Export orientation of Indonesia's manufacturing industry

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Abstract
The aim of this study is to analyze the export orientation of the manufacturing industry sector in Indonesia. In order to achieve this objective, Cobb-Douglas production function, consisting of foreign direct investment (FDI) and labor, was developed. The data from the Industrial Survey conducted by the Central Bureau of Statistics (Badan Pusat Statistik/BPS) for the period 2005-2015 with 249 manufacturing companies as samples. Based on the Hausman test, the fixed-effect model is more appropriate to be used in this study. The results from the estimation indicate that FDI and labor have a positive and significant impact on the growth of the export manufacturing industry. Labor has a stronger effect on exports than on FDI, where the coefficient of labor is 3.696 and of FDI is 0.302. On the basis of this result, it could be concluded that FDI and labor lead the export orientation to the Indonesian manufacturing industry.

Keywords: *Cobb Douglas production function, Export orientation, Foreign direct investment, Labor.*

JEL Classification: F14, D24, F2, O14, J24

INTRODUCTION

The industrial sector plays an important role for the Indonesian economy. This sector has the largest contribution to Indonesia's GDP, with the main sub-sectors, including mining and manufacturing. The manufacturing sub-sector (hereinafter referred to as the manufacturing sector) was the main contributor to the national GDP structure at 19.86 per cent in 2018 (see Fig. 1). This contribution rose by 3.86 per cent to 20.07 per cent of national GDP in the first quarter of 2019 compared to the same period of the previous year (Statista, 2019). The role of the manufacturing industry in the economy can also be seen from the chain effect of increased valued-added raw materials, absorption of local labor, increased investment and exports.

The percentage of the manufacturing sector in Indonesia's total exports also showed an upward trend. In 2017, the manufacturing industry accounted for 68.27% of Indonesia's total exports of USD 125 billion (Kementerian Perindustrian Republik Indonesia, 2018). Palm oil, apparels, and rubber and plastic industrial products are the main commodities. In 2018, the contribution of the manufacturing industry increased to 72.25 per cent or to USD 130.09 billion, an increase of 3.98 per cent compared to the previous year (Kementerian Perindustrian Republik Indonesia, 2019). However, this figure is relatively lower than the contribution of exports to the manufacturing sector in other developing countries, such as Thailand, Malaysia and Philippines, with contributions up to 90% higher. Indonesian government is committed to encourage the

productivity of the manufacturing sector in order to optimize the potential of the export market. Such activities are consistent with the results of Ramadhani, Rachman, Firmansyah, & Sugiyanto (2018) namely exports have a significant positive effect on GDP. He argues that one of the strategies to strengthen economic fundamentals is to restructure and strengthen the export performance of a country.

Indonesia is ranked 9th in the world (BKPM, 2020) with the highest MVA (manufacturing value-added) among ASEAN countries with a value of 4.5%. In line with these results, Indonesian government is developing a downstream method, given the abundance of Indonesia's natural resources and the increase of the ease of natural resources exports. The success of this strategy cannot be distinguished from investment both domestically (Domestic Investment) and internationally (Foreign Investment). Sharma (2003) found that FDI is an important variable to encourage export in East and Southeast Asian countries. Clear evidence of the role of FDI in improving performance can be seen from the ranking of China in the world from 32nd in 1978 to 3rd in 2004. Other studies also found positive direct investment (FDI) in exports in various countries, including Zhang (2005) in China, Jongwanich (2010) in Asian countries, Jevcak, Setzer, & Suardi (2010) in 10 EU Member States, Sharma (2003) in India, Magalhaes & Africano (2017), and Nisell (2017).
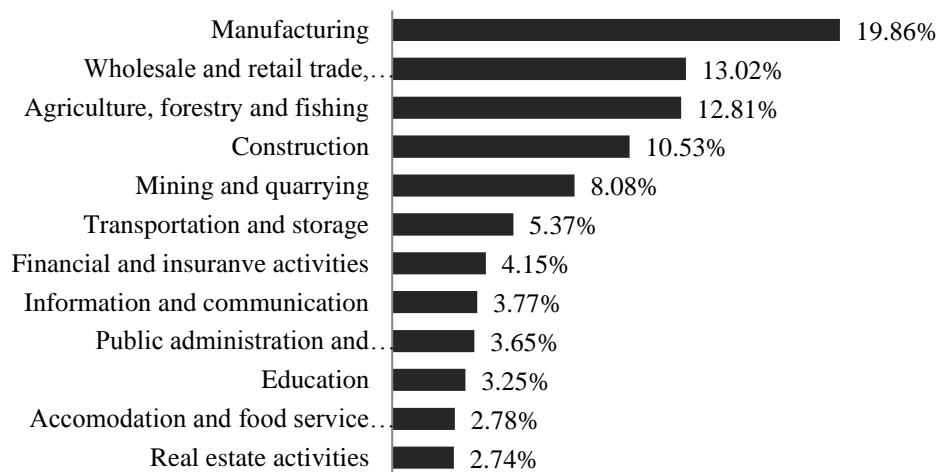

