Firms' Use of FTA Schemes in Exporting and Importing: Is There a Two-way Relationship?

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Abstract: In this paper, by employing a unique survey data for Japanese affiliates in ASEAN countries, we examined the state dependence of free trade agreement (FTA) utilization (i.e., FTA utilization in exporting (importing) at the previous year affects that in exporting (importing) at the current year) and the cross-effects in FTA utilization (i.e., FTA utilization in exporting (importing) at the previous year affects that in importing (exporting) at the current year). To do that, we estimate the dynamic random-effect bivariate probit model, which takes into account both firms' unobserved heterogeneity and the correlation in FTA utilization between exporting and importing. As a result, we found the significant state dependence in FTA utilization in both importing and exporting but not the cross effects in FTA utilization between importing and exporting.

Keywords: FTA; dynamic random-effect bivariate probit; sunk costs
JEL Classification: F15; F53; O53

1. Introduction

Since the latter half of the 1990s, there have been a vast number of papers on self-selection mechanics in firms' trading. Melitz (2003) is the theoretical pioneering study on the selection mechanism in firms' exporting. It theoretically demonstrates that exporting firms have relatively high productivity because productive firms can still obtain non-negative gross profit even if they incur sunk costs for exports. The numerous empirical studies, including Bernard and Jensen (1999), Lopez (2005), Greenaway and Kneller (2007), and Wagner (2007), have supported this theoretical prediction on

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self-selection mechanics in exporting. In recent years, moreover, the empirical literature has been extended to investigate the self-selection mechanics of firms to engage in importing and both exporting and importing (Muuls and Pisu 2009; Castellani et al. 2010; Vogel and Wagner 2010; Aristei et al., 2013). Such studies found that importers are more productive than non-importers and that firms which engage in both importing and exporting exhibit higher performance than those that engage in either exporting or importing.

Furthermore, some studies, including Muuls and Pisu (2009) and Aristei et al. (2013), examine not only state dependence in exporting and importing but also cross effects between importing and exporting. While the state dependence is the positive relationship between the current and past status of exporting/importing, the cross effects are that the past experience in importing (exporting) raises the probability of starting to export (import). For example, as mentioned in Aristei et al. (2013), common sunk costs arise when firms implement an organizational structure in charge of international operations or when firms acquire information on foreign markets, which may include both potential buyers (export) and suppliers of intermediate inputs (import). Therefore, the productivity threshold to be an importer (exporter) will be lower for exporters (importers). Also, productivity improvement through starting importing (exporting) may enable firms to bear the sunk costs of exporting (importing). As a result, in Muuls and Pisu (2009) and Aristei et al. (2013), some estimation shows the existence of both the state dependence and the cross effects.

In trading, some firms use free trade agreement (FTA) schemes in order to reduce their payment of tariff rates. The FTA has been one of the hottest issues in the world economy. Its surge has continued unabated since the early 1990s. According to the World Trade Organization (WTO) website, as of January 2012, around 500 regional trade agreements have been notified to the WTO. Due to this increasing availability of FTA schemes, international trade under FTAs has experienced a significant increase. In Asia, for example, around 20% to 30% of Thai and Malaysian trade values (imports or exports) with ASEAN countries are those under the FTA schemes in 2010 (Thai Ministry of Commerce; Malaysian Ministry of Trade and Industry). Also, among exporters of Japanese overseas affiliates in ASEAN, around 20% of exporters are using FTA schemes in exporting to ASEAN countries or Japan (Survey of Japanese-Affiliated Firms in ASEAN, India, and Oceania (JETRO)).

