Higher productivity for importing SMEs in Vietnam: Self-selection, learning-by-importing or both?

Nguyen Thi Hoa, Nguyen Ngoc Anh and Doan Quang Hung

May 2015

Abstract

This study provides first-hand evidence on the impact of import activity on firm-level labor productivity by using the longitudinal dataset for manufacturing SMEs in Vietnam from 2005 to 2013. We document three main results. First, importers are more productive than enterprises that source inputs only from domestic market with the so-called productivity premia for importers of 15.9%. Secondly, these importer premia are explained empirically by self-selection process while thirdly, learning-by-importing hypothesis is not supported by evidence from the Vietnam's SME survey data.

Keywords: Productivity premia; Importer productivity premia; Self-selection; Learning-by-importing;Vietnam, SME

Correspondence: Nguyen Thi Hoa is an associate researcher at the Development and Policies Research Center (DEPOCEN, Vietnam), email: thihoanguyen1993@gmail.com; Nguyen Ngoc Anh is a Chief economist at the Development and Policies Research Center (DEPOCEN, Vietnam) and affiliate professor at IPAG School of Business (France); email: ngocanh@depocen.org. Doan Quang Hung is an affiliated researcher at DEPOCEN and professor at Foreign Trade University; email: quanghung@depocen.org. The authors would like to thank Dao Ngoc Tien for his helpful comments and suggestions. The usual disclaimer applies.

1. Introduction

It is a well-documented fact for many countries that firms engaged in international trade perform better than firms that only serve the domestic market. A large literature has been devoted to explaining the productivity difference between firms involved in international trade and those only selling on the domestic market. A large literature has been devoted almost exclusively to the linkages between exporting and firm's performance as measured by productivity or other proxy. More recently, a growing literature has also been emerging to address the similar question between importing and firm's performance.

Trade integration has long been considered as an important factor for Vietnam's economic development and the country has seen an ever increasing trade with other countries. For example, between 2005 and 2013, the merchandise exports value of Vietnam rose by 307% while merchandise import value increased by 259% surpassing the increase in GDP of Vietnam (in nominal terms), which grew by 196% during the same period (UNCTAD, 2014).

There has been a number of studies for Vietnam looking at the linkage between export and innovation (Nguyen et al 2008), and productivity (Pham et al 2014). The linkage between import and firm's performance is under-researched. To fill in the gap and contribute to previous studies, this study provides the first empirical evidence on the impact of import activities on the firm-level productivity from Vietnam. In economic point of view, entering import market is a high-entry activity. Enterprises which desire to participate in import market have to face with certain barriers such as higher costs due to import tariff, more sunk costs, fierce competition with enterprises in host markets and so on. Those barriers act as an entry line that if enterprises are competitive enough to break through, they are able to join import market. One way to become "competitive" for enterprises is to become "more productive", exploiting their workforce in such a way to create higher value added for them. Workforce is known as a comparative advantage for enterprises in Vietnam. Vietnamese enterprises might take

advantage of cheap labor to reduce production cost and compensate for sunk cost when trading internationally. By importing, enterprises might also take huge advantages of importing such as obtaining low-cost materials for production, specializing resources in their own products or activities to enhance competitive advantages, and getting inputs from the advanced technology from foreign producers and knowledge-leading enterprises worldwide. By increasing global specialization, both import and export are beneficial for firms in many aspects. Thus, the presumption is that international trade positively affects productivity of firms.

This study begins with a preliminary analysis documenting the productivity premium for importers. The paper then sets out to explain this productivity premium in light of two contrasting theory: learning by importing and self-selection. To address question of self-selection, we use two approaches which bring out different interpretations but still with the same purpose of finding the validation of self-selection hypothesis. The first approach is to use regressions of lagged productivity level two years before enterprises start to import on the import status to investigate whether or not todays' importers were more productive than todays' non-importers two years before they start to import. The second approach is to use Probit models on the possibility of starting to import in the future given a change in labor productivity today. To facilitate interpretation, marginal effects are used together with Probit models. Models in both approaches in this part control for the ex-ante 2-digit-industry code, time, province, and the number of workers.

The question dealing with the productivity-enhancing effects due to import is addressed next. We also apply two approaches to examine the validity of learning-by-importing hypothesis. The first one is to regress post-entry labor productivity growth on the today's importing status dummies. The regressions show how the post-entry productivity is improved for enterprises that start to import compared with enterprises that do not. Furthermore, to better isolate the effect of self-selection, we apply second approach using Propensity Score Matching (PSM) method to find the matched today's

non-importers that have as similar characteristics as possible with today's importers to obtain average treatment effect on the treated (ATT) investigations. All models used in testing the second hypothesis are controlled for 2-digit-industry code, time, province, and the number of workers in different point time (depending on the model).

The next part of the paper provides literature review on recently published studies. Section 3 consists of data descriptions and preliminary analysis. Section 4 examining the validity of self-selection hypothesis of importing enterprises, Section 5 investigates the existence of learning-by-importing, and Section 6 concluding remarks.

2. Literature review

This part sketches an overall picture of empirical research only since 2011. Empirical studies from 2007 to 2010 were systematically reviewed in Wagner (2011). Empirical studies before 2007 on the same topic were surveyed in Greenaway and Kneller (2007) and Wagner (2007).