Figure 1. Contribution of industry to Indonesia's GDP 2018
Source: Statista (2019)

Increased FDI in a country can increase exports in that country (Uysal & Mohamoud, 2018). FDI contributes greatly to development through the transfer of assets, technologies and managerial skills. Based on the data from Kementerian Perindustrian Republik Indonesia (2019), FDI in the manufacturing industry amounted to IDR 195.74 trillion in 2014 and reached IDR 222.3 trillion in 2018. However, in the first semester of 2018, the value of manufacturing investment fell to IDR 122 trillion compared to the same period in 2017, amounting to IDR 146.1 trillion. According to Airlangga Hartarto (Minister of Industry of Indonesia) in Kontan (2018), this decrease was attributed to Domestic Investment (*Penanaman Modal Dalam Negeri*/PMDN) and FDI, which also saw a fall in PMDN from IDR 52.11 trillion to IDR 46.2 trillion and FDI from USD 7.06 billion to USD 5.6 billion.

Mahmoodi & Mahmoodi (2016) examined the trivariate causality relationship between FDI, exports and economic growth. Based on the panel of European developing countries, GDP and FDI have a one-way partnership to exports in the short term. There is evidence of the long-run causality of exports and FDI to economic growth and the long-run causality of economic growth and exports to FDI. FDI is having a positive impact on

exports. European countries can increase their economic growth by attracting FDI, for example by expanding the free trade zone. Meanwhile, developing countries in Asia are increasing their economic growth by increasing exports of goods and services. To reduce trade barriers, encourages export-based industry and improves quality control and training programs. Van, Dechun, Hossain, & Dung (2017) also observed that FDI and exports had a significant positive effect on Vietnam's economic growth over the long run, while FDI had a strong influence on GDP and exports over the short term. Furthermore, Jayakumar, Kannan, & Anbalagan (2014) found the importance of liberalization policies in India where liberalization could increase FDI inflow and export and import performance.

Export competitiveness of a country is measured using the Revealed Comparative Advantage (RCA) index. Indonesia's labor-intensive industry has seen a substantial decrease in competitiveness compared to other Asian countries, in particular Vietnam, which has actually improved. Moreover, Indonesia's intra-industry trade is still comparatively small compared to other countries. This suggests that Indonesia's manufacturing industry is still not using the Global Value Chain (GVC) opposed to other developing countries (Keme, 2017). There are five stages of a country's industrial development, namely the natural resource industry (Natural Resources Intensive/NRI), labor-intensive industries (Unskilled-Labor Intensive/ULI), higher skills (Human Capital Intensive/HCI), capital-intensive (Physical Capital Intensive/PCI), and technology and science-based industries Technology   Intensive/TI) (Badan Pengkajian dan Pengembangan Kebijakan Perdagangan Kemendag, 2017). Based on competitiveness indicators (RCA), Indonesia is still specialized in manufacturing exports in the NRI and ULI industries. The specialization reveals that Indonesia's manufacturing industry is still concentrated in low value-added industries. NRI's competitiveness is driven by Indonesia's natural resource reserves, while the ULI industry is supported by a comparatively low wage policy.

The industrial development strategy implemented in a country determines the industrial demand for labor in that country (Marshall, 1988). Indonesia has an "export-oriented" strategy for the growth of the manufacturing industry, which produces goods for the primary purpose of exporting or controlling the export market. According to Stein (1981) and Myint (1984), an "export-oriented" strategy would increase labor demand in the industry. That is due to the expansion of the market, which encourages business activities. The manufacturing industry absorbs a workforce of 18.25 million, or 14.72 per cent of the overall national workforce (Statistics Indonesia, 2019). The Asian Development Bank (2004) estimates the absorption from the manufacturing sector up to 20% of the population by 2024. The government is also working to improve the quality of human resources in the manufacturing sector. One of the priority programs is vocational education, which links and matches between Vocational High Schools (*Sekolah Menengah Kejuruan*/SMK) and industry. The government also promotes research and development programs aimed at generating innovation and developing labor-intensive export-oriented industries. During 2017-2018, the government conducted programs that link and match 609 industries with 1,753 vocational schools (LPEM, 2010).

