**Investigating Wage Bargaining Power of Labor, Wage Inequality and Industrial Structure in Indonesia**

**Abstract**

This study aims to investigate the bargaining power of labor over wages and the wage inequality among industries based on the industrial structure in Indonesia consisting of Large and Medium Industries, Small Industries as well as Micro Industries by using Panel Data Model. Prior studies merely concerned these issues within an industry without comparing them with the other industrial classifications. This study argues that wage inequality really matters among the industries although the bargaining power of labor over wage probably exists. 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.

**Keywords** Wage Bargaining Power, Wage Inequality, Industries, Panel Data Model

**JEL Classification Number**: J20, L16

**Abstrak**

Penelitian ini bertujuan meninvestigasi kekuatan tawar tenaga kerja terhadap upah dan ketimpangan upah di antara industri berdasarkan struktur industri di Indonesia terdiri dari Industri Besar dan Menengah, Industri Kecil, serta Industri Mikro dengan menggunakan Model Panel Data. Studi sebelumnya hanya tertuju pada masalah ini dalam suatu industri tanpa membandingkannya dengan klasifikasi industri lainnya. Studi ini berpendapat bahwa ketimpangan upah benar-benar terjadi di antara industri-industri tersebut, walaupun kekuatan tawar tenaga kerja terhadap upah mungkin ada. Studi ini juga telah menunjukkan titik kritis untuk kebijakan industri pemerintah di negara-negara berkembang yang terkait dengan masalah ini, khususnya di Indonesia.

Kata Kunci: Daya Tawar Per upah, Ketimpangan Upah, Industri, Model Data Panel

**JEL Classification Number**: J20, L16

**INTRODUCTION**

Wage bargaining power of labor and wage inequality issues of this study highly rely on the theoretical framework of labor demand and labor supply in the labor market. The interaction between demand for labor and supply of labor in the labor market is correlated with several important variables such as nominal wage, prices, expected price, education level, expertise of labor, and labor experiences (Dunlop & Higgins, 1942; Lindblom, 1948; Svejnar, 1986; Altman, 1995; Cerda, 2003; Pater, 2017; and Kampelmann et al., 2018). The changes of one or more of the variables in the labor market stimulate a condition of disequilibrium. The condition may lead to undesired societal reactions and demonstrations in terms of the assertion of more comfortable working conditions (supply side), termination of unilateral labor job by the company (demand side), and maybe the emergence of other conflicts of various interests between firms and labor. These issues finally have negative consequences on the economy as a whole (Audretsch, 2018; Grubb & Tremblay, 2015), particularly wage inequality. Coles and Mortensen (2011) stressed that the cost of labor recruitment is proportional to the labor of a firm and wage does not depend on the firm size, but the more productive labor is always paid with higher salaries. Moreover, Altman (1995) and Mankiw et al.(1992) also underlined pay inequality as the payment of different wage rates for labor of differing relative marginal productivities. It is stable over time depending on the degree to which effort intensity varies with changes in labor compensation and the extent to which labor productivity varies with effort intensity.

The fact of labor market indicators in Indonesia for the years 2008-2015 presents some critical points in which the levels of Indonesian Standard Industrial Classification (ISIC) of all Economic Activities are very low compared to the increasing labor force during this period. For the years 2008-2015, the number of ISIC’s economic activities in Indonesia decreased by 1950units. In addition, the change of the labor force in Indonesia during the period 2008-2013 increased significantly by 9.71 million (February) and 6.24 million (August). The absorption of labor force in small and micro industries in Indonesia, however, grew insignificantly by 1.6 million and 0.6 million, respectively. This suggests that the unemployment rate was relatively high for the years 2008-2013. Additionally, the increase of Human Development Index (HDI) of Indonesia from 2008 to 2013 was relatively small at 2.64 which indicated that the quality of human resources of Indonesia (Mankiw et al., 1992) was still far from the economic accelerator of development as a whole (CBS, 2016).

Besides, on average, the increase of the Regional Nominal Minimum Wage in Indonesia during the period 2008-2014 was relatively large per month, measuring at 763.057 Rupiahs. However, it was still relatively low according to the regional real minimum wage. This is caused by the implicit price deflator for GDP increase per month by 109.4 (GDP with oil and gas) and 109.7 (GDP without oil and gas). This essentially indicates that the regional real minimum wages of all provinces in Indonesia, on average, did not experience a significant increase. This shows that the economic condition of labor in Indonesia is trapped in the “money illusion” in which the bigger change in labor wages, the higher increase in prices. Table 1 presents the development of labor market indicators in Indonesia for the years 2008-2015.

