

The Effect of Spillover Foreign Direct Investment on Labor Productivity in Indonesia

Krismanti Tri Wahyuni¹, Anugerah Karta Monika¹, Robert Kurniawan², Rezzy Eko Caraka^{4,5}, Yoga Dwi Nugroho³

¹Statistics Study Program, Polytechnic of Statistics-STIS, Jakarta, Indonesia

²Statistical Computing Study Program, Polytechnic of Statistics-STIS, Jakarta, Indonesia

³Directorate of Expenditure Account, BPS-Statistics Indonesia, Jakarta, Indonesia

⁴Research Center for Data and Information Sciences, Research Organization for Electronics and Informatics, National Research and Innovation Agency, Bandung, Indonesia

⁵Department of Mathematical Sciences, Ulsan National Institute of Science and Technology, Ulsan, Republic of Korea

Corresponding Author: robertk@stis.ac.id

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Abstract

The contribution of the manufacturing sector to Indonesia's GDP reaches more than 20 percent. However, Indonesia has challenges to increase the productivity of workers who work in the industrial sector. The Omnibus law requires the assistance of foreign workers to work in Indonesia so that technology and expertise transfer happen. Foreign workers are believed to have a spillover effect in the form of skills and technology transfer through *Foreign Direct Investment* (FDI). FDI in the manufacturing sector allows an increase in labor productivity as a result of the spillover effect in the form of the transfer of skills and technology. This study aims to examine the impact of FDI spillover by making a comparison between labor productivity in companies whose ownership is dominated by foreign and domestic. Using data used from a large medium industry survey in 2010-2014. The method used in this research is panel data regression analysis with a cross-section of 28 industry subcategories derived from ISIC and a 5-year time series from 2010-2014, when the manufacturing sector became a source of growth in Indonesia of more than one percent. The results are in general FDI has a positive effect on labor productivity in companies whose ownership is dominated by foreign and domestic ownership. Meanwhile, FDI spillovers on labor productivity did not occur in companies whose ownership was dominated by domestic but occurred in companies whose ownership was dominated by foreigners.

Keywords: labor, productivity, industry, foreign ownership, spillover

JEL Classification: E24, O15, O16

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1. Introduction

World Economic Forum (WEF) states that Indonesia's main strengths are market size and macroeconomic stability. This is concluded from the value of the Global Competitiveness Index which is calculated every year. The lowest score

is innovation, especially in patent applications and R&D expenditure. In line with WEF, the International Institute for Management Development also measures Indonesia's competition performance. Indonesia's strengths are the market size (population) and the

workforce. Based on these results, the challenge that Indonesia needs to do is increase labor productivity and resource competence.

Currently, Indonesia's workforce is still dominated by the agricultural sector, but the resulting economic value added is dominated by the manufacturing sector. Based on World Bank data (2019), the contribution of the Indonesian manufacturing sector in 2017 reached 20 percent, exceeding the contribution of the world manufacturing sector (16 percent). Likewise, the contribution of Indonesia's secondary sector is 39 percent, exceeding the contribution of the world's secondary sector which is only 25 percent. However, the manufacturing industry in Indonesia has not always been a source of significant growth. The manufacturing industry experienced a decline in its contribution to Indonesia's economic growth starting in 2015. The source of growth from the manufacturing industry, which reached more than one percent, was achieved in the 2010-2014 period (Table 1). Therefore, it is crucial to study the manufacturing industry during this period concerning the productivity of its workforce.

Many kinds of research on increasing productivity using domestic inputs have been carried out. The novelty in this study is to see the influence of foreign presence in the manufacturing sector in Indonesia. The entry of Foreign Direct Investment (FDI) as a proxy for foreign capital was also accompanied by an indirect impact on the presence of foreign workers. This is in line with the mandate of the Omnibus Law which requires employers to appoint Indonesian workers as companions for foreign workers to transfer technology and transfer skills.

Table 1. Indonesia's Economic Growth and Sources of Growth (SoG) in the Manufacturing Industry Sector in 2010-2021

Year	Economic Growth	SoG of the Manufacturing Industry Sector
2010	6,38	0,86
2011	6,17	1,38
2012	6,03	1,24

Year	Economic Growth	SoG of the Manufacturing Industry Sector
2013	5,56	0,96
2014	5,01	1,01
2015	4,88	0,94
2016	5,03	0,92
2017	5,07	0,92
2018	5,17	0,91
2019	5,02	0,80
2020	-2,07	-0,61
2021	3,69	0,70

Spillover is an externality of economic activity or process that affects endogenous variables that are not directly involved. Sharma, (2018) researched in India that the presence of foreign workers has an effect *spillover* in the form of transfer of skills and technology through *Foreign Direct Investment* (FDI). FDI is associated with increased demand for "blue-collared" labor in large firms, but there is no evidence of an increase in wages. On the other hand, there is a wage/salary difference between blue and white-collar workers. Research conducted by (Mardiana, 2015) on the gender-based income gap of workers in Indonesia shows that the income of white-collar men and women is 11.15 percent higher and 18.41 percent higher than that of blue-collar workers. This is reinforced by research conducted by (Almeida-Santos et al., 2010) Almeida-Santos (2010) which explains the high wages of white-collar workers compared to blue-collar workers because white-collar jobs are more complex, have high responsibility, and require high educational qualifications.

Smruti Ranjan Behera (2015) adds that the benefits of foreign presence can be received by local companies on the condition that there is an absorption capacity of FDI externalities in the form of higher concentration and larger market size. *Spillover* FDI technology is higher in companies that are technology-intensive and carry out research and development. Javorcik (2012) clarifies the impact of FDI from the perspective of workers and the state. From the labor side,

companies with foreign ownership usually pay higher wages than domestic companies, at least more developed in terms of workforce training. Meanwhile, the existence of FDI increases labor productivity in the aggregate, which is the goal of a country's economy.