Education has a dual role to play in economic growth. There is some literature on the effect of labor on the export performance of a country. A variety of approaches to assess the contribution of education to economic development, including the rate of return analysis, human resources approach, and education and economic growth analysis (Mitra, 2018). Nasir (2006) found that capital and skilled workers have made a significant and positive contribution to the growth of industrial output. Worker skills, however, are negatively linked to capital princes and semi-skill workers. He concluded that the skills of the worker are complementary with capital and semi-skill workers. According to him,

there are a number of ways to benefit economies of scale in the future, including working with higher education institutions to generate skilled human resources, increasing investment so that they can acquire modern technology, and providing incentives for research and development (R&D). Economists in various countries have published studies on the effect of foreign direct investment (FDI) and labor on exports (see Zhang, 2005; Jongwanich, 2010; Jevcak, Setzer, & Suardi, 2010). However, no research has been conducted on the contribution of labor and FDI to the export performance of the manufacturing industry in Indonesia.

In the New Order, Indonesia's economic development was once oriented towards import substitution and then became export-oriented and subsequently geared towards superior industrial products (LPEM, 2010). However, following the 1997/98 economic crisis, the government has not set specific goals for the development of the industrial sector, except to increase production growth and export growth. Throughout the reform era, the growth of the manufacturing industry lagged far behind globally tradable sectors, with an average growth rate of just under 5%. Meanwhile, during the New Order, the manufacturing industry could rise beyond two digits. Indonesia's manufacturing exports increased from just 7% to 20% of its total exports in 1997. The success of Indonesia's export-oriented policy is the result of numerous reforms that have an impact on industries and sectors (Asian Development Bank, 2004).

Several efforts have been made by the Indonesian government to encourage the growth of the manufacturing industry, including the revitalization of the manufacturing sector through the implementation of the Making Indonesia 4.0 road map (Kementerian Perindustrian Republik Indonesia, 2019). According to Gregory in Anggita (2019), this initiative aims to foster productivity and competitiveness in five priority industries, namely the food and beverage industry, the automotive industry, the electronics industry, the chemical industry, and the textile and textile product industry. The government also has an Omnibus Law system to improve the domestic investment climate and to provide business licensing facilities. In addition, the government encourages investment focused on priority clusters (including high-tech, capital-intensive and labor-intensive clusters), establishes trade cooperation with other countries (such as FTA of Indonesia with South Korea), provides fiscal incentive facilities in the form of tax holidays, holds Regional Comprehensive Economic Partnership (RCEP) and regulates tax breaks.

In recent years, government policies have increasingly centered on driving exports from Indonesia's manufacturing industry. It is due to the large presence of the manufacturing industry in the economy, which is projected to be the mainstay of national economic growth going forward. The success of the industry is inseparable from its development and development strategy, namely export-oriented. The purpose of this study is therefore to examine whether Indonesia's manufacturing industry is suitable for export-oriented. This research is intended to provide knowledge on the direction and magnitude of the role of FDI and labor in the development of manufacturing industry exports. This article is composed of five sections. This section is an introduction that discusses the background of the topic selection and the distinctions from previous studies. Section 2 consists of data, analytical tools and the definition of operational variables. Section 3 explains the pre-estimation, results and discussions. The final part contains conclusions, policy recommendations and research limitations.

METHODS

Data were derived from a survey of manufacturing industry statistics. It is a national representation of all the manufacturing industries in Indonesia, conducted by the Indonesian Central Bureau of Statistics. This study uses panel data consisting of 249 industries with 16 time series, namely the 2005-2015. The statistics are exports, foreign

direct investment and the amount of labor employed by the industry. All data is in the log form.

The variables used in this study are exports, foreign direct investment (FDI) and the number of workers in each industry per year of analysis. Several forms of production functions have been developed by experts; among them are the Cobb-Douglas production function, the production function with constant substitution elasticity (CES) and the translog function. This research model is based on the Cobb-Douglas production theory; given that the constituent components of the Cobb-Douglas function correspond to the variables used in this study. The form of Cobb-Douglas production function in the form of stochastic as follows (Eq. 1) (Gujarati, 2004).

$$Y_i = \beta_1 X_{2i}^{\beta_2} X_{3i}^{\beta_3} e^{ui} \quad \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots \quad (1)$$

Y is output, X_2 is labor input, X_3 is capital input, and e is the base of natural logarithms. The equation can be transformed into a logarithmic form so that the equation used in this study becomes Equation (2).

$$ln(export)_{it} = \beta_0 + \beta_1 \, ln(FDI)_{it} + \beta_2 \, ln(labor)_{it} + u_{it} \quad \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots \quad (2)$$

Output is proxied by the number of exports and capital is proxied by Foreign direct investment (FDI). β_0 is an intercept, ε_{it} is a stochastic error term where subscript it shows the number of cross- section (i) and time period (t).