**Table 1 Description of Labor Market Indicators of Indonesia, 2008-2015**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Indicators |   | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | Change |
| ISIC’s Economic Activities | Unit | 25694 | 24468 | 23345 | 23370 | 23592 | 23698 | 23744 |   | -1950 |
| 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 | 743174 | 841529 | 908824 | 988829 | 1088903 | 1296908 | 1506231 |  | 763057 |
| 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 PDB  | % | 237.6 | 257.3 | 278.5 | 301 | 314.3 | 328.2 | 347 |  | 109.4 |
| Implicit price deflator for PDB– |  |  |  |  |  |  |  |  |  |
| 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**: Own calculation (2018) based on Central Bureau of Statistic (CBS) of Indonesia, 2008-2015.

The important point that can be underlined in this study is that the interaction between demand for labor and supply of labor in the labor market depends on the intensity and the magnitude of relations between the existing crucial variables, whether they are from labor supply side (labor) or the demand for labor side (firm) (Svejnar, 1986; Lindblom, 1948). There is a fact in the developing countries that the intensity and magnitude of the firm’s monopoly power is stronger compared to the labor bargaining power over wage (see Table 1), especially in Indonesia

This study has some main purposes: (1) at the early stage of the study is to investigate the wage bargaining power of labor in the labor market in accordance with the types of industries in Indonesia; (2) to prove that the classical labor market theory relating to the marginal product of labor (labor productivity) is the main determinant of labor wage; (3) to examine the wage inequality based on the industrial structure among the three groups of industries in Indonesia; and (4) to investigate probable government involvement particularly in the developing countries where wage equality is still an issue in the labor market. The previous evidence has shown that the wages of the public sector has a positive correlation to that of the private sector (Córdoba et al., 2009; Gersbach & Schniewind, 2005). However, 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. His results suggested the efficient contract (vertical contact curve) as a probable dominant variable in establishing the outcome for many 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 wage bargaining power of labor and wage inequality which relies highly on the industrial classifications in Indonesia as a case study.

The rest of this study is organized as follows. Section 2 briefly expresses the conceptual framework of bargaining power and labor market theory in connection with the labor demand and the labor supply as well as the labor market equilibrium. Section 3 presents the research method of the study. Section 4 discusses the main results of the study, particularly the proper model to estimate wage and labor demand and supply in the labor market. Lastly, section 5 provides the concluding remarks and the implications of the study.

**BARGAINING POWER AND LABOR MARKET THEORY**

The definition of the term bargaining power is most commonly used in connection with the labor market by the economists. Marshall (1930) expressed that the term of bargaining power can be formulated as a general concept in relation to all the various forces which determine the wage rates in the labor market. According to Marshall, the dissimilarity in bargaining power of labor will result in the labor’s disadvantage which decreases his wages, thus decreasing his efficiency as a worker and consequently decreasing further his efficiency as a bargainer. The bargaining advantage of a factor can be formulated as where *Af* is the bargaining advantage of the factor; *Pf* is the actual price paid for the factor; *Spc* is the supply price of the factor under pure competition in all relevant markets; and *Dpc* is the demand price of the commodity under pure competition in all relevant markets, (Dunlop & Higgins, 1942). Marshall’s expression was then supported by Lindblom (1948) with some major conclusions from his study, namely (1) the wage rates or prices are not merely determined by the bargaining power;(2) the bargaining power includes all the forces influencing the determination of wage or price; (3)the power antithesis between price determination by human forces and by economic laws is false; (4) inequality or advantage has to be measured relatively to a specified level and tendency of wage rate or price movement as well as relatively to time; (5) power over wages or prices together with the inequality or advantage in bargaining power cannot be explained as a strategic strength or potential excluding motives or desires to use it.

 Dunlop and Higgins (1942) previously emphasized that bargaining power discloses many factors with respect to determining the inequalities in the labor market. They also differentiated the concepts of “determining” and “resultant” bargaining power as well as the bargaining power measurements. Determining concept of bargaining power can be influenced by several factors which may be interconnected. Those are (1) tastes of workers and employers in connection with wages and man-hours bought and sold (the indifference maps) as well as institutional factors including property rights and wage-hour legislation. The change of these factors will influence demand and supply; (2) market conditions particularly on the extent of and type of competition in the labor market, the product market, as well as the markets for complementary and competitive factors of production; (3) pure bargaining power with respect to the ability to reach favorable bargains excluding market conditions. On the other hand, a resultant concept is to assess the bargaining power by the resulting wage (the actual wage) rather than by the forces behind a wage. Based on the major two concepts, Dunlop and Higgins formulated the interaction with a general equilibrium approach to make the analysis more realistic.

