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Determinants of Unemployment in the Large and Medium Industrial Sector in Indonesia

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Abstract

As a country with the second-highest unemployment rate, Indonesian policymakers should worry about this condition. Based on the macroeconomic perspective, unemployment is affected by the firms' labour demand. It highlights that the firm's profit or loss highly determines the labour force demand. This paper aims to analyze the efficiency of the use of foreign capital and domestic capital to reduce the unemployment rate. Using the Fixed Effect Model, this study results show that the labour force significantly affects industrial output, and the changes of industrial output highly increase the labour demand in the market. However, foreign and domestic capital neither significantly reduce unemployment rate in Indonesia nor stimulate the large and medium industries to absorb labour in the market. The Government should utilize foreign and domestic capital efficiently as possible to reduce unemployment rate.

Keywords: Unemployment, labor demand theory, fixed effect model

1. Introduction

Unemployment is one of the indicators of a country's development; a low unemployment rate is a benchmark for a government's success in managing the country's life; besides that, unemployment is an indication that the state is unable to fulfil its citizens' rights, as stated in Article 27 paragraph 2 of the 1945 Constitution, "Every citizen is entitled to a decent job and a livelihood for humanity." It's no wonder that this has always been the state's top important objective, as stated in number 3 of the National Long-Term Development Plan (RPJP) 2005-2025, which is to decrease poverty and unemployment. Moreover, the unemployment rate is one of the indicators used to measure progress towards the eighth Sustainable Development Goal (SDG), which aims to encourage inclusive and sustainable economic growth, productive employment and total employment absorption, and decent work for all.

Unemployment is a direct challenge to every country's economic and social stability, obstructing its human and economic progress. According to economic literature, unemployment raises the chance of poverty and leads to inequality (Abouelfarag & Qutb, 2020). Losing a job will result in a decline in quality of life, which will impact psychological pressure and negative societal attitudes or even relatives that believe unemployment is "community waste," which will exacerbate the unemployment's psychological stress. Not to mention the societal consequences of unemployment that will occur if no solutions are found, such as higher crime rates, suicides, and so on.

According to World Bank data, Indonesia has the second-highest unemployment rate among ASEAN member countries, averaging 4.403 per cent from 2010 to 2020. Of course, the government must be concerned about this; to minimize the unemployment rate, various steps must be made to ensure that this figure does not rise, resulting in poverty in Indonesia. The absorption of industrial sector labour into the national labour force is also low, with the absorption of the labour force in large and medium industries (LMI) at 3.98 per cent in 2008 and 4.59 per cent in 2018, a 0.61 per cent rise. This shows that the absorption of labor in LMI (in Table 1) is increasing from year to year, while unemployment in the industrial sector is decreasing.

Table 1: Development of Employment data on LMI

							1 -						
		2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	Change
LMI's Labor	%	3.98	3.82	3.86	3.99	4.11	4.16	4.25	4.29	5.09	5.17	4.59	0.61
Absorption													
LMI's	%	96.02	96.18	96.14	96.01	95.89	95.84	95.75	95.71	94.91	94.83	95.41	-0.61
Unemployment													

Source: Central Bureau of Statistics (2021)

Large industries have a total workforce of more than 100 people, while medium enterprises have a force of 20 to 99 individuals. This is based on the number of workers, not on whether the company utilizes machines or not, and not on the amount of capital the company has (BPS, 2021). The conventional classification of Indonesian Standard Industrial Classification (ISIC), based on economic activities, divides large and medium businesses into many sectors. LMI have 24 ISIC, namely as given in Table 2.