This research equation consists of several variables, including FDI, labor and export. Foreign Direct Investment (FDI) is an investment made by residents of a country that crosses world borders intending to obtain interest rates in the long run (OECD, 2008). There are three things about direct investment: direct investment by an individual who lives outside the economy in which he or she invests, direct investment by foreigners either unincorporated or incorporated. Direct investment may also take the form of subsidiaries, associations and branches. In this study, FDI variable used is defined as investment that is invested in the Indonesian manufacturing industry, whether by individuals, groups or other parties coming from abroad. The labor variable used is the total number of workers who work in each manufacturing industry each year. Export variable is the cumulative export of manufactured industrial goods sold abroad in USD per year.

The exported commodity is part of a company's output and is marketed to other countries around the world. Foreign direct investment affects exports by funding the use of inputs in the production process and plays a part in the transfer of technologies and knowledge. FDI may be used by companies to buy and fund production operations, such as the purchasing and repair of machinery, the land rent, the payment of workers' wages and other production costs. Labor affects exports through its role as input in the production process. Labor productivity will influence the output or exports of the manufacturing company.

RESULTS AND DISCUSSION

Development of FDI, labor, and export in Indonesia's manufacturing industry

The manufacturing industry has a chain effect that is created by increasing the value-added of raw materials, absorption local labor, increasing investment and exports. The contribution of the manufacturing sector to Indonesia's total exports is showing a rising pattern. The export value of manufactured products hit USD 108.6 billion in 2015 and then rose to USD 110.5 billion in 2016. In 2017, the manufacturing industry accounted for 68.27% of Indonesia's total exports, or around USD 125 billion (Kementerian Perindustrian Republik Indonesia, 2018). The main commodities exported

are palm oil, apparels, rubber and plastic industry products. In 2018, the contribution of the industry rose by 3.98 per cent to 72.25 per cent or to USD 130.09 billion (Kementerian Perindustrian Republik Indonesia, 2019). Also in 2019, the export share of the manufacturing industry rose to 75.5 per cent or USD 126.57 billion. However, this figure is comparatively smaller than the ratio of exports to the manufacturing sector in other developing countries, such as Thailand, Malaysia and Philippines which have contributions of up to 90 per cent.

The Indonesian government aims to foster the productivity of the manufacturing sector in order to optimize the potential of the export market. It is one approach to strengthen economic fundamentals by restructuring and improving the export performance of a country (Ramadhani, Rachman, Firmansyah, & Sugiyanto 2018). The manufacturing industry became a government concern again in 2016. The sector was boosted again after reaching its golden age in the early 1990s. It was triggered by the deterioration of the global economic conditions that have had an effect on world commodity prices. The Indonesian government has now moved from a sector that depends on natural resources to an export-oriented sector that absorbs labor, namely the manufacturing industry. As in the 1990s, this industry is projected to be one of the pillars of the national economy. According to Budiyanti (2016), there are several strategies that the government can take to re-advance the industry, making it immune to crisis shocks and draw investors.

Based on data released by the Kementerian Perindustrian Republik Indonesia (2019), FDI in the manufacturing industry in 2014 amounted to USD 13 billion. The value of FDI fell to USD 11.8 billion in 2015. In 2016, it increased to USD 16.7 billion but decreased again to USD 13.1 billion in 2017 and USD 10.4 billion in 2018. During January-December, it reached USD 6.3 billion. This figure declined with just 29.7 per cent of total FDI, while the service sector accounted for the highest FDI share, hitting 59.1 per cent. The fall that has taken place over the past several years cannot be separated from the dynamics of the global economy as a result of many countries' trade conflicts and a recession of the international economy. That can also be seen from the decline in Domestic Investment (PMDN). According to Uysal & Mohamoud (2018), an increase in FDI in a country can increase exports in that country, and vice versa.