In the academic literature, in contrast to the above-mentioned case of just trading, there are few studies on the self-selection in the use of FTA schemes. As in the case of just exporting, however, it is known that there is the self-selection mechanism in FTA

utilization in exporting. Demidova and Krishna (2008) demonstrates theoretically that only the productive firms can use FTA schemes in exporting rather than most favored nation (MFN) scheme. Takahashi and Urata (2010) is the empirical paper analyzing this. They examine FTA usage by Japanese firms at the firm level by employing a questionnaire survey (cross-section data), finding that larger firms are more likely to use FTA schemes. Indeed, as mentioned in the next section, there is a significant amount of fixed costs for FTA utilization in exporting and importing. The simplest example is the costs for learning about FTA schemes. Firms need to check whether their products are eligible to any FTA schemes and then how much the preferential tariff rates are. Particularly in the case of FTA utilization in exporting, FTA users need to do a large amount of documentation works in order to obtain certificates of origin (CoOs). In short, as in the case of just trading, there will be selection mechanism in firms' use of FTA schemes in their exporting or importing.

Furthermore, there might be the state dependence and the cross effects also in the context of FTA utilization. First, if the use of FTA schemes has positive impacts on firm performance, say, through scale economy, such performance improvement through FTA utilization in importing (exporting) may enable firms to bear the sunk costs of FTA utilization in not only importing but also exporting (not only exporting but also importing). Second, a significant fraction of fixed costs for FTA utilization might be sunk costs. For example, the above-mentioned example, learning costs on FTA schemes, will be one of the sunk costs. If such sunk costs occupy a significant fraction of fixed costs for FTA utilization, firms with the past experience in FTA use in exporting (importing) are more likely to be able to use FTA schemes in exporting (importing) in the current year. Also, if a significant fraction of such sunk costs is common in using FTA schemes in exporting and importing, we may expect the existence of the cross effects. Namely, the past experience of FTA utilization in exporting (importing) encourages firms to use FTA schemes in importing (exporting) in the current year.

In this paper, we examine empirically the above-mentioned state dependence and cross effects in the context of FTA utilization. To do that, we employ a unique dataset collected by the Japan External Trade Organization (JETRO). JETRO has carried out an ongoing survey of Japanese affiliates operating in Asia for 22 years, since 1987. The survey was initially targeted at manufacturing companies, but in the wake of growth in the service sector, inclusion of non-manufacturing companies began in 2007 (the 21st survey). The survey, named the "Survey of Japanese-Affiliated Firms in ASEAN, India, and Oceania," has included questions on the affiliates' FTA use particularly in several recent years. For example, it asks whether the affiliate currently uses any existing

bilateral/multilateral FTAs for import or export activities. Some basic firm characteristics, including employment, are also available in this survey. Moreover, we can exclude firms using other kinds of free trade schemes such as duty-drawback systems, under which the custom duties on imported components are exempted if imported items are used for manufacturing exported items. In short, the JETRO survey is suitable for analyzing firms' use of FTA schemes.

This paper contributes greatly to adding some new facts on firms' FTA use to the literature of the self-selection mechanism. The literature on firm-level studies has investigated the self-selection mechanics in several kinds of firms' international activities, including exporting, importing, investing, outsourcing, and so on (see, for example, Hayakawa et al., 2012). However, in the context of firms' FTA use, there are few papers. No studies explore the self-selection mechanism in firms' FTA use in importing. Also, there are no studies investigating the state dependence and cross effects in FTA use between importing and exporting. Furthermore, our paper has methodological contribution. In the analysis of the state dependence and cross effects in just importing and exporting, while Aristei et al. (2013) take only firms' unobserved heterogeneity into account, Muuls and Pisu (2009) do only the correlation between exporting and importing. In this paper, we take into account both firms' unobserved heterogeneity and the correlation in FTA utilization between exporting and importing, by estimating the dynamic random-effect bivariate probit model.

The rest of this paper is organized as follows. The next section specifies our empirical framework. Data issues are discussed in Section 3. Section 4 presents our estimation results, and Section 5 concludes on this paper.