The barriers to absorb benefits from the presence of foreign investment in Indonesia at present are minimized by the *omnibus law*. The arrangement of regulations with the *omnibus law* was put forward by President Joko Widodo at the Plenary Session of the People's Consultative Assembly (MPR) on October 19, 2019, that the government would issue two major laws,

namely the Job Creation Law and the Law on Empowerment of Macro, Small and Medium Enterprises (MSMEs). Every law will become an *omnibus law*, namely one law that will revise several laws, even dozens of laws. Ansari (2020) states that *omnibus law* is applied to improve regulations in each country to boost the climate and competitiveness of investment and to have efficient in-laws and regulations. The climate and competitiveness of foreign investment in Indonesia can be seen from the graph below, which shows the percentage of companies with foreign capital ownership which is increasing from year to year.

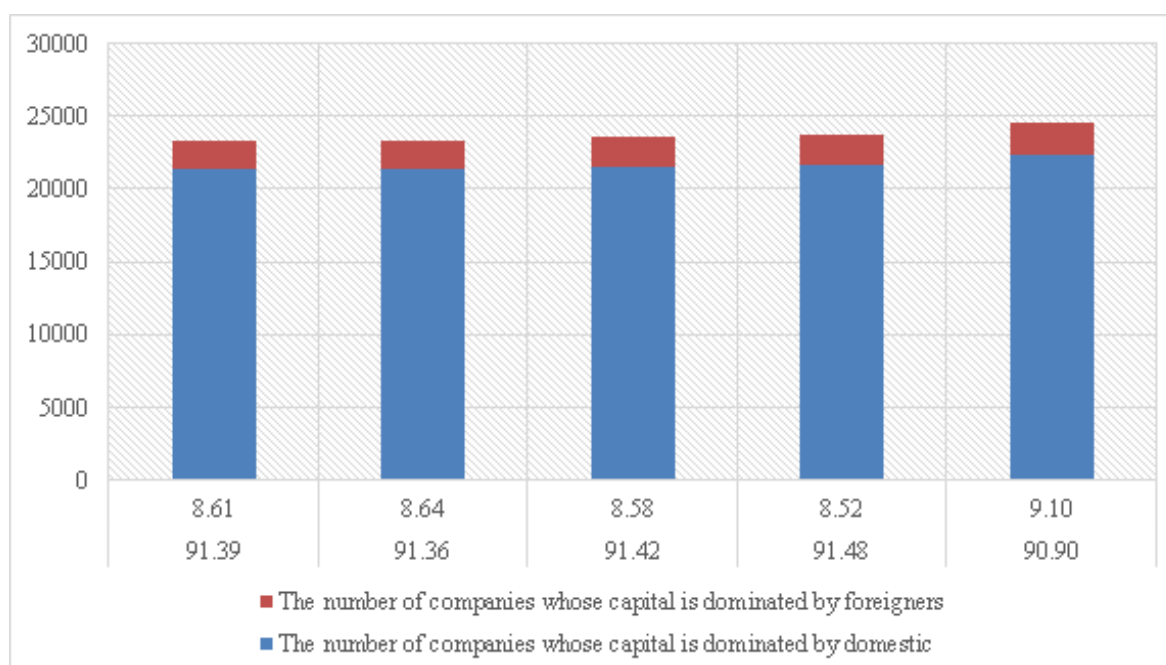


Figure 1. Number and percentage of companies whose capital is dominated by domestic and foreign, 2010-2016

Source: 2010-2014 Annual Survey of Large and Medium Industries, BPS

Labor productivity is an important topic to increase economic efficiency since labor input as a production factor follows the theory of *diminishing marginal return* which declines over time (Mankiw, 2010). Increasing labor productivity due to the influence of foreign capital and *spillovers* is the easiest and possible to happen in the large and medium-scale manufacturing sector. Ningrum (2008) explained in her research about the

absorption of industrial labor by the sub-sector to FDI in Indonesia. The chemical and pharmaceutical industries have the greatest value to total FDI but absorb the least amount of labor, while the textile industry, on the other hand, is the industry that absorbs the largest number of workers but has a small investment value of total FDI.

This study aims to compare labor productivity between companies whose ownership

is dominated by foreigners and domestic ownership and to analyze the effect of *Foreign Direct Investment* (FDI) on labor productivity in terms of direct and indirect effects (*spillover*). The comparison of labor productivity is carried out through the selected model, the characteristics of companies consist of various sub-sectors and their implications for the economy in general based on the appropriate literature review. The term sub-sector is used to show its role in the development of the manufacturing sector as a whole.

2. Literature Review

Increasing FDI is an important economic objective in developing countries. Karentina (2019) states that the existence of FDI is believed to improve the domestic economy (host country) because FDI is a relatively stable source of capital compared to other sources. However, foreign investors' joint-venture investments generally negatively affect private investors' behavior (Ha et al., 2022). The presence of FDI is often followed by the entry of foreign workers into the host country which raises many pros and cons.

The entry of foreign workers is a common thing in countries that adopts an open economic system like Indonesia. Kuala Lumpur Declaration in 2015, showed ASEAN countries have a vision of expanding community connectivity, institutions, and infrastructure that facilitate the movement of capital and skilled labor to expand regional trade and production networks (Ministry of Foreign Affairs of the Republic of Indonesia, 2015). This vision provides a spiritual impetus for ASEAN countries to open up to foreign workers. Indonesia has also updated regulations that are considered to facilitate the presence of foreign workers in Indonesia, with the signing of Presidential Regulation No. 20/2018 on the use of foreign workers.

The analysis of the presence of foreign workers still focuses on developed countries, but in the last decade, there has been a lot of literature on cases in developing countries. Jordaan (2018) examines that foreign workers with high and low skills have a positive impact on the productivity of the manufacturing industry in Malaysia. Foreign

workers play an important role in increasing the competitiveness of the manufacturing industry in Malaysia. In particular, the low-skilled workforce works in a modern assembly-intensive industry focused on exported products. The positive impact of foreign labor is in line with ASEAN's vision towards a united society together. This is in line with the research of Trinh (2016) which conducted a study on the rights of foreign workers in Vietnam. Skilled foreign workers play an important role in Vietnam and are more dominant than technical workers, and have a positive impact on labor productivity in companies.

Jeon (2018) found that the entry of foreign workers in Korea, in general, has a positive effect on the economy. Foreign workers contribute to increasing economic growth by increasing the labor input which is less preferred by domestic workers. Foreign workers in Korea are generally young, have low skills and low wages, which tend to hinder labor polarization. Furthermore Olsson & Tåg (2018) explain that foreign ownership does not affect labor income, but on domestic purchases. The same thing was conveyed by Ramstetter (2016) who examined labor wages in Malaysia using the Mincer-type equation on various combinations of independent variables. In general, this equation shows that the use of foreign workers does not have a significant effect on the wages of workers in Malaysia.