According to the International Monetary Fund Balance of Payment database, FDI is a net inflow of investment that requires the management of certain interest rates when operating a company in the economy. FDI data has a major problem that it cannot distinguish greenfield investment and capacity extension from mergers and acquisitions (Bertrand, 2004). Greenfield investment and capacity extension can directly increase the stock of physical capital in host countries. Mergers and acquisitions can encourage knowledge transfer in recipient countries through labor training, skills improvement, management expertise and organization. FDI inflows can also increase technological upgrades. The difference between greenfield investment and capacity extension, as well as mergers and acquisitions, would be more interesting to answer this research question, but it cannot be done due to limited data.

The manufacturing industry receives extra attention from the government in its current development. In the New Order, Indonesia's economic development was once oriented towards import substitution and then became export-oriented and subsequently oriented towards superior industrial products (LPEM, 2010). However, since the 1997/98 economic crisis, the government has not set clear goals for the development of the industrial sector, except to increase production growth and export growth. Throughout the Reform Era, the growth of the manufacturing industry lagged far behind the internationally tradable sectors, with an average growth rate of just under 5 per cent; whereas during the New Order, the manufacturing industry could grow above two digits.

Indonesia's manufacturing exports increased from only 7 per cent to 20 per cent of its total exports in 1997. The success of Indonesia's export-oriented policy is the result of numerous reforms that have an impact on the industry and across sectors (Asian Development Bank, 2004). After the 1980s, the manufacturing sector was an economic driver and a labor absorber to reduce poverty. According to Wie (2010), China is an example of a country that has managed to reduce poverty through a strategy of growing the country's manufacturing industry. Since 2016, the government has adopted again a policy for the manufacturing sector to be export-oriented.

In the last 4 years, employment in the manufacturing sector has started to increase. It employed 15.54 million workers in 2015 and then grew to 15.97 million in 2016. It opened up employment for 17.56 million people in 2017. The figure soared in 2018; with absorption of workforce up to 18.25 million people of 14.72 per cent of the overall national workforce (Statistics Indonesia, 2019).

Several industries in the manufacturing sector absorb the most labor, including the food industry (26.67 per cent), the apparel industry (13.69 per cent), the wood industry, wood products and cork industry (9.93 per cent), the textile industry (7.46 per cent), the non-metal mining industry (5.72 per cent), and the furniture industry (4.51 per cent) (Kementerian Perindustrian Republik Indonesia, 2019). Industrial demand for labor is also related to the country's industrial development strategy (Marshall, 1998). Countries that have export-oriented policies would have an impact on rising demand for labor in the industry. On the other hand, a country with an import substitution strategy would have a smaller market share and a limited production scale.

Pre-estimation

Before doing the estimation, there are several steps before determining the most appropriate model used in this study. Those include Breusch and Pagan Lagrangian Multiplier Test (LM Test) and Hausman Test. Other tests required are time-fixed effect and the Pasaran Cross-Sectional Dependence. LM Test is to determine the model used which are either Random Effects or simple Ordinary Least Square (OLS). Based on the LM test results, the probability value produced is smaller than zero (<0.05). Therefore, random effect is best considered as there is significant evidence of differences between companies in the manufacturing industry. In addition, the number of time series in this study was 11 years, with 249 entities as manufacturing companies. Since this number of entities is greater than the number of time series, it is better to use Fixed Effect or Random Effect.

The next test is the Hausman Test to determine whether it is better to use Fixed Effect or Random Effect. The Hausman test produces a p-value smaller than 0.05 (<0.05). So the more appropriate model to be used is the Fixed Effect (FE) model as the unique errors (ui) correlate with the regressor (Green, 2008). Fixed effect can minimize bias due to omitted variables (variables not included in the dataset but influencing the dependent variable) (Wooldridge, 2010). Related to this research, various variables affect the export of the manufacturing industry and it is very difficult to identify all of these factors in the dataset. This results in unobserved effects.

Further testing is to decide if it requires time-fixed effects while operating the FE model. The results show a probability greater than zero (>0.05). It can be concluded that the coefficient for all years is zero. So, there is no time-fixed effect is needed on this model. Cross-sectional dependence is a problem in macro panels with long period (20-30 years) and rarely becomes a concern in micro panels (short period). The Pasaran CD (cross-sectional dependence) testing is needed to know whether this problem exists. The goal is to examine whether or not the residuals between entities are correlated (contemporaneous correlation). Correlations between entities can result in bias. The

Pasaran Test shows a probability of 0.603 such that it can be concluded that there is no residual correlation.