2. Theoretical Framework

This section presents our theoretical framework on firms' FTA utilization in exporting and importing. We first consider conditions on their use of FTA schemes rather than MFN schemes. Demidova and Krishna (2008) is helpful in considering those in the case of exporting. Then, we discuss the state dependence of FTA utilization, i.e., how the FTA utilization in exporting (importing) at the previous year affects that in exporting (importing) at the current year. Last, we examine the cross-effects in FTA utilization, i.e. how the FTA utilization in exporting (importing) at the previous year affects that in importing (exporting) at the current year. For simplicity, we assume that while FTA preferential tariff rates are zero, MFN rates are positive and much higher than FTA rates.

The mechanism of firms' FTA utilization in exporting is as follows. They choose the use of FTA schemes if and only if it presents the larger gross profits to them than the use of MFN schemes. Since the sales prices of importers' products are lowered before and after the FTA utilization, importers may increase the quantity of imports. Furthermore, such an increase of demand on their products may raise those export prices. This rise is known as incomplete tariff path-through (see, for example, Feenstra, 1989; Cadot et al., 2005; Olarreaga et al., 2005; Ozden and Sharma, 2006)[1]. In sum, when using FTA schemes, exporters' revenues increase through the increase of export quantities and/or the rise of export prices. This increase of revenues is the benefits from the use of FTA schemes for exporters.

There are two sources of costs for the FTA utilization for exporters. One is the costs for complying with rules of origin (RoOs). To do that, exporters may need to change their procurement sources from the optimal pattern of procurement. Such a change of procurement sources will raise total procurement costs. We call this additional procurement costs "procurement adjustment costs". The other is the existence of fixed costs for the use of FTA schemes in exporting (FTA fixed costs in exporting). Exporter must have enough knowledge on FTA schemes in order to, say, check whether their products are eligible to any FTA schemes. Furthermore, to certify the "originality" of their products, exporters must collect several kinds of documents including a list of inputs, production flow chart, production instructions, invoices for each input, contract document, and so on. With these documents, exporters apply CoOs to the authority.

As a result, if the increase of revenues exceeds procurement adjustment costs and the FTA fixed costs in exporting, exporters choose to use FTA schemes in exporting. Several factors have influence on this condition. For example, since the productive firms have the larger quantify of exports in general, such exporters have the larger impacts of importer sales prices' changes on their revenues through changes in export quantities and export prices before and after the FTA utilization. As a result, such exporters enjoy the larger benefits and are more likely to use FTA schemes. The similar story can be applied into demand side. Namely, the larger benefits will be obtainable when exporting to countries with the larger demand.

The mechanism of firms' FTA utilization in importing is relatively simple and is as follows. The main benefit is the reduction of procurement costs through importing

[1] For example, Cadot et al. (2005) examine NAFTA's impact on the prices received by textile and apparel exporters in Mexico and found that export prices rise by around 80% of tariff margin. Similarly, Ozden and Sharma (2006) explore US Caribbean Basin Initiative's impact on the prices received by eligible apparel exporters and found that export prices rise by around 65% of tariff margin.

duty-free products. This reduction will lead to the reduction of prices of importers' products and thus to the increase of revenues. Again, the productive firms will be more likely to enjoy the larger reduction of procurement costs and/or increase of revenues. On the other hand, the costs for FTA utilization in importing are the existence of FTA fixed costs in importing including costs for simulating how much the benefits from FTA utilization are. To simulate that, importers must have enough knowledge on FTA schemes. Importers use FTA schemes if and only if these benefits exceed FTA fixed costs in importing.

Based on the above framework on firms' FTA utilization, we next examine how the FTA utilization in exporting (importing) at the previous year affects that in exporting (importing) at the current year. In both exporting and importing, there are two sources for such "state dependence". One is the positive impacts of FTA utilization on firm performance. For example, if FTA utilization increases export/import quantities, it may also raise exporters'/importers' productivity through enjoying scale economy. Then, due to such rise of productivity, exporters/importers turn out to obtain much larger benefits from FTA utilization than costs for that. In other words, firms' productivity turns out to be above the productivity cutoff dividing between FTA users and FTA non-users.

