher salaries is paid to productive labor. Then, Altman (1995) and Mankiw et al.(1992) also paid attention on the unequal payment due to the different labor wage rates of differing relative marginal productivities.

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It will be stable in the long run which depend on the effort intensity level with changes in the compensation of labor as well as the productivity of labor varies with the extent to effort intensity.

The indicators of Indonesian labor market for 2008 to 2015 show the important aspects of economic activities based on Indonesian Standard Industrial Classification (ISIC). The economic activities for this period increased lower than the increasing labor force. Between 2008 and 2015, the ISIC's economic activities decreased by 1950 units and the change of the labor force for 2008 to 2013 increased by 9.71 million significantly in February and 6.24 million in August. However, the demand for labor force in small and micro industries grew by 1.6 million and 0.6 million, respectively. This value indicates that the increasing unemployment rate was quite high in 2008 to 2013. In addition, Human Development Index (HDI) from 2008 to 2013 slighty increased around 2.64 which related to the quality of human resources in Indonesia (Mankiw et al., 1992) and enabled to be the economic agents for economic growth and development as a whole (CBS, 2016). In addition, an increase of GDP price deflator index in this period is 109.4 (GDP with oil and gas) and 109.7 (GDP without oil and gas) affected on decreasing regional real wage, even though, regional nominal minimum wage for the period of 2008-2014 relatively increased by 763.057 Rupiahs. It means that the labor market in Indonesia experienced money illusion in which the bigger change in labor wages, the higher increase in prices. The labor market indicators in Indonesia for the years 2008-2015 are represented in Table 1.:

**Table 1.** Economic Indicators of Labor Market in Indonesia, 2008-2015

| Economic Indicators | | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | Change |
|---|---|---|---|---|---|---|---|---|---|---|
| ISIC's Economic Activities | Unit | 25,694 | 24,468 | 23,345 | 23,370 | 23,592 | 23,698 | 23,744 | | -1,950 |
| Labor –Micro Industry | Million | | | 4.8 | 4.8 | 5.6 | 5.4 | 6 | 6.5 | 1.6 |
| Labor – Small Industry | million | | | 1.6 | 3.5 | 3.5 | 4.3 | 2.3 | 2.3 | 0.6 |
| UMR of Provinces- Indonesia | Rupiah | 743,174 | 841,529 | 908,824 | 988,829 | 1,088,903 | 1,296,908 | 1,506,231 | | 763,057 |
| Labor Force –February | million | 111.48 | 113.74 | 116 | 119.4 | 120.41 | 121.19 | | | 9.71 |
| Labor Force –August | million | 111.95 | 113.83 | 116.53 | 117.37 | 118.05 | 118.19 | | | 6.24 |
| Unemployment –February | million | 9.43 | 9.26 | 8.59 | 8.12 | 7.61 | 7.17 | | | -2.26 |
| Unemployment-August | million | 9.39 | 8.96 | 8.32 | 7.7 | 7.24 | 7.39 | | | -2 |
| Implicit price deflator for GDP | % | 237.6 | 257.3 | 278.5 | 301 | 314.3 | 328.2 | 347 | | 109.4 |
| Implicit price deflator for GDP– No oil & gas | % | 228.3 | 252.4 | 273.7 | 292.6 | 305.8 | 319.4 | 337.9 | | 109.7 |
| HDI of Indonesia | | 71.17 | 71.76 | 72.27 | 72.77 | 73.29 | 73.81 | | | 2.64 |

**Source**: Statistics Indonesia, 2008-2015.

The important point that can be underlined in this study is that the existing labor market in which the interaction between labor demand and labor supply depends on the characteristic relations among the variables from supply of labor side or labor demand side (firm) (Svejnar, 1986; Lindblom, 1948). Generally, in the developing countries, the extent of the firm's monopoly power is stronger compared to the bargaining power of labor over wage (see Table 1), especially in Indonesia.