On the relationship between international trade activities and productivity, there are many recently published empirical research analyzing micro data from various countries that distinguish between four types of firms: exporting-only enterprises, importing-only enterprises, two-way traders that both buy and sell in global market, and non-traders that only active in domestic market. Productivity differential and its link with difference level of engagement in international trade are the building block of these studies including evidence from Spain (Minondo, 2012), Sub-Saharan African (Foster-McGregor et al., 2013), Chile (Kasahara and Lapham, 2013; Wu, 2013), Malaysia (Lee, 2014), Netherlands (Berg, 2013), Slovenia (Loecker, 2012), Spain (Manijón and Máñez, 2012), and Ethiopia (Abreha, 2014).

From their studies, a big picture is sketched out as follows. Enterprises that engage in international trade are more productive than enterprises that only sell and buy on the national market only. It can be documented by using simple regressions with or without control variables and fixed firm effects to find the significant

productivity differential, namely productivity premia, between traders and non-traders. Two-way traders are often the most productive enterprises, followed by one-way traders while domestic market-active enterprises are the least productive ones. Evidence in favor of productivity premia was found for exporters (Minondo, 2012; Kasahara and Lapham, 2013; Foster-McGregor et al., 2013; Wu, 2013; Lee, 2014). Regarding the import activities, Kasahara and Lapham (2013), Manijón and Máñez. (2012), and Abreha (2014) reported positive importer productivity premia. Among the studies covering both importing and exporting, Foster-McGregor et al. (2013) reported that productivity only statistically significantly differs between two-way traders and importing-only enterprises and no significant difference in productivity is found between two-way traders and exporting-only enterprises. Berg (2013) observed an increasing productivity from non-traders, importers, exporters and two-way traders orderly. Therefore, it is well established in the literature with strong evidence for data from various countries that enterprises engaged in international trade are more productive than enterprises that only trade domestically.

To explain the empirical consistency of a positive correlation between import and productivity at the firm level, two hypotheses were established, namely self-selection hypothesis (the more productive an enterprise is, the higher possibility it goes importing) and learning-by-importing hypothesis (the more an enterprise engages in international trade activities, the higher productivity it enjoys). Those two hypotheses are mutually and causally linked. Self-selection of more productive firms into importing market occurs before starting time and productivity-enhancing effects of import occurs after starting time. Thus, investigation on the existence of the latter hypothesis should control for the effect of the former one.

Beginning with the first hypothesis, Abreha (2014) ran OLS regressions on lagged values of labor productivity controlling for firm capital, share of skilled workers, export intensity, year dummy and industry and did the Kolmogorow-Smirnov tests. In his work, both approaches exhibited strong evidence of firm self-selection into import

market. To explain, he argued that importing is associated with fixed costs that are sunk costs such as the cost of searching for foreign suppliers, inspections of goods and the negotiation-related expenses, contract constructions, acquisitions of customs procedures and similar.

For the learning-by-importing hypothesis, Berg (2013) recognized twins of importers based on pre-entry productivity level, productivity growth, ownerships, number of workers, industries, and regions. Comparing static productivity levels between importers and their matched twins, Berg found no significant evidence for learning-by-importing. In contrast, Abreha (2014) used a model in which static and dynamic effects of importing are separately estimated. The results expressed positive productivity-enhancing effect by importing. To explain, Abreha argued that the intensive use of imported materials is linked with higher productivity level among importers. In short, applying various estimation methods, these recently published studies have consistent results with previous ones, which provides no clear evidence in favor of learning-by-importing. In this study, we apply the so-called "standard approach" (Wagner 2005, p.2) with the extension to Probit models and PSM method.

In summary, previous studies gave persuasive empirical evidence on a positive correlation between international trade activities including import and productivity at firm level for numerous and increasing number of both developing and developed countries. In theory, the direction of causality between productivity and import can run from either side or from both sides simultaneously and studies on the direction of causality between productivity and importing status is still in on-going process.

3. Data description and preliminary analysis

In our study, we use the bi-annual SMEs survey conducted by the Institute of Labor Science and Social Affairs (Vietnam) in collaboration with the Central Institute for Economic Management – CIEM (Vietnam) and University of Copenhagen (Denmark) over the period from 2005 to 2013. This data set contains a battery of rich

information on the performance and behavior of firms and traces the development of firms through time, allowing us to construct a panel data of firms, which is essential to addressing our research questions [1] In our analysis, we focus on firms in the manufacturing industry since they are the main source of import and export activities in the economy and make up the large part of the sample. This empirical study, therefore, is based on information for all Vietnam SMEs from the manufacturing sector in the period from 2005 to 2013.

In this study, we focus on labor productivity which is calculated as the value-added over workforce (i.e. full regular workers). All variables has monetary value are corrected by using GDP Deflator of Vietnam with base year being year 2010. GDP Deflator is taken from World Bank database. Data are slightly processed before being taken into analysis. Since the study targets the SMEs, all firms whose number of regular workers do not satisfy classifications are excluded (i.e. large firms). Besides, in some cases some firms reported wide variation of value added. They have either tiny or very huge amounts of value added in some years, leading to tiny or very huge fluctuation of labor productivity. We suspect that these extreme values might be caused by reporting errors, idiosyncratic events or the natural characteristics of the firm. Therefore, provided that this kind of outliers might influence the findings in both descriptive statistics and economic investigations, all firms of the bottom and top one percent of labor productivity distribution are excluded from all computations.