Table 2: Indonesian Standard Industrial Classification

Number	Description	Number	Description	Number	Description
(10-2015)	Food	(18-2015)	Printing and Reproduction of Recording Media	(26-2015)	Computers, Electronics and Optics
(11-2015)	Drink	(19-2015)	Products from Coal and Petroleum Refining	(27-2015)	Electrical Equipment
(12-2015)	Tobacco Processing	(20-2015)	Chemicals and Goods from Chemicals	(28-2015)	Machinery and Equipment
(13-2015)	Textile	(21-2015)	Pharmaceuticals, Chemical and Traditional Medicine Products	(29-2015)	Motor Vehicles, Trailers and Semi Trailers
(14-2015)	Apparel	(22-2015)	Rubber, Rubber and Plastic Goods	(30-2015)	Other Means of Transportation
(15-2015)	Leather, Leather and Footwear	(23-2015)	Nonmetallic Digging Items	(31-2015)	Furniture
(16-2015)	Wood, Goods from Wood and Cork and Woven Goods from Bamboo, Rattan and the like	(24-2015)	Base Metals	(32-2015)	Other Processing
(17-2015)	Paper and Goods from Paper	(25-2015)	Metal Goods, Not Machinery and Equipment	(33-2015)	Repair and Installation Services of Machinery and Equipment

Source: Central Bureau of Statistics (2021)

Inviting investors to invest in the country will influence the unemployment rate. As a result of the influx of capital, the labour market will be absorbed, reducing the country's unemployment rate. Domestic investment (PMDN) and foreign direct investment (PMA) are two types of investment in Indonesia. Most policymakers want to improve the benefits of the labour market, and attracting investment is viewed as an essential strategy for many nations to improve local labour market conditions (Dinga &Münich, 2010). Investment (capital) and labour are a function of output, where Q = K.L and a company's / industrial sector's revenue is generated through this output. If the firm's profit is decreased by the expenditures incurred, and the result is positive (profit), the company will add input in the form of capital or labour; if the effect is negative (loss), the company will cut capital or labour. However, the only factor of production that may be added (reduced) is labour in the short term. The relationship between investment (capital) and working labour will be evident with the unemployed due to this output.

On the one hand, introducing the minimum wage can boost worker welfare, but on the other side, it will raise unemployment. Companies or employers will respond rationally to the existence of this minimum wage policy; if the minimum wage remains below the cost of producing a good or service, the possibility of employment termination will below; however, if the minimum wage is applied to the point where the cost of production exceeds the revenue received by the company, the most logical step in the short term is to terminate employment.

The author will perform a study on the impact of investment, labour, output prices, industrial output, and minimum wage on unemployment in Indonesia's industrial sector, based on the context of the problem as indicated above.

2. Literature Review

The notion of maximal behavior of the company or worker explains how the demand for labour in the company and the supply of labour from workers are explained. Both economic actors are considered to act to maximize their profit potential.

The marginal product of labour (MVP_L) value is the price of output multiplied by marginal effects $(MVP_L = PQ \times MPL)$ in a perfect competition market with a product price level as high as PQ. On the other hand, adding a worker costs the company the same amount as worker W nominal wage rate. If the MVP_L value is greater than the W nominal pay rate, the corporation will hire more people and vice versa. Companies that want to maximise profits will employ many people until they reach a situation where the nominal salary and the marginal product value of labour are identical. As more workers are hired, MVP_L will continue to fall, causing the labour demand curve to shift downward.

Wage rate changes will have an impact on the company's production expenses. This will cause the corporation to raise the selling price of its manufactured items; however, consumers will respond to the price increase by lowering their consumption or possibly refusing to buy at all. Companies will expect wage hikes in the short run by limiting production output. As a result of the lower production plan, the required labour force will be reduced. Companies will respond to wage rises in the long run by adjusting inputs, including deploying cutting-edge technology and replacing labour with machines or robots.

According to Fields (1994), the minimum wage is the lowest wage that an employer can pay or accept any worker. It is caused by the union engaging in collective bargaining and raising the wages of its members, the government paying their employees higher salaries than they might earn elsewhere or other institutional interventions. Salary companies are considered a cost burden. Thus, wage restrictions corresponding to the value of MPL are set to encourage enterprises to operate correctly. However, because some workers' wages are currently more significant than the marginal value of the products they create, the government's minimum wage policy would increase the average salary level of workers. As a result, the company's headcount will be reduced in the short term, resulting in job losses because the substitution effect and wage output function in the same direction; Wang & Gunderson (2012) found that raising the minimum wage would lower labour demand and hence hire low-paid workers. Companies must replace other inputs for labour or lower output due to higher labour expenses due to a higher minimum wage.