Table 1. BP/LM Test, Hausman (1978) Specification Test and Testing for Time Fixed Effects

Pre-estimation test	Coef.
BP/LM Test	
Chibar2 (01)	409.63
Prob>chibar2	0.000
Hausman (1978) Specification Test	
Chi-square test value	88.55
P-value	0.000
Testing for Time Fixed Effects	
F (10, 2478)	1.76
Prob>F	0.0624

Estimation results

This section will present an analysis of the main findings of the study. The data used consisted of 2739 observations for each variable (Table 2). Researchers are using two methods to compare the results of both tests. However, the correct final result is still based on the pre-estimation of the fixed-effects model in the previous section. The comparison method to be used is random effects.

Table 2. Descriptive statistics

Variable	Obs	Mean	Std.Dev.	Min	Max
FDI	2739	7.954	10.813	0	100
Export	2739	10.189	13.792	0	100
Labor	2739	8.327	1.653	4.159	13.28

Table 3 presents estimation results of several fixed and random effects model specifications. Columns (1) through (4) report the estimated results of fixed effects and columns (5) through (8) display the results of random effects. The first specification formed consisted only of 1 dependent variable and 1 independent variable. The equations in columns (1) and (4) involve only one independent variable, FDI. Both estimation results indicate a significant positive effect of the FDI variable on exports from the manufacturing industry. The results of the fixed effect (1) imply that if there is only one type of input in the form of FDI, an increase in FDI by 1 per cent may increase exports by 0.417 per cent. This figure is not much different from the results of random effects, which is equal to 0.42 per cent.

Columns (2) and (6) are the results of the model specification with one other independent variable, namely labor. Both of these columns produce significant and positive estimation results at a significance level of 1 per cent. The column estimator (2) indicates that if there is only one type of production factor in the form of labor, an increase of 1 per cent in the number of labor would increase the export performance by 5.119 per cent. This finding is almost twice the estimated random effects (6), which is only 2.680 per cent. When FDI and labor are both single factors of production, it can be seen that the effect of labor on exports is greater than the effect of FDI on export performance. This indicates the importance and magnitude of the influence of labor inputs on the progress of the Indonesia's manufacturing industry.

Columns (3) and (7) are estimation results of the core equation. There are two independent variables (FDI and labor) and one dependent variable (exports). Column (3) shows a significant and statistically positive effect at a significance level of 1 per cent. The results show that a 1 per cent rise in FDI would have an effect on exports of 0.302 per cent. Meanwhile a 1 per cent increase in labor will affect an increase in export

performance by 3.696 per cent. Random Effect (7) also shows a significant positive outcome of FDI value that is not much different but labor has a figure that is much different than half of the results of fixed effects (3).

Columns (4) and (8) also show the results of the estimation of the main equation, but the independent variables used are labor and dfdi. Dfdi is a dummy of FDI where 1 implies the presence of FDI in the industry and zero means no FDI in the company. Estimation results show a significant positive effect of labor and dfdi on exports in each model used. This means that if there is FDI in manufacturing companies, the company will be able to increase its exports by 4.221 per cent. This number is not so far from the results of random effects (8). Meanwhile the labor estimator shows 4.236 per cent, this means that a 1 per cent increase in the number of workers will increase exports by 4.236 per cent. This finding is far greater than the random effects (8). It is almost the same as the results of the estimated columns (1). The labor coefficient also indicates a number that is not much different from dfdi, which is 4.236 per cent, which is smaller than columns (2). The coefficients of FDI (3) and dFDI (4) have far different values. FDI (3) uses the original value of FDI in the form of a percentage while dFDI uses the extreme value of existing and non-existent FDI.

Table 3. Estimation Results

Dependent variable : Export								
	Fixed Effects				Random Effects			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Fdi	0.417***		0.302***		0.422***		0.371***	
	(0.0316)		(0.0306)		(0.0310)		(0.0311)	
Labor		5.119***	3.696***	4.236***		2.680***	1.711***	1.568***
		(0.333)	(0.330)	(0.364)		(0.236)	(0.219)	(0.257)
Dfdi				4.221***				5.582***
				(0.640)				(0.634)
Constant	6.874***	-32.44***	-22.99***	-27.90***	6.830***	-12.13***	-7.012***	-6.596***
	(0.251)	(2.774)	(2.688)	(2.866)	(0.425)	(1.938)	(1.778)	(1.977)
Observations	2,739	2,739	2,739	2,739	2,739	2,739	2,739	2,739
R-squared	0.117	0.117	0.169	0.132				
Number of industry	249	249	249	249	249	249	249	249

*Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1*

The highest R-squared value is in columns (3) of 16.9 per cent. This figure shows that FDI and labor can explain variations in the exports variable by 16.9 per cent. If there is only one independent variable regressed as in columns (1) and (2), the resulting R squared value is smaller than the regression with two independent variables, such as columns (3) and (4). This increase is not surprising, because according to Wooldrige (2015), the addition of variables to the equation will automatically add the R squared value of the equation.