 It will be noted that this study does not elaborate the formula of Dunlop & Higgins' (1942) and Lindblom's (1948) expressions from the previous studies, but it attempts to focus merely on the labor market equilibrium with regard to the classical view of bargaining power in determining the wage and labor equilibrium in the labor market (the interaction of labor supply or workers and labor demand or industries) and more on wage inequality based on industrial structure. In brief, this study does not explore the labor problem with respect to the institutional approaches (Woodbury, 1987) and the bargaining process in the labor market (Cross, 1965).Hence, the further sub-sections of this study attempt to describe only the interrelated main variables in labor market equilibrium, both demand for labor and supply of labor.

***Demand for Labor***

Branson (1989),Boadway and Bruce (1991), and Altman (1995) emphasized that a firm will increase its labor as a result of the increase in output with the MPL (Marginal Product of Labor) or A firm in a competitive market with a specific price level can increase its revenue as a result of the increase in labor. This can be expressed as follows:

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whererefers to the Marginal Value Product of the labor (MVPL). In addition, an increase in the production cost of a firm or is caused by the additional labor (W.. Hence, the equilibrium condition of labor and the demand function for labor of a firm can be expressed as follows; (1) if the change of the firm’s total revenue is larger than the change of the total cost and then the firm, at a maximum profit, increases labor; (2) if the firm does not increase the number of labor because the change of the total cost is larger than the change of the firm’s total revenue. Furthermore, (3)if the firm will continue increasing in labor until the change of the total revenue equals to the change of the total cost. This condition can be reformulated as follows:

or …………………………………………………… 2

where *w* refers to the real wage rate. The demand function for labor based on equation 2 illustrates that the firm will increase the number of labor in the production process if  or. On the contrary, the firm will reduce the number of labor in the production process if the opposite occurs.

To analyze the labor absorption by a firm, this study uses the demand for labor function which is obtained from the derivation process by using the maximum profit function (Han & Kim, 2018; Chambers, 1994; Branson, 1989), in which the maximum profit function is:

 π = TR – TC 3

π refers to the obtained maximum profit of a firm, TR and TCare total revenue and total cost of the production process, respectively. The total revenue can be derivedfrom the multiplication of the quantity of output (Q) produced and the price level of output (P) and can be expressedas the following:

TR = P.Q 4

Meanwhile, the total cost (TC) is a constraint for the firm in the production process in which *w* and *r* are the prices of the labor and the capital, respectively. The stuctural equation of the total cost can be expressed as follows:

TC = wL + rK 5

Next, equations 4 and 5 are substituted into equation 3 to obtain the maximum profit function as shown below:

$π=\left(P.Q\right)- (wL-rK)$ 6

where output (Q) reflects a production function highly dependent on labor and capital. In this context, the production function used in this study is the Cobb-Douglas production function;$ Q= A.K^{α}.L^{β}$. If the production function is substituted on the maximum profit function (equation 6), then the maximum profit function becomes:

$π=P.AK^{α}L^{β}- wL-rK$ 7

Obtaining the demand function for the labor of a firm can be done by deriving the maximum profit function from equation 7 against labor (L):

$\frac{∂π}{∂L}=P\frac{∂Q}{∂L}-w\frac{∂L}{∂L}-r\frac{∂K}{∂L} =0$ 8

or

$\frac{∂π}{∂L}=P.A.K^{α}L^{β-1}-w\frac{∂L}{∂L}-r\frac{∂K}{∂L} =0$……………………..…………………..………….. 9

In the end, the function of demand for labor of a firm with respect to the panel data model (PDM)can be represented as follows:

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Where *i* indexes firms and *t* indexes years; *Lit* is the demand for labor (labor absorption), *pit* is the price level, *Qit* is the outputs, and *wit-1* is the wage rates. A simple Cobb-Douglas production function is assumed.

***Supply of Labor***

Basically, the supply of labor is influenced by a person’s desire to get more real income and has more free time (backward bending supply curve). The formation of the supply of labor highly deals with the utility function (Branson, 1989; Deaton & Muellbauer, 1989; Boadway & Bruce, 1991). The simple pattern of utility function of labor can be expressed as:

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where *U* stands for the utility of labor,is the expected real income, and *S* refers to leisure of labor. The simple utility function of labor is subjected to the expected real income.

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where *T* refers to the total hours available to the labor, and *T-S* reflects the number of working hours. In this study, we assume a homogeneous labor force with a single wage rate and we can reformulate mathematically the labor-supply in the form of panel data model (PDM). To simplify the panel data model of this study, it is assumed that the labor utility is equal to the expected real labor wage or the nominal wage divided by the expected price. Hence, the number of labor working hours is not incorporated in this model. The limitation of the secondary data is the main reason why the labor working hours are excluded from the formulation of this study. However, this condition does not reduce the main issue that this study focuses on wage bargaining power of labor, wage inequality, industrial structure. The supply of labor can be formulated in a general form with nominal wage as the most important variable in this labor supply model as shown in the following:

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where *i* indexes firms and *t* indexes years; *Lit* is the number of labor supply, is the expected real labor wage and equals to the nominal wage divided by the expected price, thus *g(L)* refers to the output produced by labor.