Table 1: Trade participation of SMEs in Vietnam

Year	2005-2013	2005	2007	2009	2011	2013
Non-traders	7124	1373	1310	1448	1515	1478
Exporting-only firms	535	128	95	106	105	101
Importing-only firms	245	69	34	50	43	49
Two-way traders	179	34	35	36	34	40
Total	8083	1604	1474	1640	1697	1668

Source: Calculated from the SMEs data provided by CIEM

[1] It is unbalanced dataset because there are firms which are surveyed in one year but not in another/other years. The study mainly uses unbalanced form of data but occasionally employs the balanced form of data in case the number of observations is large.

Table 1 illustrates the share of four types of firms according to trading status in each year of the dataset. One noticeable feature is that the most popular trading entity is non-traders, while proportions of exporters, importers and two-way traders are very small. There are 8083 enterprises surveyed, of which 88.14% are non-traders, 6.62% are exporters, 3.03% are importers and only 2.21% are two-way traders over the period. This can be interpreted from a fact that due to being SMEs with limitation in terms of size, capital and other resources, they hardly go international. Interestingly, in every survey year, that pattern of trading status keep the same and the number of observations is evenly distributed.

Table 2: Average labor productivity of SMEs, from 2005 to 2013

Unit: thousand VND/year

Year	2005-2013	2005	2007	2009	2011	2013
Non-traders	55873.68	45723.05	55153.61	58781.63	59454.68	59421.82
Exporting-only firms	83567.15	54722.26	106323.3	100433.7	87082.34	77397.58
Importing-only firms	162197.1	260200.9	90363.47	181735	109747.6	100126
Two-way traders	105620.2	68614.68	88091.18	87843.77	147118.3	133138.3
All enterprises	62159.89	56152.72	60045.78	65860.31	64815.47	63444.93

Source: Calculated from the SMEs data provided by CIEM

Table 2 provides an overall picture of the average labor productivity of all enterprises increased during the 2005-2013 period. As can be seen, enterprises that engage in international trade seem to have higher average labor productivity than other enterprises. Interestingly, for the whole period, import-only firms seem to have outperformed the exporting-only firms and two-way traders. However, more recently (in 2011, and 2013) the two-way traders outperform the import-only firms, which in turn consistently outperform exporting-only firms.

To investigate further the correlation between import/export activities and firm-level characteristics, we run a number of simple OLS regressions of firm's level of productivity on the trading status dummies (i.e. import only, export only, both import and export). Basically, we run the following OLS regressions of firms' characteristics one by one on trading status dummy variables as the following equations:

$$lnY_{it} = \alpha_0 + \alpha_1 Exp\_only_{it} + \alpha_2 Controls_{it} + \varepsilon_{it} \quad (1)$$

$$lnY_{it} = \beta_0 + \beta_1 Imp\_only_{it} + \beta_2 Controls_{it} + \varepsilon_{it} \quad (2)$$

$$lnY_{it} = \gamma_0 + \gamma_1 Two\_way_{it} + \gamma_2 Controls_{it} + \varepsilon_{it} \quad (3)$$

where lnY_{it} is logarithm of firm-level characteristics including number of workers, value-added, labor productivity, physical capital, per worker physical capital, investment, per worker wage, the ratio of high skill workers (calculated as the number of non-production workers divided by total regular workers), and gross profit of enterprise i in year t. Exp_only_{it}, Imp_only_{it}, and Two_way_{it} are trading status dummy variables. Non-trader is used as the reference group. To specify, variable Exp_only_{it} is equal to 1 if an enterprise only exports and equal to 0 if it is a non-trader. Similarly, variable Imp_only_{it} is equal to 1 if an enterprise only imports and equal to 0 if it is a non-trader; and variable Two_way_{it} is equal to 1 if an enterprise both exports and imports and equal to 0 if it is a non-trader. $Controls_{it}$ is referred to control variables, including time, industry dummy, logarithm of firm size and management quality dummy. We include in the model a number of control variables, such as dummies for 2-digit-industry code[2], time, provinces, number of workers, main manufacturing locations, firm's experience, ownership types, and management quality. The inter-industry variation which might cause different capital intensity and degree of vertical integration is limited by controlling for industry dummy by using at the 2-digit-industry level information. In addition to industry dummy variable, the study also uses at least three other control variables: year dummy (for time), province dummy (for region) where the firms' manufacturing factory is located, and the number of employees (for firm size). In some models, several additional control variables are included to improve the accuracy. They are the firm age (for firm's experience), ownership dummy (for types of ownership), and the owner's education level (for management quality).

[2] Industry codes used in this study follows Vietnam Standard Industrial Classification in 1993 (VSIC 1993)

Table 3 presents regression results.[3] In general, enterprises which involve in international markets not only operate on larger scale with more high skill workers ratio but also more productive, more capital intensive, and more profitable compared with enterprises which do not trade internationally.

