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EXPORT PREMIA IN THE PALM OIL INDUSTRY SECTOR IN INDONESIA (LEARNING-BY-EXPORTING HYPOTHESIS)

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Abstract—Among the advantages of international trade is *export premia*, in which the exporters have the advantages of productivity compared to non-exporter. *Export premia* can be analyzed through two hypotheses: *self-selection hypothesis* and *learning-by-exporting hypothesis*. The first hypothesis states that high level of firm productivity is a requirement to enter the export market. On the other hand, the second hypothesis convinces that the decision to enter the export market positively impacts the firm productivity. Empirically, the *learning-by-exporting hypothesis* is still inconclusive compared to the *self-selection hypothesis*. Based on literatures, this study applies *Total Factor Productivity* (TFP) measurement to test *learning-by-exporting hypothesis* in the palm oil industry in Indonesia as a major palm oil producing and exporting country in the world. Although the Indonesian government has applied an export tax policy in the national palm oil industry, the empirical result during the period of 2010-2014 showed that export experience (*dummy* and intensity) in previous year had positive impact on firm productivity in the current year.

Keywords: *export premia; learning by exporting hypothesis*.
JEL Classification: F10, F61, O12.

I. INTRODUCTION

Among the impacts of international trade is the *export premia*, which results the productive advantage of exporters compared to the non-exporters in the manufacturing industry sector. Debate on the relationship between export and industrial productivity is divided in two hypothesis groups: the *self-selection hypothesis* and *learning-by-exporting hypothesis*. The first hypothesis states that productivity determines firms' decision to enter the export market. In this case, only firms with high productivity are able to conduct export activities and compete in the international market. Clerides, et.al. (1998) showed that firms with high productivity were able to accommodate *sunk cost* to enter the export market.

Learning-by-exporting hypothesis states the opposite; firms' decision to enter the export market positively affects productivity. In this case, exporters' productivity are higher than that of non-exporter as a result of *knowledge and technology spillover* from the international market. According to Blalock and Gertler (2004), exporter firms received beneficial information from international consumers to reduce production cost, and improve product design and quality.

However, the *learning-by-exporting hypothesis* has been a debate due to differences in empirical study results in several countries. The empirical proof of *learning-by-exporting hypothesis* was still inconclusive. Several studies that failed to prove the *learning-by-exporting hypothesis*, tended to be directed at *self-selection hypothesis*. Liu, et.al. (1999) did not find any proof that the firms' productivity in electrical and electronics industries in Taiwan entering the export market was getting higher. In fact, the productivity growth of exporter firms was higher before entering the export market. This indicated that higher productivity of exporter firms compared to non-exporter firms was not due to knowledge and skills spillover from the export market, but the ability to survive in the export market.

Another study on *learning-by-exporting hypothesis* also failed to show the presence of *export premia*. The study of Greenaway, et.al. (2005) that applied regression technique of *matched difference in differences* failed to demonstrate a significant difference between the growth of productivity of exporter and non-exporter in the manufacturing industry in Sweden, both prior to and subsequent to entering the export market. The high level of *trade openness* in Sweden resulted in import penetration, so that non-exporters were able to compete with exporter firms.

In the case of manufacturing industries in Indonesia, studies on *learning-by-exporting hypothesis* at firm level were conducted by Sjoholm (1999), as well as Blalock and Gertler (2004). The two studies successfully proved the positive impacts of entering the export market toward firms' productivity.

Based on the debates on *learning-by-exporting hypothesis*, this study is aimed to identify academic contributions (*research gap*) referred to the studies done by Sjoholm (1999), as well as Blalock and Gertler (2004). First, this study focuses on palm oil industry sector in Indonesia, as the largest palm oil producing and exporting country in the world that was not specifically seen in the study samples of Sjoholm (1999), as well as Blalock and Gertler (2004). Generally, studies on *learning-by-exporting hypothesis* used manufacturing industry samples overall or focused on one industry sector with high level of *value added* and technology use. While *learning-by-exporting hypothesis studies* in industry sectors with low level of *value added* and technology use, such as palm oil industry are still difficult to find.

Second, the measurement of firms' productivity in the Sjoholm study (1999) used value added growth of

production output and labor productivity ; while Blalock and Gertler (2004) used *gross output* with the production function evolution technique. This study estimated productivity in the form of *Total Factor Productivity* (TFP) as *dependent variable*; similar to empirical proof of *learning-by-exporting hypothesis* conducted by Bernard and Jensen (1999), and Trofimenko (2008).