***The Equilibrium in the Labor Market***

To determine the equilibrium condition in the labor market, equations 10 and 13 above can be utilized. The equilibrium formula of wage and the number of labors supplied and demanded with respect to the panel data model (PDM) can be expressed in equations 14 and 15 as follows:

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and ………………………….………….……....15

where we assume that  equals to 1. It means that there is a complete and correct adjustment of to p, as p rises from, moves by the same proportion, leaving the ratio /p unchanged. This condition shows that labor demand and supply move together with the price level changes, leaving employment and the real wage unchanged. In brief, the nominal wage constitutes the function of squared output produced multiplied by the price level. Furthermore, the labor equilibrium represents a function of nominal wage because of  or the real wage.

**RESEARCH METHOD**

 The critical questions of this study address on whether the wage bargaining power of labor 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 directly focuses on the wage and labor equilibrium state in the labor market with the different classifications of industries. The industries are classified into three groups, namely (1) Large and Medium Industries (LMI) consisting of 24 industries for the years 2008-2013, (2) Small Industries (SI), and (3) Micro Industries (MI) including 23 industries each for the period 2010 to 2015, respectively. The data are obtained from the Central Bureau of Statistics (CBS) of Indonesia in line with the Indonesian Standard Industrial Classification (ISIC) based on the annual Large-Medium Industry Survey and Small-Micro Industry Survey. Wages (W) in this study stands for the expenditures for labor by industries in billion rupiahs for Large and Medium Industries and million rupiahs for Small and Micro Industries; Output (Q) refers to the Large-Medium Industries’ value of output according to a double-digit of the ISIC in billion rupiahs for Large and Medium Industries and million rupiahs for Small and Micro 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 17. 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 18. The labor data used in this study is the number of labor used by each industry. Descriptive statistical indicators of the main variables observed in the three classified industries in this study are represented in Table 2.

**Table 2 Descriptive Statistical Indicators of the Main Variables of Study**

|  |  |  |  |
| --- | --- | --- | --- |
| Statistic | Large-Medium Industries (LMI) | Small Industries (SI) | Micro Industries (MI) |
| Indicators | L | O | W | P (VA) | L | O | W | P (VA) | L | O | W | P (VA) |
|  Mean | 188930 | 101375 | 5260.45 | 39896.4 | 127221 | 8374859 | 1338638 | 3266588 | 240067 | 7294385 | 717142 | 3158256 |
|  Median | 150125 | 65663.5 | 3843 | 29979.5 | 19554.5 | 1764931 | 251114 | 819616 | 48021.5 | 1102982 | 138175 | 563290 |
|  Maximum | 884602 | 722022 | 37356 | 224526 | 1248771 | 1.20E+08 | 1.5E+07 | 3.7E+07 | 2926612 | 1.37E+08 | 6089148 | 4.9E+07 |
|  Minimum | 5844 | 3509 | 124 | 907 | 6 | 52 | 4 | 33 | 56 | 5704 | 234 | 880 |
|  Std. Dev. | 178637 | 122740 | 5375.61 | 40466.5 | 220221 | 1.8E+07 | 2402191 | 5790217 | 487289 | 1.7E+07 | 1249953 | 6584214 |
|  Skewness | 1.69397 | 2.96464 | 3.01081 | 2.20649 | 2.74332 | 4.16667 | 2.86541 | 3.20592 | 3.16625 | 4.84231 | 2.24122 | 3.93254 |
|  Kurtosis | 5.73079 | 13.5416 | 14.9583 | 9.05033 | 11.1132 | 23.0903 | 12.6366 | 15.2937 | 13.5589 | 30.98 | 7.70795 | 22.1939 |
|  Jarque-Bera | 113.612 | 877.685 | 1075.57 | 336.486 | 551.585 | 2720.12 | 722.813 | 1105.42 | 871.642 | 5040.87 | 242.979 | 2474.02 |
|  Probability | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
|  Sum | 2.7E+07 | 1.5E+07 | 757505 | 5745086 | 1.8E+07 | 1.16E+09 | 1.85E+08 | 4.51E+08 | 3.3E+07 | 1.01E+09 | 9.9E+07 | 4.36E+08 |
|  SS. Dev. | 4.56E+12 | 2.15E+12 | 4.13E+09 | 2.34E+11 | 6.64E+12 | 4.30E+16 | 7.91E+14 | 4.59E+15 | 3.25E+13 | 4.11E+16 | 2.14E+14 | 5.94E+15 |
|  Obs | 144 | 144 | 144 | 144 | 138 | 138 | 138 | 138 | 138 | 138 | 138 | 138 |