Overall, the results of the estimation of fixed effects and random effects indicate that FDI and labor have a significant positive effect on the significance level of 1 per cent on exports of Indonesia's manufacturing industry. The effect of FDI on exports when used as a single factor of production (column 1) as well as being one of the factors of production between two types of inputs (column 3) produces statistics that are not so different, as do the results of the random effects in column (5) and (7). However, the effect when FDI has a single input is greater than when it has two types of inputs. When there is only one type of input in the form of FDI (column 1), the manufacturing industry produces more capital-intensive output as the presence of FDI appears to be used for the procurement of machinery, buildings and other equipment that can support capital-intensive industries. However, if there are two types of inputs (FDI and labor) (column 3), the effect of FDI on exports will be reduced because the manufacturing industry is not

only focused on producing capital-intensive output, but also on balancing it with the use of labor. So the capitals collected in the company (Domestic Investment and Foreign Investment) are not only for capital-intensive equipment but also tools and machinery for enhancing labor performance.

To find out how the impact of the presence of FDI in the industry can be answered by column (4). The figure provided by the FDI dummy shows that the presence of FDI in the manufacturing industry would have an impact of 4.221 per cent on exports. Nonetheless, if we use historical FDI data from the manufacturing companies studied, the regression results of the FDI effect are only 0.302 per cent. This large gap in figures means that FDI in the manufacturing sector is currently not optimal. Government policies and strategies are required to maximize the benefits of existing FDI in manufacturing companies, considering the potential benefits that the industry will gain much more than 10 times the current benefits of FDI.

The effect of labor on exports as regarded as a single factor of production (column 2) as well as one of the factors of production for two types of inputs (column 3 and 4) shows statistics that are not so different. However, the results of the random effect estimation in column (2), (3), and (4) are far different from those of the fixed effects estimation. Even the numbers generated by random effects are half times smaller than those produced by fixed effects. The study should, however, emphasize the outcomes of fixed effects. The effect when labor is a single input (column 2) is greater than when the company has two types of input (column 3 and 4). The explanation for this is similar to FDI as a single factor of production. Labor, which is the sole factor of production, will make manufacturing companies produce labor-intensive output without the need to divide the intention for equipment such as machinery. Nonetheless, the effect of labor reduces as two types of inputs, as management focus will be divided with the aim of optimizing the benefits of the two existing factors of production.

The effect of FDI and labor as a single input (column 1 and 2) is much different, and the influence of labor is 12 times greater than that of FDI. By using FDI as a dummy, the effect of labor remains greater than the effect of FDI, although there is little difference (column 2 and 4). Overall, each model specification will generate a greater labor value than that of FDI. This can be inferred that Indonesia's manufacturing industry needs more labor than FDI, and Indonesian manufacturing companies tend to be labor-intensive. The types of products of the competitive non-oil manufacturing industry going into the export market include the food and beverage industry (USD27.28 billion), the base metals industry (USD17.37 billion), and the textile and apparel industry (USD 12.90 billion) (Minister Industry in Kontan, 2020). Based on the types of mainstay export products, the production process of such items is labor-intensive, both in the manufacturing of raw materials and in the adding of valued added to semi-finished goods. The process involves both skilled and trained labor.

The manufacturing industry is believed to be able to strengthen the Indonesian economy from global shocks. Reinforcing domestic potential is analogous to reinforcing plant roots that cannot be toppled by storms. The government promotes the export of commodities, the basic ingredients of which are owned by Indonesian nature, on the condition that there must be value added. The Indonesian government has an export-oriented policy in the development of the industry. As explained in the previous section, this strategy has an impact on the expansion of the workforce. Based on the estimation results, labor has a greater role than FDI. It can be concluded that the export-oriented strategy is the appropriate strategy for the development of the manufacturing industry. The magnitude of the influence of labor on Indonesian export performance (based on the results of regression table 3.2) and the potential of available human resources in Indonesia will be absorbed by the implementation of this strategy.