Research on the effect of FDI on productivity was carried out by Hamzah (2015) who researched the vertical spillover of FDI in manufacturing industrial companies in Indonesia. This research shows an increase in the productivity of the manufacturing industry in a production chain, among others, through imitation, acquisition of skills, local and export competition. Also, this increase in productivity is due to technology transfer. The technology transfer process also affects *spillover* knowledge that occurs through four channels, including competition, demonstration effects, worker mobility, and industrial vertical relations. Similar research was carried out by Yudianto et al., (2010) on manufacturing companies listed on the Indonesia Stock Exchange (IDX) to determine *technology spillover* and FDI on productivity. The results

showed that *technology spillover* and FDI had a positive and significant effect on productivity and for foreign-owned companies, the effect was higher than for domestic companies. Specifically in the manufacturing industry in Ethiopia, FDI is related to technological improvement through business competition, better management, and knowledge of exports (Abebe et al., 2022).

On the other hand, research on FDI on productivity is growing. Karentina (2019) examine the effect of FDI *spillovers* on labor productivity in domestic companies in Indonesia and identify the short and long-term impacts of FDI *spillovers* on the productivity of domestic companies. The results showed that *horizontal spillovers* harm the productivity of domestic firms in the long run but positive in the long run and FDI *spillovers* affect the productivity of domestic firms more effectively when the industry is *capital-intensive*. FDI spillover does not occur due to low levels of low productivity and the absence of labor training for domestic companies in manufacturing firms in Brazil (Sarker & Serieux, 2022).

Furthermore, Azeroual (2016) research conducted in Morocco further examines the impact of FDI originating from abroad (France and Spain) on the productivity of the manufacturing industry labor force as seen from the *Total Factor Productivity* (TFP). The results of this study indicate that the differences in the sources of origin of investment (France and Spain) greatly impact the TFP of Morocco. A statistically negative relationship occurs in FDI originating from France for industries with medium and high technology mastery. However, this is inversely related to FDI originating from Spain which is positively related to all industry categories. The existence of this negative relationship is explained in terms of the existence of "*The Effect of Firm's Competition*", namely, differences in productivity between Moroccan and French companies and differences in the adaptation of technology transfer between countries. A similar study was conducted by Banga (2011) in India which examined the direct and indirect impacts of FDI from both the United States and Japan on the productivity growth of the manufacturing industry. The difference in the source or origin of FDI that was studied shows

that FDI originating from Japan has *spillovers* larger than FDI originating from the United States. This is because the type of technology is carried by foreign companies and also because there is a low productivity gap between Japanese and Indian companies compared to US and Indian companies.

Research on labor productivity in the industrial sector has been conducted by Pradeep et al., (2017) with variables *research and development*, export, FDI, and *spillover* of each variable, as well as using the dynamic panel data method of the sys-GMM approach. Foreign *presence* has an indirect effect (*spillover*) which is positive for the productivity of manufacturing firms in India, which varies due to other variables. The application of panel data was also carried out by Alfiyani & Wahyuni (2018) to see the positive influence of the *spillover* approached by *foreign presence*, exports, company size, and capital intensity on the sectoral productivity of large and medium-scale processing industries in Indonesia. Wojciechowski (2017) found that the increase in FDI was accompanied by a convergence of labor productivity between Poland and the EU-15. The productivity gap is an obstacle to absorbing benefits from the presence of foreign investment to increase the productivity of domestic companies. Also, research conducted by Mehmet Mucuk (2013) states that the presence of FDI that enters a country will increase *net capital* which is known as the *positive direct effect*, and create jobs through *forwarding and backward linkage* and a *multiplier* which is called *positive indirect effect*.

The study conducted in Indonesia by Negara & Adam, (2012) and Suyanto et al., (2014) explains that FDI *spillovers* increase the productivity of its peers but different conditions occur in the upstream industry companies (*upstream industry*). Similar research is not only carried out in Indonesia but also outside Indonesia. Research by Hanousek et al., (2011) conducted a study on the direct and indirect effects of FDI in the European Market (*Emerging European Markets*). This direct effect is reflected in the productivity which can be calculated through the Total Factor Productivity (TFP) or labor productivity of companies controlled by foreign investors. The

indirect impact is reflected in the *spillover* in domestic companies and industries. *spillover* This includes technology transfer, access to markets, training for workers, and improving the quality of human resources (*human capital*).

3. Methodology

3.1 Scope of Research and Data

This research is a quantitative study that describes the industrial sector (business field) in Indonesia. The data used are secondary data from surveys conducted by BPS such as the National Labor Force Survey (Sakernas) August 2008-2017, Gross Domestic Product (GDP) according to business fields in 2010-2018, the realization of foreign investment (PMA) in 2017, Results of the 2016 Economic Census Company Business Data

Collection, 2016 Economic Census Processing Industry Company Data Collection Results, Agglomeration of the Manufacturing Industry in Indonesia Analysis of the 2016 Economic Census Listing Results and the Annual Large and Medium Industry Survey (IBS) from 2010 to 2014, as well as data for international comparisons from the World Bank. The use of data for different years is adjusted to the latest available data. The type of data used is panel data consisting of cross-sections and time series. *The cross-section* used is the industrial sub-sector based on KBLI (Indonesian Standard Business Classification) where the industry category is divided into 23 subcategories. The period used in this study was 2010-2014. The following are the subsectors used as a cross-section:

1. Food industry;
2. Beverage industry;
3. Tobacco processing industry;
4. Textile industry;
5. Apparel industry;
6. Leather industry, leather goods, and footwear;
7. The timber industry, wood, and cork products (excluding furniture), and woven goods made of bamboo, rattan, and the like;
8. Paper and paper goods industry;
9. Recording media printing and reproduction industry;
10. Coal product industry and petroleum refining;
11. Chemical industry and goods made of chemicals;
12. The pharmaceutical industry, medicinal products, and herbal medicine;
13. Rubber industry, rubber and plastic goods;
14. Non-metal mineral goods industry;
15. Basic metal industry;
16. Metal goods industry, not machines and their equipment;
17. The computer industry, electronic and optical goods;
18. Electrical equipment industry;
19. Machinery and equipment industry not included in the others;
20. Motor vehicle industry, trailers, and semi-trailers;
21. Other transportation equipment industry;
22. Furniture industry;
23. Other manufacturing industries (including a combination of the repair and installation of machinery and equipment sub-sectors).