Changes in medium to long-term unemployment are closely correlated with medium- to long-term changes in private investment, according to Modigliani's theory, a natural manifestation of a Keynesian paradigm in which changes in autonomous investment are the driving force behind the movement of output and employment. (Herbertsson &Zoega, 2002)

Private overseas investment and public development assistance are two examples of international financial flows. Portfolios and direct investments are two types of foreign investment. This type of portfolio investment does not provide direct control over the company. In contrast, PMA from multinational corporations gives you direct ownership and control of the company in the host country (Quer et al., 2012).

In his writings, Elder-Vass (2019) contends that lay theories of value or value theories that the community/customer genuinely utilizes as an actor in appraising things are more effective. Economic value is defined in this theory as the amount of money that must be exchanged for something. It is a subjective number because various persons can have different perspectives. Still, employing a socially shared or intersubjective theory of lay value is also a socially constructed quantity. According to Comanor's (2018) research, regulatory processes and markets can influence prices that are supposed to be traded. Therefore, enterprises seeking maximum profits would adapt their prices to accommodate the regulatory environment or demand in which they are located.

The Harrod-Domar economic growth model and the Solow growth model are two ideas that can theoretically measure economic growth. The long-term economic growth model proposed by Harrod-Domar is a balanced equilibrium growth system. When there is a deviation from the equilibrium point, unemployment rises, and inflation persists. As a result, the balance compares natural growth rates dependent on increasing the labour force, saving, and investment while ignoring technological advances. Solow modified the Harrod-Domar growth theory without assuming stable proportions and integrated technological change characteristics into his growth theory (Solow, 1956).

Meanwhile, Okun's Law can explain the relationship between productivity growth and unemployment. According to Farsio & Quade (2003), Okun's Law is one of the most widely recognized ideas in economics since it captures the relationship between GDP/total output (national output) and unemployment. According to Okun's law, a one-percentage-point decrease in unemployment results in a three per cent increase in output. According to Okun's direction, the economy must continue to grow to prevent wasting jobs. The rise of output and unemployment are linked so that a decrease in unemployment boosts productivity, whilst an increase in unemployment lowers productivity. Simply said, persons who are not working do not contribute to the amount of output created since they do not produce.

3. Materials and Methods

3.1. Materials

This study looks at how investment, workers employed, output prices, industrial output, and the minimum wage affect unemployment. The data structure used is a data panel, a combination of cross-section data based on the ISIC's 24 industrial sectors and annual time series data from 2008 to 2018. Secondary data were acquired from the Central Statistics Agency (BPS), the World Bank (WB), Nasional Single Window for Investment (NSWI), and other related sources for this study.

The study employed descriptive and quantitative analysis of recursive model panel data using regression analysis. In regression panel data analysis research, three regression model estimation approaches can be used: common effect model (CEM), fixed effect model (FEM), and random effect model (REM).

3.2. Methods

Syahnur et al. (2019) studied the balance of wages and labour in the labour market from two perspectives: demand and supply. The demand side focuses on the company's work needs, whereas the supply side focuses on the labour supply.

By modifying the research of Syahnur et al. (2019), this study only looks at the company's demand-side of labour (demand side). The firm's profits or losses will determine the extent of the company's demand for labour, so this study uses the maximum profit function to determine the company's need for demand for labour. Furthermore, this study used investment variables (capital) to determine how much demand for capital will affect a company's revenue. Knowing a company's demand for capital (addition or reduction of investment) will undoubtedly change the maximum profit. This change will impact the labour absorption that the company will do; when the company experiences profits, they will increase labour. The company's maximum profit functions are:

$$\pi = TR - TC \tag{1}$$

Where TR or TR = P.Q and TC or TC = wL + rK refer to the company's total revenue and expense, respectively, and π is the corporate profit function. The profit function of labour demand is thus given by the equation (2).