**Source**: Own calculation (2018) based on Central Bureau of Statistic (CBS) of Indonesia, 2008-2015.

Then, using equations 17 and 18, this study also enables the writer to make the comparison in terms of the inequality in wage bargaining power and labor equilibrium (demand for and supply of labor) in the labor market based on industrial structure, particularly in each industry classification. Equations 17 and 18 used in this study are as follows:

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and

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where refers to the equilibrium of estimated nominal wage of each industry (*i*) at the period of time (*t*) in the labor market. In addition, stands for the equilibrium of supply and demand of labor of each industry (*i*) at the period of time (*t*) as a function of the predicted nominal wage of industries. To sum up the results of labor bargaining power over wage in the labor market, this study concentrates on the sign of the regression coefficient of estimated nominal wage from the result of panel data model. If the sign of its coefficient is positive (> 0), it will be concluded that the labor has great bargaining power over wage. Otherwise, if the sign of wage coefficient is negative (< 0), then the wage bargaining power of labor is weak. In general, larger positive sign of the expected nominal wage coefficient means greater labor bargaining power over wage in the labor market. Theoretically, the traditional labor economics underlines that the bargaining solution lies on the marginal revenue product of labor,, (equations 1 and 2) or  and  (Branson, 1989).

**FINDINGS AND DISCUSSION**

* 1. ***The Proper Model to Estimate Wage Equilibrium in the Labor Market and Estimated Coefficients***

This study starts with selecting the appropriate model to estimate the wage equilibrium in the labor market of each industry based on equation 17. First, the testing results from the panel data models show that the proper model used to perform better estimation of the wage equilibrium in large and medium industry (LMI) is the Random Effect Model (REM).The results are illustrated by the Chow test (Likelihood Ratio Test) with a significant value of F-statistic (p-value = 0.0079 <0.05) and represented by the Hausman test with an insignificant value of Chi-square statistic (p-value = 0.7499 > 0.05). Second, the appropriate estimation model for small industry (SI) classification is the Random Effect Model (REM) as well. This is shown by the value of Chow test (Likelihood Ratio Test) which has a significant value of F-statistic (p-value = 0.00950 < 0.05) and indicated by the Hausman test which has an insignificant Chi-square statistic (p-value = 0.6128 > 0.05). The last, the better estimation model for micro industries (MI) classification used in this study is, however, the Fixed Effect Model (REM). This was caused by the Chow test (Likelihood Ratio Test) which has an insignificant F-statistic value (p-value = 0.1142 > 0.05) and affected by the Hausman test which has a significant Chi-square statistic (p-value = 0.0182< 0.05).In summary, we may restate the major points reached in this study as expressed below by Table 3.

**Table 3 The Proper Model for Estimating Wage Equilibrium in the Labor Market of Indonesia, 2008-2015**

|  |  |  |
| --- | --- | --- |
| **Type of Industry** | **Tests for Proper Estimate Model of Wage Equilibrium** | Summary |
| Large & Medium | **Chow Test (LR Test)** | Statistic | d.f. | Probability |  |
| (LMI) | Cross-section F | 1.996655 | -24,120 | 0.0079 | REM |
|  | Cross-section Chi-Square | 49.055166 | 24 | 0.0019 |
|  | **Hausman Test** | Chi-Sq. Statistic | Chi-Sq. d.f. | Probability |
|  | Cross-section random | 0.101588 | 1 | 0.7499 |
| Small Industry | **Chow Test (LR Test)** | Statistic | d.f. | Probability | REM |
| (SI) | Cross-section F | 1.479669 | -22,114 | 0.0095 |
|  | Cross-section Chi-square | 34.66377 | 23 | 0.0042 |
|  | **Hausman Test** | Chi-Sq. Statistic | Chi-Sq. d.f. | Probability |
|  | Cross-section random | 0.25613 | 1 | 0.6128 |
| Micro Industry | **Chow Test (LR Test)** | Statistic | d.f. | Probability | FEM |
| (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 | 0.0182 |

**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) 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 for the period 2010 to 2015, respectively, (3). To choose a better estimation model between Pooled Least Square/Common Effect Model and Fixed Effect Model, 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 Fixed Effect Model. On the contrary, Common Effect Model will be used. In addition, the Hausman test will be performed to decide whether Random Effect Model or Fixed Effect Model. When the value of Chi-Squares- statistic > the critical value of Chi-Squares or the probability-value <the 5% significance level is significant, Fixed Effect Model is a proper panel data model to estimate. But, if it is not significant, Random Effect Model will be used as the estimated panel data model.