3.2 Methodology

The analytical method used is descriptive and inferential analysis. Descriptive analysis is carried out by describing the labor conditions of the manufacturing industry with indicators and describing the appropriate measures.

Inference analysis is used to achieve the research objective, namely to determine the effect of FDI on labor productivity by regressing the determinant variables of labor productivity according to the processing industry sub-sector.

The model formed in the inferencing analysis is based on the decline in the Cobb-Douglas production function. Pindyck & Rubinfeld (2013) explain that the relationship between input and output is described by the production function through the production process and can be written: $Q = f(A, K, L)$ where Q is output (*quantity*), A is technology, K (*capital*) is capital and L is labor (*labor*). The aggregate output can be written as the dependent variable (Y) which can often be valued by the amount of money generated from the output value. If labor is transferred to the left side as the divider of output, then the labor productivity function is obtained as follows.

The variables used in the inferencing analysis are labor productivity (PTK) as an dependent variable, foreign capital (FDI), company fixed capital (IMD), company size (*size*), and *foreign presence* (FP) as independent variables. Labor productivity (PTK) is obtained by dividing the added value produced by all firms in each sub-sector of the processing industry by the number of workers. In the equation, this variable consists of the labor productivity of domestic companies (PTKDL) and the labor productivity of foreign companies (PTKA).

The capital intensity variable (K / L) is divided into two variables, namely the intensity of foreign capital which is proxied by *Foreign Direct Investment* (FDI) divided by the labor of each sub-sector, and the intensity of domestic capital (IM

which is proxied by the *fixed capital* company's each sub-sector divided by the number labor of each subsector. FDI is calculated by multiplying output by the percentage of foreign ownership of each company then adding up for each subsector.

Meanwhile, variable A (technology) in the Cobb-Douglas model is disaggregated into two variables, namely company(*size*) and *foreign presence* (FP). Firm size is used as a proxy for subsector economies of scale and is calculated by comparing the total output of each sub-sector with the number of workers. *Foreign presence* is a variable used as a proxy variable for *spillovers* or the indirect impact of foreign capital entering the country, calculated as the *share of the* output of companies whose capital ownership is dominated by foreigners in each sub-sector. All variables used are transformed in logarithmic form except for *foreign presence* because it is already in the form of a percent.

This study aims to distinguish the direct effect of FDI and the overall effect in the form of direct and indirect effects with the *spillover* that occurs. The model is used to see the variables that affect labor productivity in companies that are dominated by foreign ownership and are compared with a model that regresses the variables that affect labor productivity in companies that are dominated by domestic (domestic or local). So that four models can be written as follows:

$$PTKDL_{it} = \beta_0 + \beta_1 FDID_{it} + \beta_2 IMD_{it} + \varepsilon_{it} \quad (1)$$

$$PTKD_{it} = \beta_0 + \beta_1 FDID_{it} + \beta_2 IMD_{it} + \beta_3 SIZED_{it} + \beta_4 FPD_{it} + \varepsilon_{it} \quad (2)$$

$$PTKLA_{it} = \beta_0 + \beta_1 FDIA_{it} + \beta_2 IMA_{it} + \varepsilon_{it} \quad (3)$$

$$PTKL_{it} = \beta_0 + \beta_1 FDIA_{it} + \beta_2 IMA_{it} + \beta_3 SIDEA_{it} + \beta_4 FPA_{it} + \varepsilon_{it} \quad (4)$$

Note:

PTKDL : the labor productivity of companies whose ownership is predominantly domestic with direct influence

PTKD : the labor productivity of domestic companies whose ownership is dominated by the overall effect, either directly or indirectly

PTKLA : the labor productivity of companies whose ownership is dominated by foreign with direct influence

PTKL : the labor productivity of foreign companies whose ownership is dominated by the overall effect, either directly or indirectly

<p>FDID : Foreign Direct Investment of companies whose ownership is predominantly domestic</p> <p>FDIA : Foreign Direct Investment of companies whose ownership is dominated by foreign</p> <p>IMD : company fixed capital of companies whose ownership is predominantly domestic</p> <p>IMA : company fixed capital of companies whose ownership is dominated by foreign</p> <p>SIZED : company size of companies whose ownership is predominantly domestic</p> <p>SIZEA : company size of companies whose ownership is dominated by foreign</p> <p>FPD : foreign presence of companies whose ownership is predominantly domestic</p> <p>FPA : foreign presence of companies whose ownership is dominated by foreign</p>	<p>method with the FEM model has the most types, according to what assumptions are met. Meanwhile, REM assumes that individual effects are random, meaning that there is no correlation between individual effects and the independent variables in the model (Baltagi, 2005)</p> <p>Model selection is done by several tests to get the best model. The Chow test is usually a test that is performed first, by checking the presence or absence of an individual effect on each observation or used to select the best CEM or FEM model. If H_0 is rejected, then the FEM model is better because there are different intercepts. Furthermore, the Hausman test is used to select the REM or FEM model, by looking at the component <i>error</i> which shows the differences between individuals whether it can be described or not. Meanwhile, the Lagrange Multiplier test is usually carried out if the Hausman test decision fails to reject H_0 and aims to confirm the results of the Chow test. This test is used to select the CEM or REM model, by testing the random effect of the <i>error</i>. If the variance of the total <i>error</i> is zero, then the best model is CEM.</p> <p>If the selected model is CEM, then the classic regression assumptions must be fulfilled because the estimation used is OLS. If the selected model is FEM, then the assumptions that need to be examined in selecting the best model are homoscedasticity, autocorrelation, and multicollinearity. If the assumption of homoscedasticity is fulfilled, the estimation used is OLS, which is the same as CEM, so that all classical regression assumptions must also be fulfilled. If there is a violation of the homoscedasticity assumption but there is no autocorrelation between individuals, the estimation method is used <i>General Least Square</i> (GLS) or <i>Weighted Least Square</i> (WLS). If both assumptions are violated, the estimation used is a <i>Feasible General Least Square</i> (FGLS) with a weighting of <i>cross-section correlation Seemingly Unrelated Regression</i> (SUR). Meanwhile, the REM model that violates the homoscedasticity assumption is estimated by using the <i>General Least Square</i> (GLS).</p>
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There are two subsamples of the resulting model (i and t), adjusted to the method used, namely combining data *cross-section* (23 subsectors in the processing industry) and *time-series* (5 years). The advantages of panel data regression are expected to know the heterogeneity of individuals (processing industry sub-sector) and reduce the collinearity between variables and increase the degree of freedom so that it is more efficient. The structure of the panel data regression model consists of three types of models, namely: *pooled regression* or *Common Effect Model* (CEM), *Fixed Effect Model* (FEM), and *Random Effect Model* (REM).