This study has some main purposes, investigate the wage bargaining power of labor in the labor market with respect to the types of industries in Indonesia; prove that the classical labor market theory relating to marginal product of labor (labor productivity) is the main determinant of labor wage; examine the wage inequality based on the industrial structure among the three groups of industries in Indonesia; and investigate probable government involvement particularly in the developing countries where wage equality is still an issue in the labor market. The previous studies emphasized that there is a positive relationship between the public sector wage and the private sector (Córdoba et al., 2009; Gersbach & Schniewind, 2005). But, Svejnar's (1986) study did not maintain the theory of traditional labor economics in which the bargaining solution is not

determined by the marginal revenue product (MRP) of labor in the labor market. The results proposed the efficient contract as a possible main variable in generating the outcome for a lot of firms and unions. Moreover, Kampelmann et al. (2018) underlined that educational credentials affect labor productivity more than wage costs. They also stated that corporate profits will increase if the company employs higher educated workers rather than lower educated ones, especially younger workers and women. This empirical study provides a clear indication that wage differences are highly affected by the employees' productivity. High labor productivity is influenced by the educational credentials in the production process and subsequently will lead to an increase in the company's profits. Although these previous empirical findings have made a significant contribution, they merely focused on the issues within an industry. This study tries to provide another empirical perspective with respect to bargaining power of labor over wage and wage inequality which relies highly on the industrial classifications in Indonesia as a case study.

The previous studies, Marshall (1930), used the term of labor bargaining power regarding the labor market which represents a concept related to all the various forces in establishing the wage rates in the labor market. He underlined the bargaining power inequalities of labor generate the weakness of labor in decreasing his wages and then reducing the labor efficiency and consequently decreasing the bargaining power of labor as a bargainer. This can be formulated as $A_f = \frac{P_f - S_p^c}{D_p^c}$, where $A_f$ is the benefit of labor bargaining power as a factor; $P_f$ refers to the factor actual price; $S_p^c$ is the price for the factor supply based on pure competition; and $D_p^c$ stands for the commodity price of demand (Dunlop & Higgins, 1942). This idea of Marshall was highly encouraged by Lindblom (1948) due to the bargaining power does not purely determine the wage rates or prices, involves many factors in determining the wage rate or price, the antithesis of bargaining power between wage rate or price determination by human being forces and by economic laws is false, the inequality has to be measured relatively to a specified level and to time because of the tendency of wage rate or price change, and the labor power over wages or prices with respect to the inequality cannot be represented as a strategic power without motives or desires to employ it.

Dunlop and Higgins (1942) underlined that the bargaining power of labor involves many factors in relation to determining the bargaining power inequalities in the labor market. Dunlop and Higgins (1942) distinguished the bargaining power inequalities between concepts of determining and resultant as well as its measurements. The concept of determining the bargaining power consists of firstly, tastes of workers and employers related to wages and man-hours bought and sold which is represented by the indifference maps as well as institutional factors involving the property rights and wage-hour legislation. These changes impact the demand for labor and the supply of labor. Secondly, labor market conditions with respect to the extent of and type of competition in production factors, in the product market, and in the markets for complementary. Lastly, pure bargaining power relating to the ability to attain favorable bargains without the labor market conditions. On the contrary, a concept of resultant bargaining power is to measure it by the consequential wage (the real wage) rather than by the factors behind a wage. Then, these concepts are used in formulating the interaction of demand for labor and supply of labor in the labor market by means of a general equilibrium method to construct the investigation more realistic.

However, the Dunlop and Higgin's (1942) and Lindblom's (1948) formulas are not merely employed in this study. This study just focuses on the equilibrium condition in the labor market with respect to the classical sight of the power of bargain in determining the equilibrium of wage and labor in the labor market, especially the supply of labor (workers) and demand for labor (industries) interaction and more on wage inequality based on industrial structure. In brief, this study investigates the labor problem over wage and supply-demand of labor excluding the institutional side (Woodbury, 1987) and the process of labor bargain in the labor market (Cross, 1965). Therefore, the additional sub-sections in this study undertake to explain merely on the

critical interconnected variables in the equilibrium condition of the labor market, labor demand and labor supply.

Study in labor demand in the labor market has conducted by Branson (1989), Boadway and Bruce (1991), and Altman (1995). These study highlight that a higher increase output production of a firm, more labor demand tends to increase. It refers to the Marginal Product of Labor or $MP_L$ or $\partial Q/\partial L$. In a competitive market condition, a certain level of price, a firm enables to increase the firm's revenue due to the increase in the number of labor. The equation 1 represents this condition as follows:

$$\Delta R = P.\frac{\partial Q}{\partial L}\Delta L \quad (1)$$

where $P(\partial Q/\partial L)$ stands for Marginal Product of Labor or $MP_L$ or $\partial Q/\partial L$. multiplied by price P or the Value Product of the labor ($MVP_L$). However, the increase of output production of a firm, it also increases the production cost or $\Delta C$, because of the extra labor ($W.\Delta L$). This explains us the three possible conditions which will be faced by a firm; (1) if $\Delta R > \Delta C$, the total revenue changes of a firm is higher than the total cost changes, a firm reaches at a maximum profit, then increases labor demand; (2) in contrast, if $\Delta R < \Delta C$, the firm will reduces the number of labor demand. (3) if $\Delta R = \Delta C$, a moderate position for a firm. The equation 2 presents this relation as follows:

$$W = P\frac{\partial Q}{\partial L} \text{ or } w = \frac{W}{P} = \frac{\partial Q}{\partial L} \quad (2)$$

where *w* stands for the real wage rate. The story of equation 2 can also be expressed briefly by $W_0/P < (\partial Q/\partial L)$ or$W_0 < P(\partial Q/\partial L)$.