Industry-specific estimates of equation 17 are reported in Table 4. The econometric results indicate that all panel data model estimates of output (SqrPQ) of each industry in Table 4 are positive and significantly different from zero. Moreover, the estimated coefficient of Large and Medium Industries (LMI-REM) is higher than the others, namely Small Industries (SI-REM) and Micro Industries (MI-FEM). It means that the labor bargaining power over wage in the three types of industries has a positive direction with increasing labor output. This is highly correlated with the classical labor economic view in which the wage level of labor depends positively on the marginal product of labor. However, the bargaining position of labor in Large and Medium Industries is relatively stronger than that in the two other industrial groups. In addition to the positive estimates of output, the effect of output at the constant level of industries (no change of industries’ output), the wage equilibrium of each industry will also increase positively in accordance with the different levels of industries. This means that the marginal product of labor will keep on increasing the labor wage level. In summary, there is a sound indication of the positive coefficients regression of the panel data model of the industries where the labor wage bargaining power in the labor market is relatively strong in different levels of each industry. This situation induces a sustained wage inequality among them which becomes as a serious problem for socio-economic development in developing countries in general, particularly Indonesia.

**Table 4 Estimated Coefficients of Wage Equilibrium of Industries by Using Panel Data Models in Indonesia, 2008-2015**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Variables |   | LMI-REM | SI-REM | MI-FEM |
| Constant | Coefficient | 85087.59 | 42330.57 | 51583.68 |
|  | Standard Error | 16793.11 | 7397.713 | 14346.5 |
|  | t-Statistic | 5.066817 | 5.722116 | 3.59556 |
|  | Probability | 0.0000 | 0.0000 | 0.0005 |
| SqrPQ | Coefficient | 0.981492 | 0.010091 | 0.02525 |
|  | Standard Error | 0.083747 | 0.000926 | 0.0015 |
|  | t-Statistic | 11.71968 | 10.89719 | 16.82812 |
|  | Probability | 0.0000 | 0.0000 | 0.0000 |
| Cross-section random | Standard Deviation | 51595.02 | 37831.87 |  |
|  | Rho | 0.1553 | 0.0815 |  |
| Idiosyncratic random | Standard Deviation | 120330.7 | 126972.2 |  |
|  | Rho | 0.8447 | 0.9185 |  |
| Weighted Statistics | R-squared | 0.49023 | 0.645854 | 0.825602 |
|  | Adjusted R-squared | 0.48669 | 0.64325 | 0.790416 |
|  | S.E. of regression | 119839.1 | 126624.4 | 222014.9 |
|  | F-statistic | 138.4802 | 248.0224 | 23.4642 |
|  | Prob (F-statistic) | 0.0000 | 0.0000 | 0.0000 |
|  | Mean dependent variable | 129393.9 | 101063.6 | 239048.2 |
|  | S.D. dependent variable | 167048.2 | 211999.8 | 484957.2 |
|  | Sum squared residual | 2.07E+12 | 2.18E+12 | 5.62E+12 |
|  | Durbin-Watson stat | 1.171286 | 1.855552 | 1.985379 |
| Unweighted Statistics | R-squared | 0.465083 | 0.640471 |  |
|  | Sum squared residual | 2.43E+12 | 2.36E+12 |  |
|  | Mean dependent variable | 187420.2 | 125117.4 |  |
|  | Durbin-Watson stat | 0.996179 | 1.712432 |  |
| Effects Specification | Log likelihood |  |  | -1881.48 |
| Cross-section fixed (DV) | Akaike info criterion |  |  | 27.61565 |
|  | Schwarz criterion |  |  | 28.12474 |
|   | Hannan-Quinn criter. |   |   | 27.82253 |

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

**Notes**: (1) Large and Medium Industries- Random Effect Model (LMI-REM), Small Industries- Random Effect Model (SI-REM), Micro Industries-Fixed Effect Model (MI-FEM), 2). (a) Large and Medium Industries (LMI) consisting of 24industries 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.