Compared with non-traders, exporting-only enterprises have an operation scale which is 1.10 times higher with 12.3 % bigger high-skill worker ratio. They are also 14.9% more productive, 18.3% more capital-intensive, and 24.4% more profitable. The firm size of importing-only enterprises is 1.12 times bigger with 33.5% more high skill worker ratio than non-traders. They are also 25.5% more productive, 57.5% more capital-intensive, and 64.6% more profitable. Importing-only enterprises are not only better than non-traders but also better than exporting-only enterprises in all aspects and better than two-way traders in most aspects except for workforce and high skill workers ratio. For two-way traders, some previous studies such as Vogel Alexander (2008) reported that two-way traders are the most productive among all other groups but SMEs in Vietnam show different behavior. Importing-only enterprises enjoy the highest productivity premia of 25.2%, followed by two-way traders with 22% and exporting-only enterprises with 15.7%. This is also consistent with the preliminary data analysis conducted above.

To investigate further the premia for internationalized firms, following Wagner (2007, p8) who defines productivity premia of traders is the percentage difference of the average productivity between traders, either one-way or two-way, and non-traders, ceteris paribus, we test the productivity premia by regressing measure of productivity on three trading status dummy variables indicating whether or not an enterprise is exporting-only, importing-only, or two-way trading. Specifically, variants of the following specification are used with the SME data from the years 2005 to 2013

[3] We compare results from four models, two of which are from unbalanced data and the other two from balanced data. In two forms of the dataset, we run regressions with and without fixed effects/random effects and use Hausman's test to choose between fixed effects and random effects. The difference in results between models with fixed effects/random effects indicates the existence of the unobserved firm heterogeneity.

$$lnLP_{it} = \alpha_0 + \alpha_1 Exp\_only_{it} + \alpha_2 Imp\_only_{it} + \alpha_3 Twoway_{it} + \alpha_4 Controls_{it} + \varepsilon_{it} \quad (4)$$

where $lnLP$ is labor productivity in logarithm of firm i is at time t. Exp_only and Imp_only are dummy variables for exporting-only, importing-only enterprises, and $Twoway$ is a dummy variable for enterprises that both export and import in year t. $Controls$ is a vector of control variables including 2-digit-industry dummy, province dummy, firm size, and year dummy and four additional variables, namely main production locations dummy, firm's experience, proprietorship dummy and management quality dummy, and ε is the error term. The coefficients α_1, α_2 and α_3 to be estimated are export premium, import premium and the premium for firms engaged in both export and import. With the panel data, we use Hausman's test to choose between fixed effects and random effects models.[4]

Productivity premia for firms that engage in international trade including exporting-only firms, importing-only firms and two-way traders are reported in Table 4, Table 5 and Table 6, respectively.[5] In comparison with earlier results from the preliminary analysis, the estimated coefficients shown in Model 1 in Table 4, Table 5, and Table 6 are all lower, possibly due to more control variables added.[6] These trader premia are highly statistically significant and often large in economic point of view. Table 4 reports estimated export premia as 0.232. In comparisons, fixed effects regression result from Model 2 in Table 5 shows that compared with non-traders, importing-only enterprises are only 15.9% more productive. Roughly similar to

[4] To economize space, Hausman tests' results are not reported but available on request. The Hausman's test results show that fixed effects are chosen in all models instead of random effects. What differentiate the models in this section from the regression model in Table 3 regressing labor productivity on trading status is not only that they are added more control variables but also that we control for unobserved firm heterogeneity accounting for time-invariant firm characteristics.

[5] In those three tables reporting trader premia, Model 1 and Model 2 report coefficients estimated in unbalanced dataset while Model 3 and Model 4 report them in balanced dataset. Basically, results from unbalanced form of data are relatively similar to those from balanced data in terms of both significant interval and the magnitude of coefficients. Model 1 and Model 3 use Ordinary Least Square (OLS) regressions while Model 2 and Model 4 controls for fixed firm effects.

[6] To economize on space and to focus on the scope of this empirical investigation, estimations of control variables and constant coefficient are not reported in detailed tables but summarized in the text where relevant. Controlling for firm unobserved heterogeneity considerably increases/decreases the estimated premia and even change the result completely. In Model 4 reported in Table 6, controlling for unobserved firm heterogeneity makes the regressions become insignificant. Detailed results are available on request.

exporter premia, fixed effects regression result from Model 2 in Table 6 reveals that compared with non-traders, two-way traders are 19.9% more productive. The question now we are trying to address is whether such productivity premia is due to imports, or the observed premia is purely due to some selection process going on.