To catch the main purpose of this study related to demand for labor, it is reformulated by applying the maximum profit function (Han and Kim, 2018; Chambers, 1994; Branson, 1989). The maximum profit function of a firm is:

$$\pi = TR - TC \quad (3)$$

π stands for a firm profit function, TR or TR = P.Q and TC or TC = wL + rK refers to a total revenue and total cost of a firm, respectively. Then, the profit function of demand for labor is represented in the equation 4:

$$\pi = (P.Q) - (wL - rK) \quad (4)$$

output (Q) constitutes a production function which depends on input factors, such as labor and capital. In this study, the Cobb-Douglas production function is used, $Q = A.K^{\alpha}.L^{\beta}$. Then, the profit function of a firm (equation 4) becomes as follows:

$$\pi = P.AK^{\alpha}L^{\beta} - wL - rK \quad (5)$$

To obtain the maximum profit function of a firm, it will derive the equation 5 against labor (L) as shown in the equation 6 and the final derivation result is prepared in the equation 7, respectively:

$$\frac{\partial \pi}{\partial L} = P.A.K^{\alpha}L^{\beta-1} - w\frac{\partial L}{\partial L} - r\frac{\partial K}{\partial L} = 0 \quad (6)$$

Moreover, the equation 7, the maximum demand for labor function of a firm, will be reformulated in the Longitudinal Data Model or Panel Data model (PDM) as follows:

$$L_{it} = p_{it}.Q_{it}.w_{it}^{-1} \quad (7)$$

where *i* and *t* represent firms and years, respectively; $L_{it}$ refers to labor demand, $p_{it}$ and $Q_{it}$ stand for the price and the outputs, and $w_{it}^{-1}$ refers to the wage rate.

In the context of labor supply in labor market, it substantially correlates with the consumer behavior theory or utility function (Branson, 1989; Deaton & Muellbauer, 1989; Boadway & Bruce, 1991). The utility function of labor supply, U, indeed depends on expected real income, $y^e$, and labor leisure, *S,* (the equation 8).

$$U = U(y^e, S); \frac{\partial U}{\partial y^e}, \frac{\partial U}{\partial S} \rangle 0 \tag{8}$$

In fact, the expected real income is a function of real wage and the number of labor working hours, *T-S* and T refers to the available of labor total hours. The expression of the variable relationship is presented in the equation 9 as follows:

$$y^e = \frac{W}{P^e}.(T - S) = w^e.(T - S) \tag{9}$$

There are two assumptions employed in this study. The first, homogeneity of labor force in line with a single wage rate is applied and the utility function of labor supply constitutes the expected real wage of labor or the nominal wage divided by the expected price. To make a simple model of this study mathematically, the working hours of labor is not incorporated in this PDM. The reason is that the secondary data of that is not available. This way, however, does not decrease the critical point of this study related to wage bargaining power of labor, wage inequality, industrial structure. The supply of labor can be reformulated in a general form with nominal wage as the most important variable in this labor supply model as shown in the following:

$$L_{it} = L({w_{it}}^e), or \qquad {w_{it}}^e \equiv \frac{W_{it}}{{P_{it}}^e} = g(L_{it}), \qquad g' \rangle 0, or \qquad W_{it} = {P_{it}}^e.g(L_{it}) \tag{10}$$

where *i and t* stand for firms and years, respectively; $L_{it}$ and $w^e$ are labor supply and the expected real wage of labor. This is represented by the nominal wage which is divided by the expected price$p^e$, and finally *g(L)* constitutes the labor-produced output.