The other is the reduction of FTA fixed costs in exporting/importing. A significant fraction of FTA fixed costs in exporting/importing seems to be incurred only in starting FTA utilization in exporting/importing. For example, the general knowledge on FTA schemes never vanishes. The know-how on certifying RoOs will be useful in using FTA schemes in exporting at the next year. As a result, the FTA fixed costs in exporting/importing become much lower for firms that used FTA schemes in exporting/importing at the previous year. Thus, such firms will be likely to again use FTA schemes at the current year.

Last, we examine the cross effects, namely, how the FTA utilization in exporting (importing) at the previous year affects that in importing (exporting) at the current year. There are similar two sources for such effects as the case of state dependence. Namely, one is the positive impacts of FTA utilization on firm performance. Due to the rise of productivity through FTA utilization in exporting and importing, firms' productivity turns out to be above the productivity cutoff of FTA utilization in importing and exporting, respectively. The other is the commonality of FTA fixed costs between the cases of exporting and importing. For example, again, the general knowledge on FTA schemes is useful for FTA utilization in both exporting and importing. As a result, the FTA fixed costs in exporting and importing become lower for firms that used FTA schemes in importing and exporting at the previous year, respectively.

3. Empirical Framework

Based on the theoretical framework in the previous section, this section specifies our empirical framework for analyzing the use of FTA schemes in exporting and importing. In particular, we shed light on the state dependence and the cross effects. To this end, we estimate a model for the probability of FTA use in exporting or importing as a function of previous FTA use status in both exporting and importing, in addition to several firm characteristics. For firm *i*, our model is given by:

$$FTA_{it}^{EXP*} \equiv \pi_{it,EXP}^{FTA} - \pi_{it,EXP}^{MFN} = \alpha_1 FTA_{it-1}^{EXP} + \beta_1 FTA_{it-1}^{IMP} + x'_{it-1}\gamma_1 + c_{1i} + u_{1it} \quad , \tag{1}$$

$$FTA_{it}^{IMP*} \equiv \pi_{it,IMP}^{FTA} - \pi_{it,IMP}^{MFN} = \alpha_2 FTA_{it-1}^{IMP} + \beta_2 FTA_{it-1}^{EXP} + x'_{it-1}\gamma_2 + c_{2i} + u_{2it} \quad , \tag{2}$$

$$FTA_{it}^{EXP} = 1\left[FTA_{it}^{EXP*} > 0\right] \text{ and } FTA_{it}^{IMP} = 1\left[FTA_{it}^{IMP*} > 0\right] \ , \ t = 2,\ldots, T, \tag{3}$$

where $\pi^{S}_{it,EXP}$ is firm *i*'s gross profits in year *t* from exporting under tariff scheme *S* (*FTA* or *MFN*). Similarly, $\pi^{S}_{it,IMP}$ is firm *i*'s gross profits in year *t* from importing under tariff scheme *S* (*FTA* or *MFN*). Coefficients α and β capture the state dependence and the cross effects, respectively. A vector of **x** consists of several firm characteristics, listed later, and is assumed to be strictly exogenous. c_{1i} and c_{2i} capture individual random effects. u_{1it} and u_{2it} are error terms.

We estimate this model with three kinds of methods. First, like Aristei et al. (2013), we estimate this model as bivariate probit model by assuming no individual unobserved heterogeneity (i.e. no individual random effects) and that the initial conditions (i.e. pre-sample history) are exogenous[2]. Then, the error terms u_{1it} and u_{2it} are assumed to be independent over time and to follow:

$$\begin{pmatrix} u_{1it} \\ u_{2it} \end{pmatrix} \sim N\left[\begin{pmatrix} 0 \\ 0 \end{pmatrix}, \begin{pmatrix} 1 & \rho \\ \rho & 1 \end{pmatrix}\right]. \tag{4}$$

This model takes the correlation in FTA utilization between exporting and importing into account but does not control for individual unobserved heterogeneity.