Third, this study also used variables of export status and firm export intensity as main *explanatory variables* in analyzing *learning-by-exporting hypothesis*, as in the studies of Sjoholm (1999), as well as Blalock and Gertler (2004). However, variables of export status and intensity in the study used *lag period* toward firm productivity. This differs from the study by Sjoholm (1999), as well as Blalock and Gertler (2004) that used variables of export status and export intensity to estimate firms' productivity during the same period. This followed the development of testing method of *learning-by-exporting hypothesis* in describing the *learning process* post-entry in the export market, as in the studies of Bernard and Jensen (1999); Trofimenko (2008); and De Loecker (2013).

Fourth, this study enriches *explanatory variable* that was not used by Sjoholm (1999), neither by Blalock and Gertler (2004) in analyzing *learning-by-exporting hypothesis*, which is the characteristic of export destination country. The increase of firms' productivity post export is also determined by the characteristics of the export destination countries. Trofimenko (2008) demonstrated that export to developed countries would give larger positive impact toward firms' productivity compared to exporting to developing countries.

Fifth, testing of export status endogeneity variable was not performed in the studies of Sjoholm (1999), neither Blalock and Gertler (2004); so that the study strives to overcome the issue of endogenity by using export tariff fees as *instrumental variable* (IV). The palm oil industry in Indonesia is among industrial sectors that impose the government's export tariff policy; so that it is highly relevant to use the export tariff as IV for firm export status in this study.

Based on the identification of *research gap* in the study of Sjoholm (1999) as well as Blalock and Gertler (2004), the following is a brief profile of the palm oil industry sector in Indonesia. The major aim of this study is to analyze whether the exporter firms' productivity is averagely higher than the non-exporters in the palm oil industry sector in Indonesia through the *learning-by-exporting hypothesis approach*.

II. LITERATURE REVIEW

The international trade creates exporters' advantages toward non-exporters. The productivity characteristic of exporter firms that is better than non-exporters is known by the term of *export premia*. *Learning-by-exporting hypothesis* emphasizes the assumption that *export premia* is due to the firms' decision to enter the export market. Therefore, higher firms' productivity occurred subsequent to conducting export activities.

Castellani (2002) revealed two main reasons behind the learning process on the presence of exporter firms in the international market. First, the connection with international buyers brought benefits related to knowledge and technology, such as introduction of technical skills encompassing product design and the latest production methods. Second, high international demand caused increasing production capacity utilization leading to *economies of scale* exploitation. Love and Mansury (2009) added that improvements on firms' productivity after entering the export market were due to three factors: (i) stronger competition level in the international market forced firms to rise product quality and production process in order to be competitive; (ii) introduction to superior foreign knowledge and technology helped exporter firms raise their productivities; and (iii) export activities encouraged investments on R&D and innovation so that firms' productivity increased.

Testing of the *learning-by-exporting hypothesis* generally involved firms' export status variables as main *explanatory variable* (difference between exporter and non exporter) and control variables at firm/industry level. The condition was illustrated by Bigsten and Gebreeyesus (2009) into the simple function as follows :

$$PRODUCTIVITY_{it} = f(EXPORT_{it}, CONTROLS_{it}) \quad \text{..... (1)}$$

In which firm productivity *i* in year *t* was influenced by export status variable and firm control variable in the same year. In this case, the existence of *learning-by-exporting hypothesis* or the positive impact of export activity on productivity was determined by firms' export status variable that could be expressed in the form of *dummy* as well as export intensity (percentage of firm output exported).

Besides that, validation of *learning-by-exporting hypothesis* used the firms' status export variable and control variable at firm/industry level with *lag period*. The condition was also depicted by Bernard and Jensen (1999) in the simple function as follows :

$$PRODUCTIVITY_{it} = f(EXPORT_{it-1}, CONTROLS_{it-1}) \quad \text{..... (2)}$$

In which firm productivity *i* in year *t* was affected by export status variable and firm control variable of the previous year. This was stated by De Loecker (2013) that export experience and other firm behavior played a role in determining the future of firms' productivity.

Meanwhile, control variables at firm/industry level reflect firm/industry charateristics that can be used as *channel* in describing the *learning-by-exporting hypothesis* phenomenon. At firm level, control vaiables that are often used in analyzing *learning-by-exporting hypothesis* comprises firms' ownership status (foreign/domestic), firm location, firm size, capital intensity, and characteristics of export destination countries. While level of competition is used as control variable at industrial level. Therefore, the hypothesis of this study is: the exporters' productivity is

averagely higher than non-exporters in the palm oil industry sector in Indonesia.