To determine the labor market equilibrium, the substitution of equations 7 and 10 generate the equilibrium condition of wage and the number of labors supplied and demanded in the labor market related to the Longitudinal Data Model or Panel Data model (PDM) as represented in the equations 11 and 12:

$${W_{it}}^* = W(\sqrt{p_{it}.g_{it}}), \tag{11}$$

and $${L_{it}}^* = L({W_{it}}^*), where \quad {W_{it}}^* = g(L_{it}) \tag{12}$$

To employ the equation 11 and 12, this study assumes that the expected price $p^e$ equals to 1. This means that a completely and exactly adjustment of expected price $p^e$ to the actual price *p*, as *p* rises from$p_0$, so the expected price $p^e$ changes with the equal magnitude and maintaining the unchanged ratio$p^e$/p. This highlights that labor demanded and supplied change in line with the change of price level, keeping the unchanged employment and the real wage. In summary, the equilibrium of nominal wage is a function of squared output produced and price level and the equilibrium of labor is a function of nominal wage equilibrium due to $W = p.g(L)$ or the real wage$w = \frac{W}{p} = g(L)$.

The critical questions of this study address on whether the bargaining power of labor over wage in the three industrial groups matter in Indonesia as one of the developing countries? Is the classical labor market theory related to the marginal product of labor (labor productivity) as the main determinant of labor wage? How far is the inequality of labor equilibrium (demand for labor and supply of labor) among the three groups of industries in Indonesia? To what extent is the possible involvement of government policies with respect to reducing the inequality of labor wage in the labor market? To address these issues, this study refers to Svejnar's (1986) result related to the

traditional labor economics view and the research finding of Kampelmann et al. (2018) who underlined the effect of educational credentials on labor productivity more than wage costs. Based on these studies, it straightforwardly emphasizes on the equilibrium of wage and labor in the labor market with the different classifications of industries.

## Methods

The industries are organized into three groups, namely LMI consist of 24 industries, 2008-2013, SI and MI including 23 industries, 2010 to 2015. The data are obtained from the Central Bureau of Statistics (CBS) of Indonesia in line with the ISIC based on the annual LMI Survey, S and M Industry Survey. Wages (W) in this study stands for the expenditures for labor by industries in billion rupiahs for LMI and million rupiahs for S and M Industries; Output (Q) refers to the LMIs' value of output according to a double-digit of the ISIC in billion rupiahs for LMI and million rupiahs for S and M Industries; Price (P) uses a proxy of value added (market price) by industries in billion rupiahs for Large and Medium Industries and million rupiahs for Small and Micro Industries (Comanor et al., 2018). This is done because it is very difficult to find the price data of industries. Then, the value of output price is multiplied by the output produced and then is rooted so that it becomes an independent variable for equation 13. Furthermore, the result of estimated wage is the main variable that determines the demand for and supply of labor in each industry studied, as formulated in equation 14. The labor data used in this study is the number of labor used by each industry.

Then, using equations 13 and 14, this study also enables the writer to create the comparison in terms of the inequality of labor bargaining power over wage and the equilibrium of labor (demanded labor and labor supplied) in the labor market based on industrial structure, particularly in each industry classification. Equations 15 and 16 used in this study are as follows:

$$W_{it}{}^{*} = W(\sqrt{p_{it}.g_{it}}), \quad or \quad W_{it}^{*} = \alpha_{it0} + \alpha_{it1} SqrPQ_{it} + \varepsilon_{it} \tag{13}$$

and

$$L^{*}{}_{it} = L(\hat{W}_{it}{}^{*}), where \quad \hat{W}_{it}{}^{*} = g(L_{it}) \qquad or \quad L_{it}^{*} = \beta_{it0} + \beta_{it1} West_{it}^{*} + \upsilon_{it} \tag{14}$$

where $\hat{W}_{it}{}^{*}$ stands for the estimated nominal wage equilibrium of industry (*i*) at the year (*t*) and $L^{*}{}_{it}$ refers to the supply of and demand for labor equilibrium of industry (*i*) at the year (*t*) as a function of the predicted value of nominal wage of industry. To reach the crucial purpose of this study relating to labor bargaining power over wage, it highly focuses on the sign result of the estimated equation 14, the estimated coefficient of the nominal wage. The results will highlight that if the sign of its estimated coefficient is positive (> 0), it will be concluded that the labor bargaining power over wage is high. On the contrary, negative (< 0), the labor bargaining power over wage is weak. Generally, larger positive sign of the estimated nominal wage coefficient, higher labor bargaining power over wage in the labor market. Theoretically, the traditional labor economics underlines that the labor power of bargain in the labor market is indeed correlated by the marginal revenue product of labor, $\frac{\partial y}{\partial L}$, (equations 1 and 2) or $R = P.\frac{\partial y}{\partial L}.L$ and $W = P.\frac{\partial y}{\partial L}, or \qquad w \equiv \frac{W}{P} = \frac{\partial y}{\partial L}$ (Branson, 1989).