Table 3: Preliminary analysis on firms' characteristics according to trader types

Independent variable \ Dependent variable		Log labors	Log value-added	Log labor productivity	Log capital	Log capital per worker	Log high skill workers	Log gross profit
Exporters Only	Coefficient	1.10***	0.157***	0.149***	0.183***	0.183***	0.123***	0.244***
	Robust S.E	0.046	0.040	0.034	0.054	0.054	0.028	0.053
	Observations	7655	7654	7622	7654	7654	7429	7614
	R-squared	0.282	0.764	0.165	0.684	0.197	0.281	0.576
Importers Only	Coefficient	1.122***	0.323***	0.252***	0.575***	0.575***	0.335***	0.646***
	Robust S.E	0.066	0.055	0.048	0.065	0.065	0.034	0.074
	Observations	7365	7365	7332	7365	7365	7144	7324
	R-squared	0.256	0.77	0.178	0.699	0.22	0.277	0.59
Two-way traders	Coefficient	1.596***	0.22***	0.211***	0.286***	0.286***	0.273***	0.475***
	Robust S.E	0.074	0.079	0.054	0.098	0.098	0.043	0.099
	Observations	7298	7298	7266	7298	7298	7078	7261
	R-squared	0.274	0.769	0.173	0.69	0.20	0.28	0.584
Control variables								
Firm size		No	Yes	Yes	Yes	Yes	Yes	Yes
Industry dummy		Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year dummy		Yes	Yes	Yes	Yes	Yes	Yes	Yes
Province dummy		Yes	Yes	Yes	Yes	Yes	Yes	Yes
Management quality		Yes	Yes	Yes	Yes	Yes	Yes	Yes

Source: Calculated from the SMEs data provided by CIEM

*** p<0.01, ** p<0.05, * p<0.1

Table 4: Exporter productivity premia

Independent variable: lnLP				
Dependent variable: Export dummy				
	Model 1	Model 2	Model 3	Model 4
Exporter productivity premia	0.130***	0.232***	0.240***	0.289***
S.E	0.05	0.121	0.097	0.168
R-squared	0.20	0.095	0.23	0.118
Observations	7613	7613	2337	2337

Source: Calculation based on the SMEs data provided by CIEM

*** p<0.01, ** p<0.05, * p<0.1

Table 5: Importer productivity premia

Independent variable: lnLP1				
Dependent variable: Import dummy				
	Model 1	Model 2	Model 3	Model 4
Importer productivity premia	0.207***	0.159***	0.269***	0.295***
S.E	0.053	0.151	0.098	0.179
R-squared	0.215	0.085	0.248	0.106
Observations	7325	7325	2194	2194

Source: Calculation based on the SMEs data provided by CIEM

*** p<0.01, ** p<0.05, * p<0.1

Table 6: Two-way trader productivity premia

Independent variable: lnLP				
Dependent variable: two-way trader dummy				
	Model 1	Model 2	Model 3	Model 4
Two-way trader productivity premia	0.180***	0.199***	0.203***	0.171
S.E	0.053	0.148	0.099	0.1703
R-squared	0.213	0.085	0.245	0.10
Observations	7259	7259	2186	2186

Source: Calculation based on the SMEs data provided by CIEM

*** p<0.01, ** p<0.05, * p<0.1

Note: Model 1: Unbalanced panel data, OLS regression without fixed effects. Model 2: Unbalanced panel data, OLS regression with fixed effects. Model 3: Balanced panel data, OLS regression. Model 4: Balanced panel data, OLS regression with fixed effects.

4. Self-selection of firms into import market

As discussed in literature review, the import premium could be explained by self-selection process, with the direction of causality running higher productivity to import activities. That is the more productive enterprises self-select into import markets. To test the hypothesis that more productive enterprises purchase inputs from foreign countries we follow Wagner (2008) and compare the pre-entry difference in productivity between importers and non-traders. If the more productive enterprises become importers, then we would expect to see a significant difference in productivity between today's importers and today's non-importers several years before they started to import. In other words, we need to investigate whether or not today's importers were more productive than today's non-importers several years back when all of them did not participate in import markets.

For this purpose, we select all enterprises that did not import between year t-2 and t, namely non-importers, and compare the productivity of those enterprises with those who did not import in year t-2 and t-1 and start to import in year t, namely import-starters.[7] Furthermore, to increase accuracy and to detail the causality running from productivity to one-way trade, we divide non-importers into two groups: (1) non-traders, including enterprises that neither exported nor imported in year t-2 to year t; (2) exporting non-importers that did not import but still export in year t-2 and year t-1. Therefore, on one hand, we compare productivity of enterprises that neither import nor export in t-2 and t with that starts to import in t. On the other hand, we compare productivity of enterprises that only exports in year t-2 to year t with that starts to import in t.[8]

[7] We choose to compare the productivity of non-traders and one-way trading starters in year t-2, not t-4, because with year t-2, the time gap is shorter than year t-4, there are more observations to improve the accuracy of the estimations in econometric models. In this data set, we can look at four cohorts of import – enterprises that start to import in 2013 (where t-2 is year 2011, t is year 2013), enterprises that start to import in 2011 (where t-2 is year 2009, t is year 2011), enterprises that start to import in 2009 (where t-2 is year 2007, t is year 2009), and enterprises that start to import in 2007 (where t-2 is year 2005, t is year 2007).

[8] Because the data is conducted once in every two years, the reported trading status is year t-1 is unknown. We assume that the trading status of enterprises in t-2 and t-1 is unchanged. Note that there might be the occurrence of re-importers because some enterprises that starts to import in time t (import-starters in time t) might have imported several years earlier and begin to import again in time t. Within this empirical investigation of panel data from 2005 to 2013, we eliminate all re-importers which are observable in the data set, and due to the limitation of surveyed time length, it is impossible to identify re-importers before survey in 2005.