CEM is a panel model that is estimated using *Ordinary Least Square* (OLS) as a regression in general so that there is no difference in the characteristics of each individual and time in the model. FEM is usually the most desirable panel model because the advantages of panel data can be seen from the component *error* caused by deterministic differences between individuals and can be analyzed to show the diversity of the individuals studied. The existence of an individual effect causes the intercept value of each individual to be different. The estimation

4. Results and Discussion

4.1 Descriptive

The industrial sector in Indonesia is supported by companies engaged in the industrial sector. Based on ownership, there are foreign and domestic owned companies. IBS data shows that less than 10 percent of foreign companies operate in Indonesia. In 2010, 8.9 percent of the total companies were foreign companies, this number increased to 9.9 percent of the total companies operating in Indonesia in 2014. Foreign companies in Indonesia are dominated by food industry companies. This is understandable given the large population of

Indonesia so that the number of food industry companies dominates the number of companies in Indonesia.

In running their business, companies need labor. Globalization has made Indonesia accept foreign workers to work in companies in the industrial sector. The presence of foreign workers in Indonesia is caused by many factors, either because of the good skills of foreign workers or because of the ownership relationship of foreign companies in Indonesia. Based on IBS data for 2010-2014, it can be seen that more than 35 percent of the workforce working in the industrial sector are foreign workers.

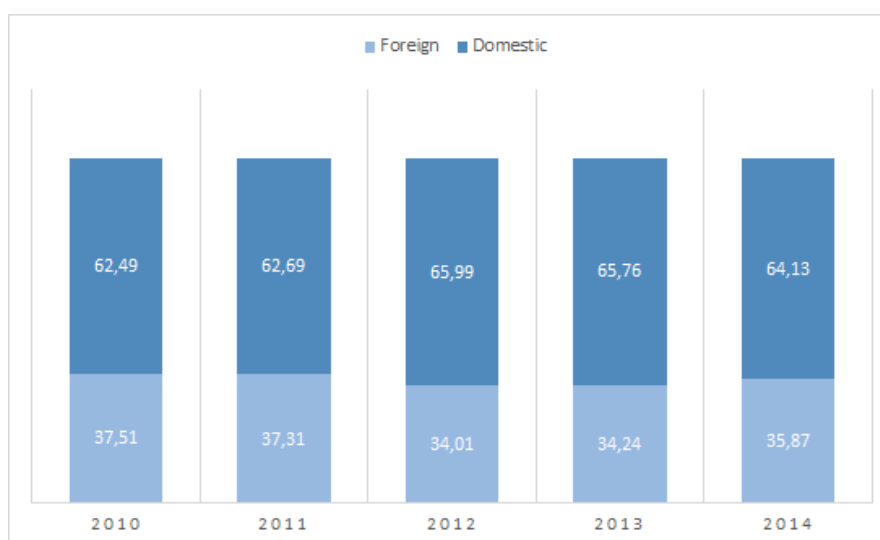


Figure 2. Percentage of foreign and domestic foreign workers in the industrial sector in Indonesia in 2010-2014

Source: Annual Survey of Large and Medium Industries 2010-2014, BPS, processed data

The presence of foreign workers is also considered to facilitate technology transfer. Many labor experts argue that foreign workers have high productivity because they have good *soft skills* and *hard skills*.

Pindyck & Rubinfeld (2013) state that productivity is the amount of output produced by each worker on average. According to the Central Statistics Agency, labor productivity

is a value that shows the ability of workers to produce production goods as measured by dividing the added value of production by the number of workers paid. Added value is the amount of output minus the value of the input (intermediate consumption). In simple terms, labor productivity is a measure of the effectiveness of labor in producing products in a certain unit of time.

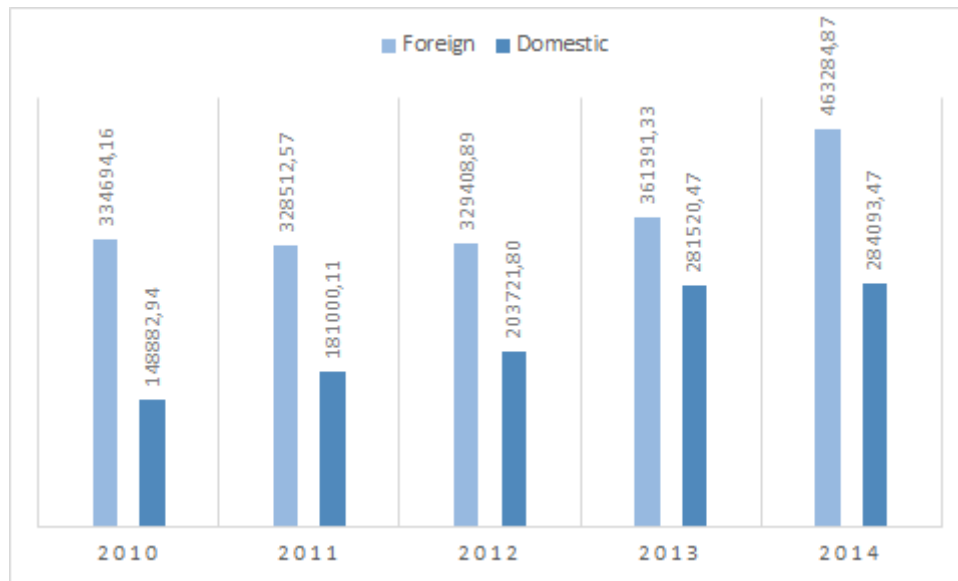


Figure 3. Productivity of foreign and domestic companies in the industrial sector in Indonesia in 2010-2014