## Results and Discussion

Descriptive statistical indicators of the main variables observed in the three classified industries in this study are represented in Table 2.

**Table 2.** Descriptive Statistics of the Main Variables of Study According to Industrial Classification

| Statistic Indicators | Large-Medium Industries (LMI) | | | | Small Industries (SI) | | | | Micro Industries (MI) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | L | O | W | P (VA) | L | O | W | P (VA) | L | O | W | P (VA) |
| Mean | 188,930 | 101,375 | 5,260 | 39,896 | 127,221 | 8,374,859 | 1,338,638 | 3,266,588 | 240,067 | 7,294,385 | 717,142 | 3,158,256 |
| Median | 150,125 | 65,664 | 3,843 | 29,980 | 19,555 | 1,764,931 | 251,114 | 819,616 | 48,022 | 1,102,982 | 138,175 | 563,290 |
| Maximum | 884,602 | 722,022 | 37,356 | 224,526 | 1,248,771 | 120,000,000 | 14,623,190 | 36,715,970 | 2,926,612 | 137,000,000 | 6,089,148 | 48,546,016 |
| Minimum | 5,844 | 3,509 | 124 | 907 | 6 | 52 | 4 | 33 | 56 | 5,704 | 234 | 880 |
| Std. Dev. | 178,637 | 122,740 | 5,376 | 40,467 | 220,221 | 17,716,441 | 2,402,191 | 5,790,217 | 487,289 | 17,314,231 | 1,249,953 | 6,584,214 |
| Skewness | 1.7 | 3.0 | 3.0 | 2.2 | 2.7 | 4.2 | 2.9 | 3.2 | 3.2 | 4.8 | 2.2 | 3.9 |
| Kurtosis | 5.7 | 13.5 | 15.0 | 9.1 | 11.1 | 23.1 | 12.6 | 15.3 | 13.6 | 31.0 | 7.7 | 22.2 |
| Jarque-Bera | 113.6 | 877.7 | 1,075.6 | 336.5 | 551.6 | 2,720.1 | 722.8 | 1,105.4 | 871.6 | 5,040.9 | 243.0 | 2,474.0 |
| Probability | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Obs | 144 | 144 | 144 | 144 | 138 | 138 | 138 | 138 | 138 | 138 | 138 | 138 |

**Source**: Statistics Indonesia, 2008-2015.

**Table 3.** The Appropriate Model for Estimating Wage Equilibrium

| Industries | Tests for Appropriate Estimated Model of Wage Equilibrium | | | | Summary |
|---|---|---|---|---|---|
| Large & Medium (LMI) | Chow Test (LR Test) | Statistic | d.f. | Probability | |
| | Cross-section F | 1.996 | -24,120 | 0.008 | |
| | Cross-section Chi-Square | 49.055 | 24 | 0.002 | REM |
| | Hausman Test | Chi-Sq. Statistic | Chi-Sq. d.f. | Probability | |
| | Cross-section random | 0.101 | 1 | 0.749 | |
| Small Industry (SI) | Chow Test (LR Test) | Statistic | d.f. | Probability | |
| | Cross-section F | 1.479 | -22,114 | 0.009 | |
| | Cross-section Chi-square | 34.663 | 23 | 0.004 | REM |
| | Hausman Test | Chi-Sq. Statistic | Chi-Sq. d.f. | Probability | |
| | Cross-section random | 0.256 | 1 | 0.613 | |
| Micro Industry (MI) | Chow Test (LR Test) | Statistic | d.f. | Probability | |
| | Cross-section F | 1.432 | -22,114 | 0.114 | |
| | Cross-section Chi-square | 33.683 | 23 | 0.053 | FEM |
| | Hausman Test | Chi-Sq. Statistic | Chi-Sq. d.f. | Probability | |
| | Cross-section random | 1.780 | 1 | 0.018 | |

**Notes**: (1). REM (Random Effect Model) and FEM (Fixed Effect Model), LR Test (Likelihood Ratio Test), and d.f. (Degree of Freedom), (2). (a) LMI consisting of 24 industries for the years 2008-2013; and (b) SI as well as MI including 23 industries for the period 2010 to 2015, respectively, (3). To choose a better estimation model between Pooled Least Square/Common Effect Model and FEM, it uses the Chow test/Redundant test. When the value of F-statistic> F-critical value or the probability-value < the 5% significance level is significant, the proper panel data model to estimate is FEM. On the contrary, Common Effect Model will be used. In addition, the Hausman test will be performed to decide whether REM or FEM. When the value of Chi-Squares- statistic > the critical value of Chi-Squares or the probability-value <the 5% significance level is significant, FEM is a proper panel data model to estimate. But, if it is not significant, REM will be used as the estimated panel data model.