$$\pi = (P.Q) - (wL + rK) \tag{2}$$

Output (Q) is a production function that depends on input factors, such as labour and capital. This study used production functions adopting the Cobb-Douglas function, Q = A. $K^{\alpha}.L^{\beta}$. So that the profit function of a company becomes as follows:

$$\pi = P.AK^{\alpha}L^{\beta} - wL - rK \tag{3}$$

To get the maximum profit function of a company, it will be derived equation (3) to labour (L) as shown in equation (4) below.

$$\frac{\partial \pi}{\partial L} = P.AK^{\alpha}L^{\beta-1} - w\frac{\partial L}{\partial L} - r\frac{\partial K}{\partial L} = 0 \text{ atau } P.AK^{\alpha}\frac{L^{\beta}}{L} - w\frac{\partial L}{\partial L} - r\frac{\partial K}{\partial L} = 0$$
 (4)

$$L = P.AK^{\alpha}L^{\beta} - w\frac{\partial L}{\partial L} - r\frac{\partial K}{\partial L} \text{ atau } L = P.\hat{Q} - w\frac{\partial L}{\partial L} - r\frac{\partial K}{\partial L}$$
 (5)

Based on equation (5), the maximum demand for labour functions is reformulated in the Data Model (Pool Data Model /PDM) as follows:

$$L_{it}^* = P_{it}.\widehat{q_{it}}.w_{it}^{-1}$$
 atau $L_{it}^* = P_{it}.\widehat{k_{it}}l_{it}.w_{it}^{-1}$ dan $K = f(r)$ (6)

Where i and t are types of industries and years, L_{it}^* is the demand for labor, P_{it} and $\widehat{q_{it}}$ refers to the price and estimation of output, w_{it}^{-1} is the wage rate, then k_{it} is capital (investment), l_{it} is the working labor force, and r is the interest rate, the investment made is assumed to have taken into account the existing interest rate.

The regression model of panel data used to solve the equation (6) above is using a recursive model as in the Kala *et al.* (2018) research model as follows:

$$q = \beta_0 + \beta_1 k_{it} + \beta_2 l_{it} + \varepsilon_{1:t} \tag{7}$$

$$L_{it}^* = \beta_0 + \beta_1 P_{it} + \beta_2 \widehat{q_{it}} + \beta_3 w_{it} + \varepsilon_{2it}$$

$$\tag{8}$$

Then the regression equations (7) and (8) above are converted into natural logarithms, thus becoming:

$$Lnq = \beta_0 + \beta_1 Lnk_{it} + \beta_2 Lnl_{it} + \varepsilon_{1it}$$
(9)

$$LnL_{it}^* = \beta_0 + \beta_1 LnP_{it} + \beta_2 Ln\widehat{q_{it}} + \beta_3 Lnw_{it} + \varepsilon_{2it}$$
(10)

Where L_{it}^* , q_{it} , \hat{q}_{it} is the unemployment rate, output growth, and estimated output growth in the industrial sector i year t. β_0 is an intercept/ constant, while β_1 , β_2 , β_3 is a slope / coefesien variable, and ϵ it is a error variable.

4. Results and Discussion

4.1. Result

The results of descriptive analysis for variable data on the number of unemployed (L^*) , industrial output (q), foreign investment (k_A) , domestic investment (K_dl) , working labour (L), value-added price (P), and minimum wage (w) period from 2008 to 2018 are presented in Table 3.