Two econometric approaches are adopted to shed light on self-selection. The first approach is to use simple regressions. The econometric model regressing labor productivity, on importing status dummies is as follows:

$$lnLP_{i,t-2} = \alpha_0 + \alpha_1 Imp\_start_{it} + \alpha_2 Controls_{i,t-2} + \tau_{it} \quad (5)$$

where Imp_start refers to import starter dummy. Imp_start is equal to 1 if enterprise i starts to import in year t and equal to 0 if it does not. τ is an error term. and LP is labor productivity with t and i indicating times and firm. $Controls$ is a vector of control variables including year dummy, 2-digit-industry dummy, number of employees and province dummy.

In the second approach, we use Probit model to investigate how the probability of starting to import in year t is affected by the firm's productivity level in year $t-2$, controlling for the same fixed effects as in regression models above. In other words, the following equations are estimated:

$$Pr(Imp_{i,t} = 1 \mid Imp_{i,t-2} = 0) = F(\delta_0 + \delta_1 lnLP_{i,t-2} + \delta_2 Controls_{i,t-2} + \tau_{i,t}) \quad (6)$$

where $Imp_{i,t}$ is import dummy variable that is equal to 1 is firm i starts to import in year t, else 0. The possibility of import in the future is estimated in coefficient δ_1, showing that with each 1% increase in labor productivity, the enterprise is $100(exp(\delta_1) - 1)$ percent more likely to go importing.

In Table 7, the estimated coefficient means that before starting to import, today's importers were 29.6% higher in productivity compared with today's non-importers two years back. Result in Row 2 using OLS regression also exhibits a statistically significant difference in the past in productivity between non-trading enterprises that start to import and non-trading enterprises that do not start to import. The estimated coefficient means that non-trading enterprises that start to import were 39.6% superior in productivity than non-trading enterprises that do not start to import.

Nevertheless, the pre-entry productivity premia between exporters that start to import and exporters that do not start to import, shown in Row 3, are not statistically different from zero at the common error level. In other words, exporters

that start to import did not have superior productivity than exporters that do not start to import before starting to import.

Table 7: Self-selection of firms into import market

Models		OLS	Probit (marginal effects)
Independent variables		*lnLP*	*Import starters dummy*
Enterprises that do not start to import in t	**Coefficient**	**0.296*** **	**0.019*** **
	S.E	0.079	0.004
	R-squared/Pseudo R-squared	0.156	97.21%
	Observations	4473	3084
Non-trading enterprises in t-2, t-1 that do not start to import in t	**Coefficient**	**0.396*** **	**0.024*** **
	S.E	0.0898	0.005
	R-squared/Pseudo R-squared	0.166	97.21%
	Observations	4130	2331
Exporters in year t-2, t-1 that do not start in t	**Coefficient**	**-0.078**	**-0.33**
	S.E	0.19	0.039
	R-squared/Pseudo R-squared	0.333	97.21%
	Observations	336	154

Source: Calculation based on the SMEs data provided by CIEM

(*** p<0.01, ** p<0.05, * p<0.1)

In Table 7, Probit approach shows the possibility of going import in the future of enterprises on today's productivity for the same groups as in OLS models. They also have the same pattern of results. Row 1 result shows that each 1% increase in productivity, today's non-importers are 1.9% more likely to go import in the next two years, while Row 2 result shows that each 1% increase in productivity, today's enterprises that neither export nor import are 2.4% more likely to go import. The import premia in Row 1 and Row 2 are both statistically significantly different from zero in the error level of 0.1 or less. On the contrary, Row 3 shows statistically insignificant difference in productivity between exporters that start to import and that do not. In other words, the change in productivity of exporters have no statistically significant impact on the possibility of them to go import. Pseudo R-squared is 97.21% in all models showing that these three Probit models correctly predict 97.21% of the value and the rest is misclassified. Generally speaking, the models have good predictability.

To sum up, we find evidence in favor of self-selection hypothesis only for non-trading firms. It is a positive impact of productivity on the possibility of going import for non-trading enterprises. Productivity improvement of enterprises that already exported do not affect the possibility of them to penetrate import market. In other words, for enterprises that already engaged in export, the productivity level does not affect the possibility of becoming two-way traders.

5. Learning-by-importing internationally of firms

Learning-by-importing is characterized by the improved performance that enterprises enjoy after participating in import market. It indicates the causality of import activities on firms' performance (i.e. labor productivity in this study). To test for the learning-by-importing hypothesis, we adopt the following empirical framework

$$lnLP_{i,t+2} - lnLP_{i,t+1} = \alpha_0 + \alpha_1 Imp\_start_{it} + \alpha_2 Controls_{it} + \tau_{it} \qquad (7)$$

where Imp_start is import starter dummy variable. If enterprise *i* start in year t, Imp_start is equal to 1, otherwise its value is 0. τ is an error term. LP is labor productivity and $Controls$ includes 2-digit-industry dummy, year dummy, province dummy and number of employees in squares. The estimated coefficient α_1 shows the percentage difference in average productivity growth premium over the period $t+1$ to $t+2$ of import starters in year t compared with enterprises that do not start in year t.[9]

The implicit assumption of the above specification is that enterprises would have higher productivity after they start purchasing from foreign market. However, as implied by the previous section, enterprises which start to import might already have higher productivity than non-importers. This situation is very similar to the problem the empirical researchers face when investigating the impact of a program. In the terminology of the evaluation literature, the problem we are facing is lack of an appropriate counterfactual.