Second, like Muuls and Pisu (2009), we estimate the above two equations separately as a dynamic random-effect univariate probit model with (weakly) exogenous

[2] This condition means the initial period dependent variables, FTA_{i1}^{EXP} and FTA_{i1}^{IMP} are exogenous and this restriction is valid if the process starts at the beginning of the sample periods or if the error terms are serially independent.

regressors by assuming that error terms and random effect terms in one equation are independent of those in the other equation (Heckman, 1981). In this model, we use the following treatment for initial conditions proposed by Wooldridge (2005), specifying c_{1i} and c_{2i} given the FTA initial conditions (FTA_{i1}^{EXP} and FTA_{i1}^{IMP}) and time-constant (over-time averaged) explanatory variables $\bar{x}_i$ as follows:

$$c_{1i} = a_1 + a_2 FTA_{i1}^{EXP} + a_3 FTA_{i1}^{IMP} + \bar{x}'_i a_4 + \mu_{1i}, \tag{5}$$

$$c_{2i} = b_1 + b_2 FTA_{i1}^{IMP} + b_3 FTA_{i1}^{EXP} + \bar{x}'_i b_4 + \mu_{2i}. \tag{6}$$

μ_{1i} and μ_{2i} are assumed to follow zero mean normal distribution and have variances $\sigma^2_{\mu 1}$ and $\sigma^2_{\mu 2}$, respectively. Substituting these into equations (1) and (2), we obtain

$$FTA_{it}^{EXP*} = \alpha_1 FTA_{it-1}^{EXP} + \beta_1 FTA_{it-1}^{IMP} + x'_{it-1}\gamma_1 + a_1 + a_2 FTA_{i1}^{EXP} + a_3 FTA_{i1}^{IMP} + \bar{x}'_i a_4 + \mu_{1i} + u_{1it} \tag{7}$$

$$FTA_{it}^{IMP*} = \alpha_2 FTA_{it-1}^{IMP} + \beta_2 FTA_{it-1}^{EXP} + x'_{it-1}\gamma_2 + b_1 + b_2 FTA_{i1}^{IMP} + b_3 FTA_{i1}^{EXP} + \bar{x}'_i b_4 + \mu_{2i} + u_{2it} \tag{8}$$

We estimate this model by employing the conditional maximum simulated likelihood method. This model takes individual unobserved heterogeneity into account but does not control for the correlation in FTA utilization between exporting and importing.[3]

Third, we estimate this model following Devicienti and Poggi (2011), which empirically investigate two-way relationship between poverty and social exclusion. Their strategy is to estimate as a dynamic random-effect bivariate probit model by combining the above two kinds of estimation. Namely, under (4), they estimate equations (5)-(8) (and (3)) by employing the conditional maximum simulated likelihood method. μ_{1i} and μ_{2i} are assumed to have covariance $\sigma^2_{\mu 1}\ \sigma^2_{\mu 2}\rho_{\mu}$. This model takes into account both individual unobserved heterogeneity and the correlation in FTA utilization between exporting and importing.

Based on the discussion in Section 2, a vector of **x** includes several firm characteristics. First of all, as in the usual studies on firm heterogeneity, we introduce firm size in terms of the number of employees.[4] We may use this variable as a proxy for

[3] In other words, we assume that $\rho_{\mu\_} = 0$, where ρ_{μ} is specified later.