III. METHODS

The testing of *learning-by-exporting hypothesis* in this study focuses on the palm oil industry sector in Indonesia, divided in two industrial subsectors at five digit level of Indonesian Enterprise Field Standard Classification (KBLI): palm foodstuff oil industry (KBLI 10431) and the palm cooking oil industry (KBLI 10432). The period of five years, from 2010 to 2014, was chosen based on the revision of KBLI 2005 to KBLI 2009 that took effect in 2010. In KBLI 2005, the palm foodstuff oil industry sector was still merged into the crude oil industry sector (foodstuff oil) from plants and animals. The palm foodstuff oil industry only became a distinct industrial sector in KBLI 2009.

The estimation technique built to prove the study hypothesis consists of two phases. First, measuring the firms' productivity in the form of *Total Factor Productivity* (TFP). Measurement of firm TFP began with estimation of Cobb-Douglas production function as follows :

$$y_{it} = \beta_0 + \beta_k k_{it} + \beta_l l_{it} + \beta_m m_{it} + \varepsilon_{it} \quad \text{..... (3)}$$

In which y_{it} : natural logarithm of *gross output of firm i* in year *t*; k_{it}, l_{it}, m_{it} : natural logarithm of fixed capital value, total labor, and raw materials value of firm *i* in year *t*; and ε_{it} : *error*.

The above equation was regressed to obtain coefficient value of variables *k*, *l*, and *m*. Residual consists of component ω_{it} that reflects productivity known only to the firm, and ε_{it} reflects residual not known to researcher and firm. Thus, after the values β_k, β_l, and β_m are known, the value of firm TFP may be calculated through the following equation :

$$TFP_{it} = y_{it} - \hat{\beta}_k k_{it} - \hat{\beta}_l l_{it} - \hat{\beta}_m m_{it} \quad \text{..... (4)}$$

Data used in estimating firm TFP is sourced from Annual Survey of Manufacturing industry Firm or Large and Medium Industries (IBS) issued by the Central Bureau of Statistics (BPS). Considering the numerous *missing values* of firm fixed capital in IBS data, the fixed capital data (*k*) in this study used *proxy* amount of the firms' electrical consumption. However, the use of *proxy* has a weakness since the larger amount of electrical consumption does not surely reflect the additional firm fixed capital, but the inefficiency due to production machines that are wasteful in electrical consumption. Before going into equations (3) and (4), nominal value data of *gross output* (*y*) and raw materials (*m*) of the firms need to be deflated to remove the effects of rising prices due to inflation; so that the real value is obtained. Based on data of Large Trade Price Index (IHPB) issued by BPS, the price index of palm oil and raw materials for industry are used as deflator for *gross output* and firm raw materials.

The second phase is to estimate the impacts of export activities toward firm TFP. The study took the assumption made by Bernard and Jensen (1999), and De Loecker (2013) as a guide; stating that export experience and firm activity at present influence firm productivity in the future. The empirical specification used in the framework of this study to analyze the *learning-by-exporting hypothesis* in the Indonesian palm oil industry sector is as follows :

$$\begin{aligned} lnTFP_{ijt} = {} & \beta_0 + \beta_1 EXP_{ijt-1} + \beta_2 STAT_{ijt-1} + \beta_3 LOC_{ijt-1} \\ & + \beta_4 SIZE_{ijt-1} + \beta_5 CAPINT_{ijt-1} + \beta_6 EX\_HMC_{ijt-1} \\ & + \beta_7 HHI_{jt-1} + \beta_8 ISIC_{jt-1} + \varepsilon_{ijt-1} \quad \text{..... (5)} \end{aligned}$$

In which $lnTFP_{ijt}$: productivity of firm *i* in the industry sector *j* in year *t*; EXP_{ijt-1} : *dummy* export status of firm *i* in the industry sector *j* in year *t-1* (EXP_{ijt-1} = 1 if exporter; EXP_{ijt-1} = 0 if nonexporter) and export intensity (percentage of output exported) by firm *i* in industry sector *j* in year *t-1*; $CAPINT_{ijt-1}$: capital intensity (ratio of fixed capital value per total labor) of firm *i* in industry sector *j* in year *t-1*; $SIZE_{ijt-1}$: size (total labor) of firm *i* in industry sector *j* in year *t-1*; $STAT_{ijt-1}$: *dummy* ownership status of firm *i* in industry sector *j* in year *t-1* ($STAT_{ijt-1}$ = 1 if foreign firm; $STAT_{ijt-1}$ = 0 if domestic firm); LOC_{ijt-1} : *dummy* location of firm *i* in industry sector *j* in year *t-1* (LOC_{ijt-1} = 1 if located in industrial area; LOC_{ijt-1} = 0 other than location in industrial area); EX_HMC_{ijt-1} : export status of firm *i* in industry sector *j* in year *t-1* to *high-medium countries* (EX_HMC_{ijt-1} = 1 if exporting to *high-medium countries*; EX_HMC_{ijt-1} = 0 if other than exporting to *high-medium countries*); HHI_{jt-1} : Herfindahl Index of industry sector *j* in year *t-1*; $ISIC_{jt-1}$: *dummy* palm oil industry subsector (*ISIC* = 1 for KBLI 10432; *ISIC* = 0 for KBLI 10431); and ε_{ijt-1} : *error*.