Table 3: Descriptive Statistics of Main Variables of Study on LMI Classification

	JP (<i>L</i> *)	OI (q)	$PMA(k_A)$	PMDN (K_dl)		$\mathrm{HI}\left(P\right)$	$W_L(w)$
Statistic	(Million	(Billion	(Million	(Billion	$TKB\left(L\right)$	(Billion	(Million
Indicators	people)	Rupiahs)	US\$)	Rupiahs)	(people)	Rupiahs)	Rupiahs)
Mean	121	148000	430	2430	217366.7	67000	36.72129
Median	120	88900	194	535	157431.5	43400	33.85735
Maximum	133	1610000	3330	36000	1119579	581000	107
Minimum	111	1790	0.046	0	5844	1700	6.702498
Std. Dev.	6.05	209000	605	4620	209192.4	77900	17.58215
_	JP (<i>L</i> *)	$\mathrm{OI}\left(q ight)$	PMA (<i>k_A</i>)	PMDN (K_dl)	TKB (L)	$\mathrm{HI}\left(P\right)$	$W_L(w)$
Skewness	0.4795	4.1446	2.3032	3.8704	1.9089	2.9350	0.9695
Kurtosis	2.5101	25.5338	8.3529	22.3285	6.7155	15.1075	3.8847
Jarque-Bera	12.7578	6341.3380	548.5964	4768.6150	312.1824	1991.5390	49.9682
Probability	0.0017	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Observations	264	264	264	264	264	264	264

Source: Central Bureau of Statistics (2021)

Notes: JP (unemployment), OI (industrial output), PMA (foreign investment), PMDN (domestic investment), TKB (labour), HI (output price); and W_L (minimum wage)

The initial stage in panel data regression analysis is to determine which model best fits the research data. The p-value of the Chow Test is used to assess whether the common effect model (CEM) or the fixed effect model (FEM) is better. If the p-value is less than alpha 0.05, the FEM model is better, and vice versa. After that, the Hausman test was used to determine the FEM model with a random effect model (REM). If the Hausman Test p-value is less than alpha 0.05, the FEM model is better, and vice versa. Table 4 below displays the best model selection findings.

Table 4: Selection of the Best Model

	Statistic	d.f	Probability	Kesimpulan
Model 1 (Equation 9)				
Chow Test (LR Test)	27.55358	-23,237	0.0000	FEM
Hausman Test	96.17666	3	0.0000	
Model 2 (Equation 10)				
Chow Test (LR Test)	38071.19	-10,250	0.0000	FEM
Hausman Test	153.0505	3	0.0000	

Source: Own presentation (2021)

Notes: d.f (Degree of Freeedom) and L.R Test (Likelihood Ratio Test)

Table 5: Results of the EGLS Panel Estimation on Industrial Output

Variables	Coefficient	Probability
Constant	7.736202	0.0000
PMA (k_A)	-0.019718	0.4867
PMDN (K_dl)	0.018121	0.1266
$TKB\left(L\right)$	2.037964	0.0000
R-squared	0.929951	
Adjusted R-squared	0.922266	

F-statistic	121.0128
Prob(F-statistic)	0.0000

Source: Own presentation (2021)

Notes: (1) EGLS (Estimated Generalized Least Squares); (2) (Probability-

value < 5% significance level is significant

The FEM estimates in Table 5 above suggest that PMA and PMDN have no significant effect on industrial output but have a positive direction. The labour variables work significantly impact industrial output and a positive direction. The findings of this calculation show that for every 1 per cent increase in labour work, industrial output will grow by 2.037 per cent, providing all other factors remain constant. The coefficient value of determination (R²) in this model is 0.9299, indicating that the independent variable can explain 92.99 per cent of the variation in industrial output variables, with the remaining 7.01 per cent explained by variables outside the model.

After obtaining an estimated result of industrial output of $7,736 - 0,019LnPMA_{it} + 0,018LnPMDN_{it} + 2,037Lnl_{it}$, then searched for industrial output head (\hat{q}) using a recursive model to be further analysed in the equation (10). The results of the EGLS panel estimates on unemployment are given in Table 6.