Source: Annual Survey of Large and Medium Industries 2010-2014, BPS, processed data



Figure 4. Scatter Plot of FDI/Labor and Value Added/Labor by Subsector of Manufacturing Industry, 2014

Source: Annual Survey of Large and Medium Industries 2014, BPS, processed data

Figure 2 shows that the productivity of foreign companies is greater than that of domestic companies. In 2010, each foreign worker was able to generate an added value of IDR 334,694.16 and in 2014 was able to generate an added value of IDR 463,284.87 or experienced an increase in

productivity of 38.42 percent. Meanwhile, the productivity of domestic companies has lower productivity than foreign companies. However, during the period 2010-2014, the productivity of the domestic workforce experienced a rapid increase. If in 2010 each domestic worker only generated added value of IDR 148,882.94, in 2014 each domestic worker was able to generate an added value of IDR 284,093.47 or experienced an increase in productivity of 90.82 percent within 5 years.

The presence of foreigners almost always has a positive impact based on the previous literature in terms of the economy of the destination country. (Baranwal, 2016) explains that the influence of foreign capital in the form of FDI will affect the destination country from the demand and supply side. From the demand side, FDI will improve the quality of wages, while from the supply side, FDI can enrich the workforce with training and learning through technology, as an indirect impact.

The relationship between FDI and positive productivity is also shown from the scatter plot between Capital Intensity and Productivity in Figure 4. This figure shows the relationship between the intensity of foreign capital (FDI / L) and productivity (VA / L). The blue color shows the relationship between foreign capital and the productivity of foreign companies, while the orange color shows the domestic companies. The horizontal line shows the total productivity of the industrial sector as a whole, while the vertical line shows the total intensity of foreign capital in the industrial sector as a whole.

From this plot, a quadrant analysis can be made by forming 4 quadrants where the first quadrant is a sub-sector that has foreign capital intensity and productivity above the industrial sector as a whole. The sub-sectors that are included in this quadrant are those that effectively use their capital because the greater of foreign capital used, the more productive the workforce will be.

The second quadrant is the sub-sector that has a foreign capital intensity that is greater than the intensity of foreign capital as a whole but the productivity is lower than the productivity of

the industrial sector as a whole. This sub-sector that is included in this quadrant means that the intensity of foreign capital in this sub-sector unable to increase its productivity.

The third quadrant is the sub-sector that has a lower foreign capital intensity than the overall foreign capital intensity, but the productivity is greater than the productivity of the industrial sector as a whole. The subsectors that enter this quadrant indicate that the intensity of foreign capital in this sub-sector has no impact on productivity. Although foreign capital is small, productivity remains high.

The fourth quadrant is the sub-sector that has a lower foreign capital intensity than the overall foreign capital intensity and the productivity is also lower than the productivity of the industrial sector as a whole. The subsector in this quadrant shows that the intensity of foreign capital does not affect productivity.

The results of classifying according to company owners are as follows:

Table 2. Subsector Classification According to The 2014 Quadrant Analysis.

Quadrant	Subsectors code	
	Foreign	Domestic
1	11 Subsectors: 10, 11, 17, 19, 20, 22, 24, 27, 28, 29, 30	6 Subsectors: 20, 24, 27, 28, 29, 30
2	-	3 Subsectors: 10, 19, 26
3	-	4 Subsectors: 11, 12, 17, 23
4	12 Subsectors: 12, 13, 14, 15, 16, 18, 21, 23, 25, 26, 31, 32	10 Subsectors: 13, 14, 5, 16, 18, 21, 22, 25, 31, 32

From table 1, it can be seen that the subsector consisting of companies with foreign ownership has good foreign capital performance and productivity because almost half of the subsectors are included in the first quadrant. This means that the intensity of foreign capital has a strong influence on productivity in the 11 subsectors that are included in this quadrant.

Meanwhile, the sub-sector with companies with domestic ownership is mostly in the fourth

quadrant. This shows that the intensity of foreign capital does not affect productivity.

4.2 Inference

4.2.1 Model Selection

This study emphasizes the effect of foreign presence as a direct and indirect impact on labor productivity. The foreign presence can be identified from FDI. Equations 1 to 4 are used to determine the direct and indirect impacts as written in the methodology. These equations represent direct and indirect impacts. The direct impact is known from the equation that only uses FDI as the independent variable (equations 1 and 3), while the indirect impact of the equation using control variables is fixed capital, company size, and Foreign Presence (equations 2 and 4). The indirect impact is used to determine the

spillover of FDI on labor productivity in foreign and domestic-dominated company ownership.

Inference analysis in the study used 4 regression equations as in the methodology consisting of:

1. Model in companies whose ownership is predominantly domestic with direct influence
2. Models in companies whose ownership is dominated by the overall effect, either directly or indirectly
3. Models in companies whose ownership is dominated by foreign with direct influence
4. Models in companies whose ownership is dominated by the overall effect, either directly or indirectly

The estimation results obtained for the four models are summarized in the following table.