In terms of the determinant coefficient (R2) of each industry based on weighted statistics, Large and Medium Industries have the smallest value of R2 compared to Small and Micro Industries. This condition illustrates that the wage bargaining power of the labor in Large and Medium Industries is highly likely to increase. This is due to the value of its determinant coefficient of 0.49023 (49.023%) which indicates the ability of external variables (excluding output variable) to explain the variation of wage level about 0.50977 (50.977%) by its panel data model. Therefore, perhaps, the role of government regulations in determining the fair wage level between industries (demand side) and labor (supply side) or educational regulations for labors to increase their capability in the labor market is potentially able to help establish a better condition for the labor wage bargaining power in the future labor market, particularly in Small and Micro Industries. On the other hand, the government has to broaden the opportunities for labors at the level of Small and Micro Industries as well as to deal with increasing dynamic scale economies of their production which is highly supported by additional capital. Hopefully, the Small and Micro Industries can increase their productivity through the quality of labor. Waldman and Jensen (1998) classified the sources of economies of scale into three classifications, namely (i) at the product level (specialization and division of labor); (ii) at the plant level (the size of processing unit and economies of massed reserves), and (iii) at the multi-plant level (relatively high transportation costs relative to value/the geographic market, multiple products, and national advertisement instead of local which enable firms to utilize national or world capital markets instead of local markets).

* 1. ***The Proper Model to Estimate Labor Equilibrium in the Labor Market and Estimated Coefficients***

Before interpreting the estimation results from the labor equilibrium side (equation 18), this study must decide the appropriate model specification among the different industrial groups by means of equation 18 reported in Table 5. In general, the model used for the three types of industries is the Random Effect Model (REM) as a proper model to estimate the labor equilibrium. This is further strengthened by the Chow test (Likelihood Ratio Test) which has a significant value of F-statistic as well as the Hausman test with an insignificant value of Chi-square statistic. The values of Chow test (Likelihood Ratio Test) and Hausman test are presented in Table 5 as follows:

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

|  |  |  |
| --- | --- | --- |
| Types of Industry | **Tests for Proper Estimate 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 | REM |
|  | 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 |
| Small Industry | Chow Test (LR Test) | Statistic | d.f. | Probability | REM |
| (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 |
| Micro Industry | Chow Test (LR Test) | Statistic | d.f. | Probability | REM |
| (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 |

**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) 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 for the period 2010 to 2015, respectively.

The Random Effect Model estimates from equation 18 are presented in Table 6. The estimation results tell us that all panel data model estimates work as a function of the estimated wage level (West) of each industry, have positive values, and are significantly different from zero. However, Table 6 shows that the estimation results of LMI are greater than those of Small and Micro Industries. It can be concluded from this empirical study that the demand for and supply of labor in Large and Medium Industries is greater compared to that in the other two industrial groups. In other words, the labor demand and supply in Small and Micro Industries are lesser compared to those in Large and Medium Industries.

**Table 6 Estimated Coefficients of Labor Equilibrium of Industries by Using Panel Data Models in Indonesia, 2008-2015**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Variables |   | LMI-REM | SI-REM | MI-REM |
| Constant | Coefficient | 82814.04 | 42330.57 | 55308.71 |
|  | Standard Error | 18157.95 | 14381.9 | 23743.62 |
|  | t-Statistic | 4.560758 | 2.943323 | 2.329414 |
|  | Probability | 0.0000 | 0.0038 | 0.0213 |
| West | Coefficient | 0.996283 | 0.010091 | 0.024748 |
|  | Standard Error | 0.076044 | 0.000642 | 0.001112 |
|  | t-Statistic | 13.10144 | 15.7056 | 22.25797 |
|  | Probability | 0.0000 | 0.0000 | 0.0000 |
| Cross-section random | Standard Deviation | 67856.25 | 37831.87 | 56427.19 |
|  | Rho | 0.2727 | 0.0815 | 0.0607 |
| Idiosyncratic random | Standard Deviation | 110826.7 | 126972.2 | 222014.9 |
|  | Rho | 0.7273 | 0.9185 | 0.9393 |
| Weighted Statistics | R-squared | 0.545511 | 0.645854 | 0.783643 |
|  | Adjusted R-squared | 0.542355 | 0.64325 | 0.782052 |
|  | S.E. of regression | 110443.9 | 126624.4 | 222651 |
|  | F-statistic | 172.8397 | 248.0224 | 492.5907 |
|  | Prob (F-statistic) | 0.0000 | 0.0000 | 0.0000 |
|  | Mean dependent variable | 103521.8 | 101063.6 | 202934.6 |
|  | S.D. dependent variable | 163370.2 | 211999.8 | 476923 |
|  | Sum squared residual | 1.76E+12 | 2.18E+12 | 6.74E+12 |
|  | Durbin-Watson stat | 1.301788 | 1.855552 | 1.655648 |
| Unweighted Statistics | R-squared | 0.476127 | 0.640471 | 0.777354 |
|  | Sum squared residual | 2.39E+12 | 2.36E+12 | 7.17E+12 |
|  | Mean dependent variable | 184747.6 | 125117.4 | 239048.2 |
|   | Durbin-Watson stat | 0.957641 | 1.712432 | 1.556013 |

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

**Notes**: (1) Large and Medium Industries- Random Effect Model (LMI-REM), Small Industries- Random Effect Model (SI-REM), Micro Industries-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