[9] We regress two cohorts in one pooled group over the whole period, not separately, because of the limited observations.

In our analysis, we rely on the propensity score matching method to identify the treated and the control groups. The treatment is import-starting dummy (whether they import or not), and the "characteristics" based on which we match the untreated with the treated groups include 2-digit-industry, firm size, province, year, management quality one year before starting to trade, year t-1, and productivity growth over t-2 to t-1 (where t is the year enterprises start to trade). The outcome is the labor productivity one year after enterprises start to import.[10] The average treatment effect on the treated is given by

$$ATT = E\left(\Delta \middle| START_{i,t} = 1\right) = E\left(y_1 \middle| C_{i,t-1}, START_{i,t} = 1\right) - E(y_o | C_{i,t-1}, START_{i,t} = 1) \quad (8)$$

where ATT is average treatment effect on the treated. $START$ is import start dummy in year t. If an enterprise starts to import in t, $START$ = 1, otherwise its value is 0. y_1 is the outcome (i.e. labor productivity) of enterprises that start to import in year t while y_0 is that of enterprises that do not start to import in year t. C is composed of variables act as "characteristics" that we use to match the untreated groups with the treated groups. These variables are measured in year t-1, and productivity all calculated in year t-1.[11]

To construct a propensity score to match, we estimate a Probit model with dependent variable being import starter dummy being regressed on a vector of variables as firms' characteristics. The score is the predicted probability of receiving treatment (starting to import) given pre-entry characteristics C as follows:

$$p_i = p\left(C_{i,t-1}\right) = \Pr\left\{START_{i,t} = 1 \mid C_{i,t-1}\right\} = E(START_{i,t} | C_{i,t-1}) \quad (9)$$

where p_i is the estimated probability of starting to import of enterprise i.[12] This allows us constructing a sample composing of import starters and its matched

[10] We have three cohorts: cohort one includes enterprises start to import in 2007 as the year, year t where we investigate difference in average labor productivity between treated and control groups in year 2009, year t+1. Similarly, cohort two includes import-starters in 2009 as year t, estimating differences in labor productivity in 2011 as year t+1 and cohort three includes import-starters in 2011, estimating differences in labor productivity in 2013.

[11] The last term in Equation 8, $E(y_o|S, START = 1)$, representing for average outcome of treated enterprises (enterprises that start to import) in case they do not start (y_0) is, however, unobservable.

[12] We use STATA 13 and commands pscore together with attnd to match. Among several matching methods, the nearest neighbor was chosen. The nearest neighbor matching selects an import non-starter denoted as enterprise j which has propensity score p_j closest to that of the import starter. After matching, the balancing

import non-starters so as to investigate the causality of starting to import on productivity. After matching on the propensity score, we could compare the labor productivity differences between treated and control groups as:

$$ATT = E\left(\Delta \middle| p(C_{i,t-1}), START_{i,t} = 1\right) = E\left(y_1 \middle| p(C_{i,t-1}), START_{i,t} = 1\right) - E(y_o | p(C_{i,t-1}), START_{i,t} = 0) \quad (10)$$

where ATT, known as the average treatment on the treated, is the estimated effect of importing on the labor productivity.

The results examining learning-by-importing hypothesis is exhibited in Table 8 below.[13] All point estimates, although showing positive effect of starting to import on productivity, are not statistically different from zero at usual significant level. Therefore, again, regression method provide no evidence of learning-by-importing for the case of SMEs in Vietnam.

Table 8: Regressions of productivity growth after starting to import

Models: OLS		
Independent variables: ex-post labor productivity growth (in logarithm)		
Enterprises that do not start to import in t	Coefficient	0.052
	S.E	0.1173
	R-squared/Pseudo R-squared	0.021
	Observations	1212
Non-trading enterprises in t-2, t-1 that do not start to import in t	Coefficient	0.068
	S.E	0.1569
	R-squared/Pseudo R-squared	0.024
	Observations	1109

Source: Calculation based on the SMEs data provided by CIEM

(*** p<0.01, ** p<0.05, * p<0.1)

In next stage, we apply PSM method to investigate learning-by-importing hypothesis. The purpose of propensity score matching used in this case is to minimize the so-called self-selection effect that may affect the results for learning-

condition requiring an absence of statistically significant differences in the pre-entry covariates between the treated group and the control group is satisfied. The differences in mean value of all pre-entry variables between trade starters and the matched non-starters are not statistically significant. The matching also imposes common support by dropping treatment observations whose propensity score is higher than the maximum or less than the minimum propensity score of the controls.