Table 3. The Estimation Results of The Equation Model

Dependent Variables	Productivity of companies whose ownership is dominated by domestic		Productivity of companies whose ownership is dominated by foreign	
	1	2	3	4
Model:				
Estimation method	FEM with <i>cross-section weight</i>	REM with GLS	FEM with <i>cross-section weight</i>	FEM with <i>cross-section weight</i>
Constant	10.6231 (0.0000)	-0.9306 (0.4466)	2.0607 (0.0238)	-3.1180 (0.0629)
FDI	0.0122 (0.7531)	0.1347 (0.0846)	0.7528 (0.0000)	0.3639 (0.0001)
Fixed Capital	0.1200 (0.0000)	0.0961 (0.0000)	0.0360 (0.0152)	0.0449 (0.0129)
Size		0.5920 (0.0000)		0.5331 (0.0001)
Foreign Presence		-0.0161 (0.0000)		0.0129 (0.0000)
Adjusted R Square	0.8991	0.5931	0.9656	0.9644
F statistic	43.3126	42.5453	134.4288	119.8461
Prob (F statistic)	0.0000	0.0000	0.0000	0.0000

Source: Annual Survey of Large and Medium Industries 2010-2014, BPS, processed data

Based on the results of parameter estimation in Table 1, the following equation can be written

$$PTKDL_{it} = 10.6231 + 0.0122 FDID_{it} + 0.1200 IMD_{it} \quad (5)$$

$$PTKD_{it} = -0.9306 + 0.1347 FDID_{it} + 0.0961 IMD_{it} + 0.5920 SIZE_{it} - 0.0161 FPD_{it} \quad (6)$$

$$PTKLA_{it} = 2.0607 + 0.7528 FDIA_{it} + 0.0360 IMA_{it} \quad (7)$$

$$PTKL_{it} = -3.1180 + 0.3639 FDI_{it} + 0.0449 IMA_{it} + 0.5331 SIZE_{it} + 0.0129 FPA_{it} \quad (8)$$

Considering that the regression model used is panel data regression, it is necessary to check assumptions to obtain the best model. The Chow and Hausman test results show that models 1, 3 and 4 produce the best model FEM, while model 2 produces the best model REM.

4.2.2 Direct Impact of FDI on Productivity

To determine the impact of foreign capital on productivity, it can be seen from equations (1) and (3). In general, fixed capital is statistically significant for both models. This shows that fixed capital has a positive relationship with the increase in labor productivity in the manufacturing industry seen from its positive coefficient. If we look deeper, the effect of this fixed capital is greater in companies whose ownership is dominated by domestic compared to companies whose ownership is dominated by foreign, which can be seen from the coefficients in models 1 and 3, respectively, 0.1199 and 0.0359. A unique phenomenon and of concern is the FDI variable which shows that there is a significant difference between models 1 and 3. In model 1, the FDI variable is not significant but in model 3 the FDI variable is significant. This, of course, can be explained that FDI has a real effect and increases the productivity of the manufacturing industry workforce in companies whose ownership is dominated by foreigners. The results of this study indicate that both fixed capital and FDI can increase the productivity of the manufacturing industry for companies whose ownership is dominated by foreign and the effect of FDI is greater in increasing productivity than fixed capital. This large influence is seen from the coefficient of 0.7527 which means that an increase in FDI of IDR 10000 units will increase labor productivity by IDR 7527 /labor.

The results of this study are in line with research conducted by Karentina (2019), which shows FDI has a positive effect on labor productivity, especially for the short and long term for companies whose ownership

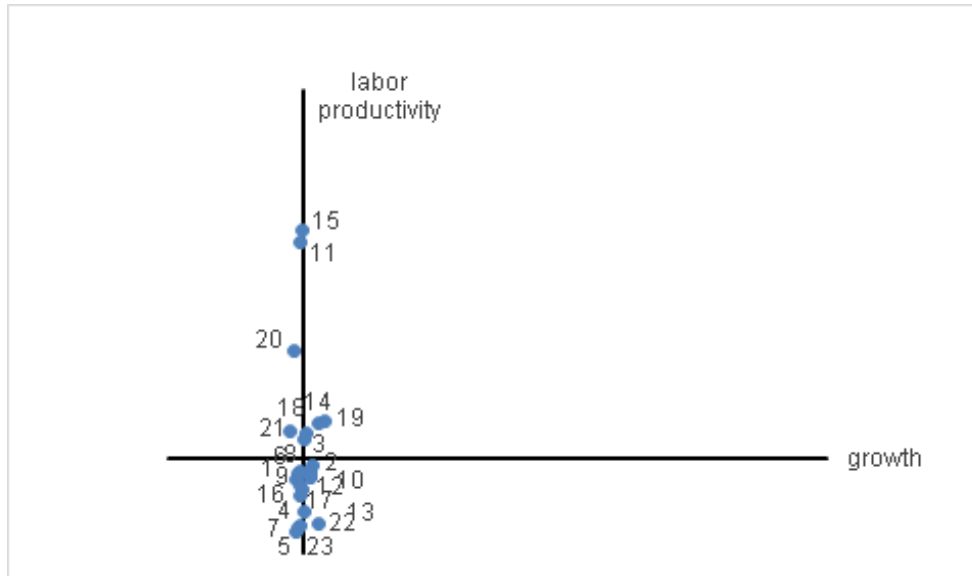
is dominated by foreign. If the results of this study are related to the omnibus law which is still hotly discussed and debated, it shows that the presence of FDI will increase the productivity of the workforce whose ownership is dominated by foreign and the existence of an omnibus law that aims to improve regulations and the investment climate so that it will be more effective the flow of FDI into Indonesia. However, on the other hand, the influence of FDI is not felt by companies whose ownership is dominated by domestic, which is marked by no increase in labor productivity. This should be the government's study and consideration so that all companies, both domestic and foreign-dominated, continue to benefit concerning labor productivity. Baskoro et al., (2019) in his research states that domestic companies are identified as labor-intensive, of course, with the implementation of the omnibus law, the government must focus on improving the quality of the workforce through improving education, training, apprenticeship programs, and worker certification. On the other hand, for companies whose ownership is dominated by foreign this increase on productivity can be achieved by improving the climate for research and technology development and maintaining the quality of the workforce through health and social protection regulations.