Data of export status and intensity, capital intensity, firm size, firm ownership status, firm location, list of firm export destination countries, Herfindahl Index calculation, and code of KBLI palm oil industry sub-sector were also obtained from the IBS Survey by BPS. List of export destination countries was then classified according to per capita income level based on the World Bank data.

In the framework of overcoming endogeneity issues in export status variable (EXP_{ijt}), the export tariff variable was used as *instrumental variable* (IV). The export tariff on palm oil commodity and derivative products used data of the Finance Ministry and Trade Ministry referred to Permenkeu concerning Establishment of Export Goods Subject to Export Duty and Export Duty Tariff, as well as Trade Minister Regulation (Permendag) concerning Establishment of Standard Export Price on Export Goods Subject to Export Duty. The Permendag also includes data on development of global CPO prices.

IV. RESULT AND DISCUSSION

The study used *balanced panel data* during the period of 2010-2014, so that the *cleaning data* process produced 419 firms from two palm oil industry sub-sectors in Indonesia (KBLI 10431 and KBLI 10432); the data were always recorded in the annual IBS survey. Based on the data, the number of firms operating in the palm food oil industry subsector (KBLI 10431) was much larger compared to the number of firms in the palm cooking oil

industry subsector (KBLI 10432). This indicates that the *Crude Palm Oil* (CPO)/*Crude Palm Kernel Oil* (CPKO) commodity was still the primadonna compared to the derivative products, such as cooking oil. CPO/CPKO products are categorized as *raw material* with higher *value added* compared to its derivative products, so that the production process is relatively simple and does not require high technology.

Although palm oil plays a role as prime national export commodity, generally the number of firms' export status is far fewer compared to non-exporters in the palm oil industry in Indonesia. The majority of exporters also operated in the palm food oil processing sector (KBLI 10431).

The initial phase estimate in the study is the calculation of TFP as *proxy* firm productivity in the palm oil industry sector in Indonesia. Based on the results of production function regression as panel with methods of *fixed effect* (FE) and *random effect* (RE), coefficients of capital value, total labor, and material value were obtained as follows :

Table 1. Production Function Estimates
Note: the sign * indicates significance level: * p<0.1; ** p<0.05; ***

Dependent variable: Log natural output (ln Y)		
	Fixed Effect (FE)	**Random Effect (RE)**
Log natural capital (ln K)	0.01208252**	0.01247508***
	(0.0047134)	(0.0037651)
Log natural total labor (ln L)	0.23707218***	0.39116257***
	(0.0407844)	(0.0283386)
Log natural material (ln M)	0.32528022***	0.35049919***
	(0.0110192)	(0.010103)
Constant	12.073392***	10.789022***
	(0.2813423)	(0.22099)
Observation	2095	2095
Adjusted R^2	0.4792	0.4878

p<0.01

The coefficient of estimated results with the FE dan RE methods both show significant values. However, based on the Hausman Test, the estimate result with FE method is selected since it is more efficient than the RE method (Prob>Chi2 = 0.0000).

Upon discovering coefficient value of the production function, the value of TFP of each firm in the palm oil industry sector in Indonesia might be obtained through *Solow Residual* technique such as in equation (4).

In order to ascertain whether exporters in the palm oil industry sector in Indonesia averagely have higher productivity than non-exporters due to decision to export, the next phase is to estimate the main empirical specifications of the study as shown in equation (5). Specifically, the estimate validates whether firms' export status in the previous year will have positive impact on firms' productivity in the current year. Results of regression with *fixed effect* (FE) method are as follows :