Ananlysis begins with selecting approriate model. Table 3 shows the proper model for estimating wage equilibrium of each industrial classification in the labor market based on equation 13. To decide an appropriate estimated model for each industry, it employs the comparison of p-value from the testing results of Langrange Multiplier test, Chow test (Likelihood Ratio Test) and Hausman test. If p-value is smaller than the value of significant level ($\alpha$), this estimated model will be used (an appropriate model fo r estimating wage equilibrium in the labor market). This study provides the testing results of Langrange Multiplier test, Chow test (Likelihood Ratio Test) and Hausman test by using the PDM. In general, LMI and SI are REM and MI is FEM. The detailed value of the estimated wage equilibrium model are presented by Table 3.

**Table 4.** Industrial Coefficients of Wage Equilibrium Using Panel Data Model

| Variables | | LMI-REM | SI-REM | MI-FEM |
|---|---|---|---|---|
| Constant | Coefficient | 85,087.590 | 42,330.570 | 51,583.680 |
| | Standard Error | 16,793.110 | 7,397.713 | 14,346.500 |
| | t-Statistic | 5.067 | 5.722 | 3.596 |
| | Probability | 0.000 | 0.000 | 0.001 |
| SqrPQ | Coefficient | 0.981 | 0.010 | 0.025 |
| | Standard Error | 0.087 | 0.001 | 0.002 |
| | t-Statistic | 11.720 | 10.897 | 16.828 |
| | Probability | 0.000 | 0.000 | 0.000 |
| Cross-section random | Standard Deviation | 51,595.020 | 37,831.870 | |
| | Rho | 0.155 | 0.082 | |
| Idiosyncratic random | Standard Deviation | 120,330.700 | 126,972.200 | |
| | Rho | 0.845 | 0.919 | |
| Weighted Statistics | R-squared | 0.490 | 0.646 | 0.826 |
| | Adjusted R-squared | 0.487 | 0.643 | 0.790 |
| | S.E. of regression | 119,839.100 | 126,624.400 | 222,014.900 |
| | F-statistic | 138.480 | 248.022 | 23.464 |
| | Prob (F-statistic) | 0.000 | 0.000 | 0.000 |
| | Mean dependent variable | 129,393.900 | 101,063.600 | 239,048.200 |
| | S.D. dependent variable | 167,048.200 | 211,999.800 | 484,957.200 |
| | Sum squared residual | 2,070E+12 | 2,180E+12 | 5,620E+12 |
| | Durbin-Watson stat | 1.171 | 1.856 | 1.985 |
| Unweighted Statistics | R-squared | 0.465 | 0.640 | |
| | Sum squared residual | 2,430E+12 | 2,360E+12 | |
| | Mean dependent variable | 187,420.200 | 125,117.400 | |
| | Durbin-Watson stat | 0.996 | 1.712 | |
| Effects Specification | Log likelihood | | | (1,881.480) |
| Cross-section fixed (DV) | Akaike info criterion | | | 27.616 |
| | Schwarz criterion | | | 28.125 |
| | Hannan-Quinn criter. | | | 27.823 |

**Source**: Own calculation by using panel data model, 2018

**Notes**: (1) LMI- Random Effect Model (LMI-REM), SI- Random Effect Model (SI-REM), MI-Fixed Effect Model (MI-FEM), 2). (a) LMI consisting of 24 industries for the years 2008-2013; and (b) SI as well as MI including 23 industries each for the period 2010 to 2015, respectively.

Based on the results of the proper model in Table 3 by using the equation 13, it shows detailed estimated coefficients form the PDM of each industrial classification in Table 4. The coefficient values of output (SqrPQ) of the observed industries in this study are positive and have significant values. However, the LMI-REM's estimated coefficient is higher than the two others, SI-REM and MI-FEM. This value denotes the bargaining power of labor over wage of these industries is highly correlated with additional output of labor. These findings really support the classical theory concerning labor economics, a higher increase of marginal product of labor and a higher wage level of labor increase. However, the power of bargain of labor in LMI is quite stronger than that in the two others. The dissimilar level of bargaining power of labor over wage of three groups of industries generate the continued inequality of wage in the labor market and this situation induces a sustained wage inequality among them which becomes a serious problem for socio-economic development in developing countries in general, particularly in Indonesia. Table 4 also shows some important information related to their determinant coefficients ($R^2$) in which the LMI's determinant coefficient is lower than the two others', SI and MI. It means that the variation of wage equilibrium in labor market can be explained by the observed variables in the model used. The results of PDM indicate that the government has important role by implementing the