4.2.3 Spillover of FDI

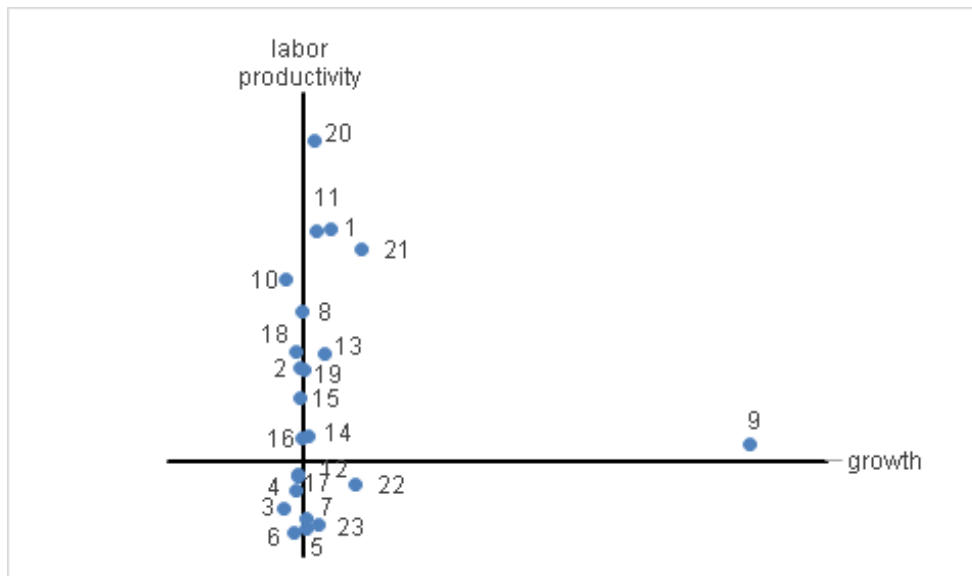
Model 2 regresses labor productivity in medium and large industrial companies whose capital ownership is dominated by domestic determinants, namely FDI and capital in the form of fixed capital in these companies as a form of direct foreign presence. Meanwhile, company size and foreign presence as a result of indirect foreign presence, respectively, express economies of scale and spillover from FDI as the expected technology component with a foreign presence. Model 4 regresses the same thing in industries whose capital ownership is dominated by foreign. Sectoral labor productivity in medium and large industrial companies whose capital ownership is dominated by domestic is relatively more homogeneous compared to

companies whose capital is dominated by foreign, as well as sectoral growth. The subsectors in companies that are dominated by domestic

capital accumulate at the point of origin so that the chosen one is REM (there is no difference in the characteristics of each subsector).



Large medium-sized companies whose capital is dominated by domestic (a)



Large medium-sized companies whose capital is dominated by foreign (b)

Figure 11. Plotting of medium and large industrial sub-sectors based on labor productivity and subsector growth according to the dominance of capital ownership (domestic (a) and foreign (b)), 2014

Source: Annual Survey of Large and Medium Industries 2014, BPS, processed data

Figure 11 is a diagram divided into four quadrants with the horizontal axis representing the growth of medium and large industries in general and the vertical axis is the labor productivity of medium and large industries in general. The productivity of labor in companies whose capital is dominated by foreign is more likely to be to the right side of general productivity and also the growth of its subsectors is more than the general growth. These differences in characteristics cause differences in the best model selected in the two models.

When the variables of company size and foreign presence are added to the model, the constant becomes negative, meaning that the input in the production process has a comprehensive effect on increasing productivity, many variables are related to technology transfer. Other production factors that are not included in the model are more in companies whose ownership is dominated by domestic compared to those owned by foreigners, as seen from the smaller R^2 . Manufacturing companies, which are mainly domestically owned, have many other problems apart from production factors, which can be related to policy or competition (market structure). This is in line with research conducted by Wojciechowski (2017) which shows that various domestic factors can hinder the spillover from foreign investment.

Company size as a proxy for the scale of the economy is the most important factor in increasing labor productivity in models 2 and 4. This shows that capital is not a major problem for labor productivity in Indonesia. The scale of the economy is closely related to business competition or the aggregate of market structure. It makes sense that high labor productivity is achieved by a company that can compete in the market. This competition is also related to efficiency in the allocation of resources used. Companies whose ownership is dominated by foreigners are closer to constant return to scale (with the total number of regression coefficients close to 1, compared to those with domestic ownership, meaning that the company is more efficient in using its resources. However, the effect of the scale of the economy is more dominant in domestic-dominated companies,

as indicated by the larger regression coefficient in model 3.

The effect of fixed capital is very small on the labor productivity of large and medium manufacturing industries in Indonesia when considering the variable company size and foreign presence. This is different from models 1 and 3 which ignore technology variables. It could be that companies that have high productivity are companies that do not have large fixed capital. This is possible because today's technology is cheaper. Companies that take advantage of high technology usually employ a smaller workforce.

When analyzed from the FDI regression coefficient, the effect of FDI is greater in companies whose ownership is dominated by foreign. In companies whose ownership is predominantly domestic, FDI has no significant effect on labor productivity. In companies whose ownership is dominated by foreign, the effect of FDI is dominant when ignoring the spillover effect of FDI. However, when incorporating an indirect influence in the form of foreign presence into the model, the effect of FDI drops sharply on labor productivity.

The indirect effect (foreign presence) from the existence of FDI in companies whose ownership is predominantly domestic has a negative sign, which means that it reduces the labor productivity. Karentina(2019) states that this negative influence occurs in the short term. Technology transfer as an indirect effect of FDI is a long-term process that needs to be carried out continuously to encourage companies to be more efficient in carrying out the production process. The implementation of foreign labor assistance as required by the Omnibus Law will have a positive impact on the company in the long term. In the short term, this can increase labor financing, so that production costs increase with additional labor.

5. Conclusions and Recommendation

The productivity of companies whose ownership is dominated by foreign is greater than companies whose ownership is dominated by domestic. The presence of foreign also causes companies to use their capital more effectively,

as shown in the scatter plot of foreign capital intensity and productivity. This is indicated by sectoral plotting.

FDI has a real direct effect and increases labor productivity in the manufacturing industry of companies whose ownership is dominated by foreign. Unfortunately, this FDI is not felt by companies whose ownership is dominated by domestic companies because there is no direct increase in labor productivity. The labor productivity of domestic companies is more influenced by fixed capital.

FDI has an effect on labor productivity in companies whose ownership is dominated by domestic if the variables of company size and foreign presence are added. The presence of FDI must be accompanied by company efficiency. In companies that are dominated by foreign, the effect of FDI spillover in the form of a foreign presence has a significant effect on increasing labor productivity. This means that when the investment tap in the form of FDI is opened, technology transfer and transfer of expertise should occur as has been proven in companies whose ownership is dominated by foreign. This is in line with the goals of the Omnibus Law. In companies whose ownership is predominantly domestic, this spillover reduces labor productivity due to the dominance of firm size. Therefore, these companies need to make efficient and increase technology absorption capacity first before promoting FDI.

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