Table 2. Estimates of Learning by Exporting Hypothesis

Dependent variable: ln TFP_{ijt}		
	(1)	(2)
Export Status (β_1)	0.2327373**	0.0050391**
	(0.1090402)	(0.0020515)
Firm Ownership Status (β_2)	0.1764331	0.1662499
	(0.1866445)	(0.1861866)
Firm Location (β_3)	-0.1216444	-0.1328856
	(0.1650446)	(0.1647395)
Firm Size (β_4)	0.1606803***	0.1559976***
	(0.0484727)	(0.0483742)
Capital Intensity (β_5)	0.0112091	0.0069047
	(0.029693)	(0.0296961)
Export to Developed Countries (β_6)	-0.2756959**	-0.1613236
	(0.1255388)	(0.1109193)
HHI (β_7)	-8.786955***	-8.843821***
	(2.098172)	(2.097283)
Dummy KBLI (β_8)	0.9825821***	0.9610795***
	(0.2995772)	(0.298939)
Constant (β_0)	11.19812***	11.13768***
	(0.3022569)	(0.3050055)
Observed	1676	1676
Adjusted R^2	0.0341	0.0227

Note:
The sign * shows significance level: * p<0.1; ** p<0.05; *** p<0.01
Column (1) : Export status (*dummy*)
Column (2) : Export status (intensity)

Based on the table above, it is clear that *dummy* variable of firm export status and export intensity in the previous year both had significant positive impacts toward firm productivity in the current year. This is in line with study results of Sjoholm (1999), as well as Blalock and Gertler (2004) for manufacturing industry cases in Indonesia. Column (1) shows that firm with export status in the previous year possessed productivity advantage for the current year of 0.2327373 compared to the non-exporter (*ceteris paribus*). While column (2) explains that export increase of 1% in the previous year will increase firm productivity in the current year by 0,005% (*ceteris paribus*). The statement of Bernard and Jensen (1999), as well as De Loecker (2013) that export experience played a role in determining the future of firm productivity was proven in this study.

Meanwhile, the status of foreign firm (PMA) and domestic firm (PMDN) in the previous year insignificantly affected the firm productivity in the current year. This is possible since the palm oil industry is categorized as *low technology*; the production process does not require high technology. Likewise, firm location located in industrial area in the previous year insignificantly affected firm productivity in the current year. This is possible since palm oil industry is oriented at natural resources, so that the firms tend to select a location nearby the oil palm estate.

Firm size in the previous year proxied by number of labor made positive impact on firm productivity in the current year. Column (1) and (2) show that addition of 1% total firm labor in the previous year will raise firm productivity in the current year by 0,16% (*ceteris paribus*). This also indicates that the palm oil industry is a labor intensive industry. The firm capital intensity in the previous year had insignificant impact on firm productivity in the current year; it increasingly strengthens the argument that the palm oil industry in Indonesia is categorized as *low technology*. Thus, firms with PMA status that tend to have high technology do not show any significant difference to the PMDN status firm.

Column (1) shows that firms exporting to developed countries in the previous year had lower productivity in the current year by 0.2756959 compared to firms that did not export to developed countries, both exporter firms and non-exporter. While column (2) shows that the level of firm productivity in the current year did not differ significantly between firms exporting to developed countries and firms that did not perform the activity in previous year. This result illustrates that developed countries as export destination do not guarantee a greater benefit compared to developing countries.

At industrial level, column (1) and (2) indicate that the lower the level of industrial competition (HHI value increasingly approaches the figure 1) in the previous year, the likelier there would be significant negative impact toward firm productivity in the current year. Conversely, the more competitive the industry competition level (value of HHI increasingly approaches 0) the more positive the impact on firm productivity.

Apart from that, column (1) and (2) show that firm productivity in the palm cooking oil industry subsector (KBLI 10432) is averagely higher than firms in the palm food oil industry subsector (KBLI 10431). This is possible since *value added* of firm production output in the palm cooking oil industry (downstream sector) is higher than the palm food oil industry (upstream sector).

In the framework of addressing the problem of export status endogeneity in empirical specification (5), the export tariff that conceptually is the determinant of firm export decision is used as *instrumental variable* (IV). The results of the *endogeneity test* indicate that export status variable (*dummy* and intensity) in empirical specification (5) is exogenous (value of Chi2(1) P-val > 0,1). Therefore, the coefficient value in the empirical specification (5) may be interpreted in analyzing *learning-by-exporting hypothesis* in the palm oil industry sector in Indonesia.

V. CONCLUSION

The empirical testing results of the *learning-by-exporting hypothesis* in this study proved there is *export premia* in the palm oil industry sector in Indonesia. Export status and intensity made significant positive impact toward firm productivity, so that exporters' productivity is higher on average compared to the non-exporters. Specifically, the study shows that export experience in the previous year positively impact toward firm productivity in the current year. This strengthens the firm learning process through export activities (*learning by exporting*).

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