Table 6: Results of the EGLS Panel Estimation on Unemployment

Variables	Coefficient	Probability
Constant	18.6171	0.0000
HI (<i>P</i>)	-0.000105	0.7424
EST_OI (\hat{q})	-0.001076	0.0047
W-L(w)	0.000837	0.1554
R-squared	0.999638	
Adjusted R-squared	0.999619	
F-statistic	53111.68	
Prob(F-statistic)	0.0000	

Source: Own presentation (2021)

Notes: (1) EGLS (Estimated Generalized Least Squares); (2) (Probability-

value < 5% significance level is significant

The results of the FEM estimate in Table 6 above show that industrial prices significantly have no effect on the number of unemployed but have a negative direction. The variable estimate of industrial output substantially affects the number of unemployed and has a negative focus, and wages significantly have no effect on the number of unemployed but have a negative direction. The findings of this calculation show that for every 1% rise in estimated industrial output, the number of unemployed will fall by 0.11 per cent, providing everything else remains constant. The coefficient value of determination (R²) in this model is 0.9996, indicating that the independent variable can explain 99.96 per cent of the variable number of unemployment, with the remaining 0.04 per cent explained by variables outside the model.

4.2. Discussion

The workforce has a positive and significant effect on industrial output, according to the results of regression analysis of the FEM approach. But investment, PMA and PMDN, has no significant impact on industrial output, although PMDN has a positive tendency. The findings of this study support Solow's theory of output growth, which states that labour and capital (investment) are the two elements that influence output. In addition, Chen et al. (2016) argued that changes in labour market institutions could increase or decrease growth through effects on employment, based on research that revisits long-term correlations by viewing labour force participation as endogenous. In terms of the impact of investment, Strat et al. (2015) found that investment is one of the best ways for developing nations to increase their output growth. Yusuf et al. (2020) find that while there are no significant short-term relationships, the long-term investment coefficient is large and positive; a 1% increase in investment inflows to the West African subregion led to a 0.26 per cent rise in output growth.

The regression analysis of unemployment numbers using the FEM approach showed that industrial output had a negative and significant effect on industrial prices and wages. On the other hand, wage variables have a positive direction, meaning that when wages rise, the number of unemployed rises. The findings of the study, which show that output has a negative impact on the number of unemployed, support Okun Law's validity. In addition, research from Dogru (2013), which examines the relationship between the unemployment rate and real output using Okun Law, concludes that Okun Law is valid. Still, the coefficient is smaller than the empirical coefficient for the United States and developed countries. According to Schubert and Turnovsky (2017), unemployment and wage bargaining determine the relationship between growth and unemployment; the tradeoff between unemployment and growth is

moderate in the long run but significantly more significant in the short term. Their analysis suggested higher government investment as the best fiscal strategy for raising growth and lowering unemployment.

As the Marginean & Chenic (2013) study examined, some of the most critical issues related to the impact of minimum wage increases started in 2008, theoretically and empirically concluded that most studies show little or no employment response to minimum wage increases. Still, several other factors are pretty significant; implementing the minimum wage will increase the number of unemployed. Furthermore, research (Siregar, 2019) on the Application of the Minimum Wage to the Unemployed reported that the implementation of the minimum wage would raise labour expenses and cause small businesses to lay off some of their employees. As a result, an increase in the minimum wage may increase unemployment. On the other hand, when the minimum wage is implemented, workers' marginal consumption tendencies will increase, resulting in increased demand and economic growth as wage rates rise. The rise in aggregate demand allows businesses to maintain or enhance output by expanding their workforce.

5. Conclusion

The regression analysis results show that the working workforce significantly impacts the increase in industrial output in Indonesia's large and medium industries, but not on capital (investment). Every policymaker's goal should be to figure out how to increase labour absorption and make it more qualified. The government must devise the best strategy for absorbing the unemployed workers, such as adopting a skilled workforce training policy. The Government should utilize foreign and domestic capital as efficiently as possible to reduce unemployment.

According to the industrial output analysis of the number of unemployed, a rise in output will reduce the number of unemployed. The government should offer enterprises in large and medium industries incentives, such as removing corporate-borne labour income taxes or providing pay subsidies to developing companies, to encourage them to increase their industrial output. On the other hand, the findings of this study show that raising the minimum wage will increase the number of unemployed people. As a result, the government must be cautious in implementing this minimum wage policy to maximize profits and absorb labour as labour demanders. The community as labour suppliers can receive fair wages to get decent welfare.

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