[4] Unfortunately, our dataset does not allow us to calculate any productivity measures such as value-added per worker or total factor productivity.

productivity because it is usual that there is positive relationship between the number of employees and productivity (see, for example, Fukao and Kwon 2006). Therefore, the larger-sized firms are expected to be more likely to use FTA schemes in exporting/importing. We also introduce a share of local inputs in total inputs and firm age (the number of years from firm establishment) as control variables. The share of local inputs may be associated with the effect of RoOs restrictiveness in the case of exporting because firms that originally have a high local input share may comply with RoOs easily. In the import side, on the other hand, the higher share of local inputs implies a smaller magnitude of imports, resulting in a smaller amount of tariff savings and thus in the less incentive to use FTA schemes for firms. The older firms will have more knowledge on international activities, including FTA schemes, and thus will be more likely to use FTA schemes in exporting and importing. In addition, we also include industry dummy, year dummy, and country dummy.

4. Data Issues

Our main data source is JETRO's "Survey of Japanese-Affiliated Firms in ASEAN, India, and Oceania." This survey has been conducted since 1987 and provides data on Japanese affiliates in those regions. For our analysis, we employ the survey data for the 2009-2012 period. In each year of this period, questionnaires were sent to around 5,000 Japanese affiliates operating in those regions. The survey received more than 2,000 valid responses (i.e. response rates of near 50%). In 2009, for example, 1,109 were from Japanese affiliates in the manufacturing industry. Of these, 915 were from ASEAN7 countries (Thailand, Malaysia, Singapore, Indonesia, the Philippines, Vietnam, and Myanmar), 128 from South Asia (India, Bangladesh, Pakistan, and Sri Lanka), and 66 from Oceania (Australia and New Zealand). From this survey, we obtain all necessary data on firm characteristics in addition to the information on firms' FTA use in importing and exporting.[5]

There are four noteworthy points in our dataset. First, our focus on foreign plants' data (i.e. Japanese overseas affiliates' data) may have some drawbacks. For example, one may say that the use of FTA schemes is determined not by each foreign plant but by her headquarters in home country (i.e. Japan). This will be true for the decision on

[5] The industry classification in this dataset is rather rough; food industry, textile industry, wearing apparel, wooden products, furniture, paper industry, chemical industry, plastic products, medicine, rubber products, pottery, iron and steel, non-metallic mineral products, metal products, general machinery industry, electric machinery industry, transport equipment, precision machinery industry, and other manufacturing sectors.

whether or not to get engaged in trading, but may not be true for the decision on FTA utilization. A number of our factory visit shows that, at least in the case of Japanese overseas affiliates, the decision on FTA utilization is mostly made by each plant, not her headquarters. The overseas affiliates are just requested by their headquarters to use any schemes available for the better international activities if possible. It is also noteworthy that, as is well known in the literature, foreign plants have higher productivity, R&D expenditure, capital-labor ratio, sales, employment, and so on (e.g., Castellani, 2002; Arnold and Hussinger, 2005; Bernard, et al., 2009). Thus, our restriction to foreign plants implies the focus on the relatively large-sized samples, which may yield biases in our estimates, particularly a coefficient for employment.

Second, we focus on Japanese manufacturing affiliates in ASEAN7 countries. In general, RoOs differ by FTAs. Thus, our estimates may suffer from some biases depending on FTAs that exporters use. However, in our sample, we can control for the differences in RoOs across sample FTAs (i.e. importing countries) to some extent. In addition to ASEAN FTA, ASEAN countries conclude on five "plus one" FTAs with Australia, China, India, Japan, Korea, and New Zealand, including ASEAN-Australia-New Zealand FTA, ASEAN-China FTA, ASEAN-India FTA, ASEAN-Japan FTA, and ASEAN-Korea FTA. Since ASEAN countries try to harmonize RoOs across these FTAs to some extent, biases from the differences in RoOs across FTAs will not be serious in our analysis.[6]

Third, at least in the case of utilization of the above-mentioned multilateral FTAs (five ASEAN+1 FTAs in addition to ASEAN FTA), we do not need to take so much into account the relationship between RoOs in using FTA schemes in exporting and the FTA utilization in importing. In general, if export destination and import source countries do not belong to the same FTA, the compliance of RoOs in using FTA schemes in exporting will become technically difficult. As a result, differences between export destination country and import source country may affect our estimates. However, this issue does not matter so much in the case of our sample countries because, as mentioned above, our sample countries are members of multilateral FTAs and thus export destination country and import source country are likely to be the members of the same FTA. Furthermore, those multilateral FTAs include "cumulation" rules, so that inputs