regulations for creating a reasonable wage level in the labor market, for instance (1) the educational regulations for labors, especially SI and MI, by increasing labor capability which encourage the labor bargaining power over wage and by enhancing a better opportunities which enable to promote the dynamic scale economies of production and support the additional capital of industries. The educational quality of labor has a positive impact on labor and industrial productivity (Waldman and Jensen (1998)).

Further estimation is the appropriate model to estimate labor equilibrium in the labor market. This study investigates the appropriate model specification of the dissimilar industrial classifications by using the equation 14. The results of using these models are represented by Table 5. Generally, the model to estimate labor equilibrium of three groups of industries is REM due to the Chow test (Likelihood Ratio Test) or the Hausman test show a significant value of F-statistic and an insignificant value of Chi-square statistic, respectively. The detailed results of these tests are denoted in Table 5.

**Table 5.** The Appropriate Model for Estimating Labor Equilibrium in the Labor Market of Indonesia, 2008-2015

| Industries | Tests for Appropriate Estimated Model of Labor Equilibrium | | | | Summary |
|---|---|---|---|---|---|
| Large & Medium | Chow Test (LR Test) | Statistic | d.f. | Probability | |
| (LMI) | Cross-section F | 3.098211 | -24,120 | 0.0000 | |
| | Cross-section Chi-Square | 70.401971 | 24 | 0.0000 | |
| | Hausman Test | Chi-Sq. Statistic | Chi-Sq. d.f. | Probability | |
| | Cross-section random | 0.278436 | 1 | 0.5977 | REM |
| Small Industry | Chow Test (LR Test) | Statistic | d.f. | Probability | |
| (SI) | Cross-section F | 1.479669 | -22,114 | 0.095 | |
| | Cross-section Chi-square | 34.66377 | 23 | 0.042 | |
| | Hausman Test | Chi-Sq. Statistic | Chi-Sq. d.f. | Probability | |
| | Cross-section random | 0.25613 | 1 | 0.6128 | REM |
| Micro Industry | Chow Test (LR Test) | Statistic | d.f. | Probability | |
| (MI) | Cross-section F | 1.432503 | -22,114 | 0.1142 | |
| | Cross-section Chi-square | 33.683203 | 23 | 0.0529 | |
| | Hausman Test | Chi-Sq. Statistic | Chi-Sq. d.f. | Probability | |
| | Cross-section random | 1.78033 | 1 | 0.1821 | REM |

**Source**: Own calculation by using panel data model, 2018

**Notes**: (1). REM (Random Effect Model) and FEM (Fixed Effect Model), LR Test (Likelihood Ratio Test), and d.f. (Degree of Freedom), (2). (a) LMI consisting of 24 industries for the years 2008-2013; and (b) SI as well as MI including 23 industries for the period 2010 to 2015, respectively.

According to the appropriate models by using the equation 14, the REM estimates are shown in Table 6. Table 6 elaborates the estimation results of PDM in which the labor equilibrium is a function of the estimated wage or West. The results show that the values of the estimated coefficients are positive and significant. But, the value of the estimated coefficient of LMI is larger than the two industries, SI and MI. This indicates that labor demanded and labor supplied of labor in LMI has a good opportunity compared to that in the two other groups.

Additionally, Table 6 also shows that the determinant coefficients (R-squared based on weighted statistics) of the three industries also vary in values. SI and MI have a higher value of 0.645854 (64.59%) and 0.783643 (78.36%), respectively, compared to LMI's determinant coefficient with the value of 0.545511 (54.55%). It means that the variation of labor equilibrium can be explained by the estimated wage or there are some unknown variables, excluding the estimated wage, which enable to provide strong clarification related to the variation of the labor equilibrium in the labor market. In summary, the labor demand and supply in LMI is still highly

likely to increase because the other key variables are still not included in this model, PDM. Therefore, the labor education quality with respect to division of labor and specialization is indeed required in the SI and MI. In this case, the government plays a big role in terms of the labor quality in the labor market in Indonesia.