[13] All coefficients are transformed into 100(exp(coefficient)-1)

by-trading. To simplify, if most of enterprises who engage in global trade already better performed before they started than enterprises who do not engage in, then the post-entry improved performance (if any) might be caused from the pre-entry performance rather than the decisions of going import.

Table 9: Learning-by-importing examination using PSM method

Unit: Thousand VND

Outcome: Average post-entry productivity in year t+1					
Number of treated observations: 62					
Sample	Treated	Controls	Difference	S.E	p-value
Unmatched	97169.3101	63268.3825	33900.9276	10137.1537	0.001
ATT	97169.3101	84676.4745	12492.8356	18382.6132	0.499

Source: Calculation based on the SMEs data provided by CIEM

Result for the leaning-by-importing from propensity score matching is exhibited in Table 9. It is found that mean labor productivity of import starters is even lower than that of import-non-starters in year t+1 but that difference is not statistically significant. Similar to results in examining learning-by-exporting, PSM method, once again, bring out completely different result from tests without matching. After matching, the difference in post-entry mean labor productivity is statistically insignificant at the usual error level. Therefore, learning-by-importing hypothesis is not valid with PMS estimations. To sum up, no evidence in favor of learning-by-exporting and learning-by-importing hypotheses from both regressions and matching approach is observed.

6. Concluding remarks

This study provides the first-hand empirical findings on the relationship between international trade activities and firm-level productivity for Vietnam using the panel data set for manufacturing SMEs which is conducted every two years from 2005 to 2013, focusing on the direction of causality between import activities and productivity by examining self-selection of more productive enterprises into import market, and for learning-by-importing effects of those activities.

First, we found evidence of productivity premia for traders using OLS with control variables and fixed effects. The results showed that trader premia in models with fixed effects are higher than those in models without fixed effects. In other words, there are unobservable firm heterogeneity and certain factors of enterprises which are connected with international trades in the way that biases downward labor productivity. When the unobservable firm heterogeneity is controlled for the productivity premia for traders increase. The second conclusion is that two-way trader premia is slightly higher than exporter premia and both of which are considerably higher than import premia. This pattern is in accordance with previous findings where it is found that two-way traders are most productive, followed by one-way traders and non-traders come the last.

Second, this study finds the evidence in favor of positive impact of productivity on import participation, indicating self-selection of more productive enterprises into import market through both OLS regressions and Probit models. Our investigation shows that today's importers were 29.6% more productive than today's non-importers two years before they start to import, and for enterprises that do not import, with each 1% increase in labor productivity today's non-importers are 1.9% more likely to do importing in the future.

Third, there is no evidence for learning-of-importing hypothesis with the application of OLS regressions and propensity score matching method. The insignificant estimated coefficients imply the fact that enterprises become more productive after engaging in import market is not due to the participation in import itself but due to their pre-trade inherent better performance.

REFERENCES

ABREHA, K. G. (2014) Importing and Firm Productivity in Ethiopian Manufacturing. Aarhus University.

BERG, M. V. D. (2013) Importing, productivity and SMEs: firm-level evidence from the Netherlands. *Discussion Paper Series nr: 13-07*. Utrecht School of Economics.

FOSTER-MCGREGOR, N., ISAKSSON, A. & KAULICH, F. (2013) Importing, exporting and performance in sub-Saharan African manufacturing firms. *Rev World Econ*, 150(2), 309-336.

GREENAWAY, D. & KNELLER, R. (2007). Firm heterogeneity, exporting and foreign direct investment. *Economic Journal*, 117(517), pp.F134-F161.

KASAHARA, H. & LAPHAM, B. (2013) Productivity and the Decision to Import and Export: Theory and Evidence. *Journal of International Economics*, 89(2), 297-316.

LEE, C. (2014) The Exporting and Productivity Nexus: Does Firm Size Matter? *ERIA Discussion Paper Series 2014-14*.

LOECKER, J. D. (2012) Detecting Learning by Exporting. *American Economic* Journal: *Microeconomics*, 5 (3), 1-21.

MANJÓN, M. & MÁÑEZ, J. A. (2012) Reconsidering learning by exporting. *Rev World Econ*, 149(1), 5-22.

MINONDO, A. (2012) The relationship between export status and productivity in services: A firm-level analysis for Spain. *Munich Personal RePEc Archive*, Paper No. 43225.

UNCTAD (2014) *UNCTAD Handbook of Statistics*, New York, United Nations Publications.

VOGEL, A. & WAGNER, J. (2008) Higher Productivity in Importing German Manufacturing Firms: Self-Selection, Learning from Importing, or Both? *Discussion Paper 3854*. IZA.

WAGNER, J. (2005) Exports and Productivity: A survey of the evidence from firm level data. HWWA Discussion *Paper 319*, 2.

WAGNER, J. (2007) International trade and firm performance: A survey of empirical studies since 2006. *Working Paper Series in Economics No.210*. University of Lüneburg.

WAGNER, J. (2011) Exports, imports and profitability: First evidence for manufacturing enterprises. *Working Paper Series in Economics No. 206*. University of Lünburg.

WU, R. (2013) Empirically Revisiting the Learning-by-Exporting Theory Using Data on Chilean Manufacturing Plants. *The Journal of Business Inquiry*, 12, 65-80.