In addition to the different estimation results of the three industries as shown in Table 6, the determinant coefficients (R-squared based on weighted statistics) of the three industries also vary in values. Micro and Small Industries have a higher value of 0.783643 (78.36%) and 0.645854 (64.59%), respectively, compared to Large and Medium Industries with the value of 0.545511 (54.55%). It means that the estimated wage variable in Micro and Small Industries can explain the variation in labor equilibrium variable which is stronger than the Large and Medium Industries as presented in Table 6. On the other hand, the determinant coefficient of Large and Medium Industries is 54.55% which reflects the weakness of the estimated wage variable in explaining the variation of the labor equilibrium variable. It implies that the other unknown main variables, excluding the estimated wage from the panel data model (LMI-REM), is likely to provide strong explanation of variation in the labor equilibrium in Large and Medium Industries (around 45.45%). In summary, the labor demand and supply in Large and Medium Industries is still highly likely to increase because the other main variables are still not included in this model. Hence, the intense supports from the government such as enhancing the quality of labor education in terms of the specialization and division of labor is indeed needed to improve the quality of the labor equilibrium in the labor market in Indonesia, particularly Small and Micro Industries.

**CONCLUSION**

 Several points can be underlined from this empirical study. First, the effect of output on the wage equilibrium in Large and Medium Industries is higher than that in Small and Micro Industries. Second, wage bargaining power of labor in Large and Medium Industries 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 Large and Medium Industries compared to the other industries. In other words, the labor bargaining power over wage in Large and Medium Industries is greater than that of the other two industries. Third, Micro and Small Industries have a higher value of R-squared compared to Large and Medium Industries which indicates that the estimated wage variable can explain the variation in labor equilibrium variable. This situation shows that the opportunity of increasing wage bargaining power of labor in Large and Medium Industries is greater than the other two industries (Micro and Small Industries). Fourth, the determinant coefficient of Large and Medium Industries is the lowest which implies that the other unknown main variables, excluding the estimated wage, are very likely to explain the variation in the labor equilibrium. In conclusion, the labor bargaining power over wage in Large and Medium Industries still has greater probability to be increased compared to that in Small and Micro Industries. It implies that the wage inequality still matters in the labor market, particularly in the three industrial groups, and tends to enlarge among them. Government has to take care seriously on the industrial structure with regard to wage bargaining power of labor and particularly wage inequality.

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 Small and Micro Industries. Then, the estimated wage variable is positively correlated to the labor equilibrium. This merely takes place in Large and Medium Industries because this industrial group’s estimated coefficients are higher than those in the other groups. In addition, the other unknown main variables which are not included in LMI-REM can explain the variation in the labor equilibrium of around 45.45%. This represents that there are other main variables, excluding the existing panel data model of LMI-REM, which play a role in increasing the labor bargaining power in Large and Medium Industries. On the other hand, Small and Micro Industries have the same small values of estimated coefficient of their panel data models but their R-squared are relatively high. In summary, the labor bargaining power and labor equilibrium (demand for and supply of labor) in these two industries is lesser which is denoted by their estimated coefficients in Table 6 and the presented output (marginal productivity of labor). The estimated wage level variables of their panel data model constitute the main variables which can explain the variation of the labor equilibrium variable about 64.59% (SI-REM) and 78.36% (MI-REM). Only 35.41% and 21.64%, respectively, the variations of labor equilibrium are explained by the other external variables of the panel data model.

This study indeed argued that the role of the government in improving and equalizing the fair wage level between industries (demand side) and labor (supply side) of each industrial classification is highly needed, particularly in developing countries. Maybe, more educational strategies aimed at increasing labor capacities through specialization programs can potentially help establish a better condition to strengthen the wage bargaining power of labor and the fair wage level of the industries in the labor market. To provide improved opportunities for the labors and to establish 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.

Last but not least, due to the limited availability of relevant data from the CBS of Indonesia, one of the critical points of this study can be considered for further empirical research. In addition, the supply of labor, theoretically, depends on the utility function of labor which includes the total hours available of workers (the leisure of workers) and other specific characteristics of labor such as attained education and training, expected inflation, etc. In this context, the formula of labor supply function becomes more complex and could also be formulated in a dual form of the mathematical function. Therefore, a further study could involve those functions in an in-depth investigation of the problem pertaining to the wage bargaining power of labor and wage inequality based on industrial structure. However, the next stage of this study will utilize the optimality of the wage bargaining power of labor and reducing the wage inequality of Small and Micro Industries in order to keep up with Large and Medium Industries in Indonesia. Moreover, the future study will investigate these issues from a dynamic perspective with input transformation as the main determinant variable of the demand for labor.

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