**Table 6.** Coefficients of Labor Equilibrium Using Panel Data Models

| Variables | | LMI-REM | SI-REM | MI-REM |
|---|---|---|---|---|
| Constant | Coefficient | 82,814.040 | 42,330.570 | 55,308.710 |
| | Standard Error | 18,157.950 | 14,381.900 | 23,743.620 |
| | t-Statistic | 4.560 | 2.943 | 2.329 |
| | Probability | 0.000 | 0.004 | 0.021 |
| West | Coefficient | 0.996 | 0.010 | 0.025 |
| | Standard Error | 0.076 | 0.001 | 0.001 |
| | t-Statistic | 13.101 | 15.706 | 22.258 |
| | Probability | 0.000 | 0.000 | 0.000 |
| Cross-section random | Standard Deviation | 67,856.250 | 37,831.870 | 56,427.190 |
| | Rho | 0.272 | 0.082 | 0.061 |
| Idiosyncratic random | Standard Deviation | 110,826.700 | 126,972.200 | 222,014.900 |
| | Rho | 0.727 | 0.919 | 0.939 |
| Weighted Statistics | R-squared | 0.545 | 0.646 | 0.784 |
| | Adjusted R-squared | 0.542 | 0.643 | 0.782 |
| | S.E. of regression | 110,443.900 | 126,624.400 | 222,651.000 |
| | F-statistic | 172.839 | 248.022 | 492.590 |
| | Prob (F-statistic) | 0.000 | 0.000 | 0.000 |
| | Mean dependent variable | 103,521.800 | 101,063.600 | 202,934.600 |
| | S.D. dependent variable | 163,370.200 | 211,999.800 | 476,923.000 |
| | Sum squared residual | 1.760E+12 | 2.180E+12 | 6.740E+12 |
| | Durbin-Watson stat | 1.301 | 1.856 | 1.655 |
| Unweighted Statistics | R-squared | 0.476 | 0.640 | 0.777 |
| | Sum squared residual | 2.390E+12 | 2.360E+12 | 7.170E+12 |
| | Mean dependent variable | 184,747.600 | 125,117.400 | 239,048.200 |
| | Durbin-Watson stat | 0.957 | 1.712 | 1.556 |

**Source**: Own calculation by using panel data model, 2018

**Notes**: (1) LMI- Random Effect Model (LMI-REM), SI- Random Effect Model (SI-REM), MI-Fixed Effect Model (MI-FEM), 2). (a) Large and Medium Industries (LMI) consisting of 24 industries for the years 2008-2013; and (b) Small Industries (SI) as well as Micro Industries (MI) including 23 industries each for the period 2010 to 2015, respectively

## Conclusion

Several critical points can be highlighted from this empirical study. First, the effect of output on the wage equilibrium in LMI is higher than in SI and MI. Second, labor bargaining power over wage in LMI is greater than that in the other two industries. These conditions enlighten that there is a close relationship between the increased output and increased wage rates in LMI compared to the others industries. In other words, the labor bargaining power over wage in LMI is stronger than the other two industries. Third, SI and MI have larger R-squared values than LMI which denotes that the estimated wage can explain the labor equilibrium variation. This situation shows that the opportunity of increasing bargaining power of labor over wage in LMI is greater than the other two industries, SI and MI. Fourth, the LMI's determinant coefficient is lower than SI's and MI's determinant coefficient which represent the higher power of bargain of labor over wage in LMI. This condition gives a greater opportunity for labor in LMI to be enhanced compared to that in SI and MI. It implies that the wage inequality indeed matters in the labor market in Indonesia,

particularly in the three industrial groups, and tends to enlarge it among them. Government has to take care seriously on the industrial structure in connection with the labor bargaining power over wage in the labor market and, particularly, wage inequality issues. Considering the estimated coefficients, this study highly supports the traditional labor economics view that the output (marginal product of labor) is a dominant variable in determining the wage variable, particularly in SI and MI. In contrast, Svejnar's (1986) finding did not support the traditional labor economics view which states that the marginal revenue product curve of labor determines the bargaining solution.

This study indeed argues implicitly that the government's role in enhancing and matching the reasonable wage level between demand for labor as industries (demand side) and supply of labor as workers (supply side) of each industrial classification is highly needed, particularly in developing countries. More educational strategies aimed at increasing labor capacities through specialization programs expected can help establish a better condition to strengthen the power of bargain of labor over wage and the reasonable wage level of the industries in the labor market. This statement is really associated with the findings of Kampelmann et al. (2018). To provide opportunities for the labors and to create the dynamic scale economies of their production in the developing countries such as Indonesia, the role of the government is highly expected, particularly in Small and Micro Industries.

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