However, the expansion of job openings in the manufacturing industry must be balanced with the skills of the available workforce so as not to reduce the quantity and quality of output. Labor productivity plays an important role in encouraging exports of the industry. This result is consistent with the research carried out by Doan & Wan (2017), Iqbal & Nosheen (2016) and Hasan & Ramaswamy (2007), which found that labor had a positive effect on exports. Indonesian government has designed a range of strategies to enhance the quality of Indonesian human resources throughout the priority programs, including vocational education, which links and matches between Vocational High Schools (SMK) and industry. Iqbal & Nosheen (2016) also found that in export-oriented industries, trade liberalization had a significant positive effect on labor

The positive contribution from FDI is also comparatively low compared to labor contribution (Table 3.2). Although Indonesia's manufacturing industry is labor-intensive, this does not mean that the existence of FDI is not important. It is important since not all the products of the industry completely involve the role of labor. The rise in FDI will encourage exports through a process of capital accumulation, advanced technologies and enhanced management and marketing strategies that are typically adopted or introduced by multinational corporations operating as foreign investors (Pramadhani, Rakesh & Nigel, 2007). This finding is consistent with a number of prior researches, such as Selimi, Reci & Sadiku (2016), Magalhaes & Africano (2017) and Purusa (2018), which also found that FDI had a positive effect on exports. The study conducted by Appleyard, Field & Cobb (2008) found that one of the advantages of FDI is that it increases the productivity of the country, which also has an impact on rising exports. A combination of complementary FDI and labor should be developed in order to increase the amount of exports from the Indonesian manufacturing industry. The Indonesian government currently has a strategy to increase FDI in the manufacturing industry, such as the omnibus law, which facilitates the investment process in Indonesia.

CONCLUSIONS, RECOMMENDATIONS AND RESEARCH LIMITATIONS

Conclusions

This study aims to analyze the effect of FDI and labor on Indonesia's manufacturing industry exports using the Cobb-Douglas production function approach. Estimation results show that FDI and labor have a significant positive effect on exports. This means that these variables play an important role in the export orientation of the industry, but labor plays a much greater role than FDI. The estimated coefficient from the Fixed Effects regression shows that the effect of labor is 12 times greater than the role of FDI. Indonesia's current development strategy for the manufacturing sector, namely export-oriented, is the right policy, considering the main impact generated in the form of employment. However, the return of labor must also be recognized by maintaining the quality of labor so as not to reduce the productivity of labor on exports. There is no question that greater labor productivity would boost the export performance of the industry. Moreover, the effect of FDI in pushing exports of the manufacturing industry has not been optimal.

Recommendations

In recent years, the manufacturing industry has played an important role in the Indonesian economy. Due to the good performance of the manufacturing industry, there is a broad chain effect, starting with increasing the value added of domestic raw materials, absorbing local labor and receiving foreign exchange from exports. The manufacturing industry has received great attention from the government given the domino effect. The strategy launched by the government is aimed at encouraging FDI and improving the quality of human resources, such as omnibus law and the link and match of vocational

education and industry. The following are some policy recommendations on this subject. There is also a need for synergy between the elements of government in order to accomplish these strategies.

It is also important to note the development of the manufacturing industry to attract FDI. Government and stakeholders must require FDI to be planted in Indonesia, followed by technology and knowledge transfers. One of the causes of low FDI influence may be the lack of technology and knowledge transfers in the industry. Most of the FDI is only used for physical development, such as infrastructure. The government has an omnibus law to create job opportunities and encourage foreign investment. This policy makes it possible for investment bureaucracy to invest in Indonesia. It must, however, be noted that the terms and conditions of foreign investment must always be upheld and not provoked by corruption, collusion and nepotism.

The government has a main strategy for improving the quality of labor, namely the link and match SMK and industry. Government also has to encourage the industry to provide training and scholarships for its employees who are productive. This will have a long-term impact on the progress of the manufacturing industry in Indonesia. In conclusion, there must be good cooperation between the government and the company, including the development of the quality of the company's workforce.

Research limitations

This research has several limitations, including labor variables which do not differentiate between skilled and unskilled labor and labor based on their educational attainment. A further drawback is that there is no type of FDI classification. Greenfield investment or capacity extension can directly increase the stock of physical capital in host countries. However, mergers and acquisitions can encourage the transfer of knowledge in recipient countries through labor training, skill improvement, management expertise and organization (Bertrand, 2004). Manufacturing industries can be distinguished based on the type of production and industrial scale. Industrial scale is critical and needs to be differentiated in research, as large-scale industries continue to use increasingly sophisticated machines. As regards the availability of data, research data are available until 2015, when the issue of export orientation of the manufacturing industry has been declared by the Indonesian government since 2017. In the corresponding study, therefore, it is hoped that the researchers will distinguish between the types of labor, the type of FDI and the scale of the manufacturing company.

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