[6] However, these ASEAN countries also have some bilateral FTAs. For example, Malaysia has a bilateral FTA with Pakistan. Singapore not only has bilateral FTAs with Jordan, Panama, Peru, and the United States but also is a member of the Trans-Pacific Strategic Economic Partnership (Brunei, Chile, New Zealand, and Singapore) and the Singapore-European Free Trade Association (Switzerland, Iceland, Liechtenstein, Norway, and Singapore). In exporting to such countries, RoOs may be different across importing countries. Then, the differences in RoOs may yield some biases in our estimates.

from other member countries can be seen as inputs originated in exporting countries.[7]

Fourth, our sample drawn from the JETRO survey seems to capture well the information of Japanese affiliates in ASEAN countries. According to the "Basic Survey of Japanese Business Structure and Activities" by the Ministry of Economy, Trade and Industry (METI), there were around 2,000 Japanese manufacturing affiliates in ASEAN7 countries in 2009. Namely, the JETRO survey includes more than half of Japanese affiliates in the case of ASEAN7 covered by the METI data. Compared with the METI data, the JETRO survey includes detailed information on affiliates' status of FTA use according to partner countries. More importantly, affiliates in the JETRO survey are not so qualitatively different from those in the METI data. For example, affiliates in ASEAN4 countries (Thailand, Malaysia, Indonesia, and the Philippines) in 2009 had almost the same mean values of employment (669 for the JETRO and 601 for the METI)[8] and the share of exports in total sales (45% for the JETRO and 48% for the METI). Thus, the sample affiliates in our dataset can be taken as the representative.

Before reporting our estimation results, we take a brief look at sample affiliates' FTA use. Table 1 reports the proportion of affiliates that use FTA schemes in exporting/importing for a certain number of years. The quantitatively similar proportions can be found between the cases of exporting and importing. In particular, the proportion decreases as the number of years increases. Nevertheless, around 46% and 39% of affiliates use FTA schemes in exporting and importing at least one year, respectively. Furthermore, around 3% and 1% of affiliates use FTA schemes in exporting and importing in all of our sample years (four years), respectively.

=== Table 1 ===

Table 2 reports the conditional probability of FTA utilization in exporting and importing. Although the conditional probability of using FTA in exporting (importing) in year t given that the affiliate did not use FTA in exporting (importing) in year $t-1$ is 19% (16%), it rises to 70% (66%) for the affiliates used FTA in exporting (importing) in year $t-1$. The similar rise can be found in the case of cross effects. The conditional probability of using FTA in exporting (importing) in year t given that the affiliate did not use FTA in importing (exporting) in year $t-1$ is 27% (21%), but it rises to 51% (45%) for the affiliates used FTA in importing (exporting) in year $t-1$. Thus, we can see

[7] For more details on cumulation rules, see, for example, Augier et al. (2005).

[8] Nevertheless, one may say that the mean values of employment are a little higher in our sample than in the METI data and thus that its higher values lead to biases in our estimates as in the case of our focus on foreign plants.

not only positive correlation between current and past use of FTA in exporting/importing but also the positive cross-correlation between current and past FTA use of exporting and importing.

=== Table 2 ===

5. Empirical Results

This section reports our estimation results. We first present our baseline estimation results and then the results on some robustness checks. The basic statistics are provided in Table 3.

=== Table 3 ===

5.1. Baseline Results

Our baseline results are reported in Table 4. Column "Bivariate" presents the estimation results for the bivariate probit model. This model takes into account the correlation in FTA utilization between exporting and importing, but not firms' unobserved heterogeneity. Coefficient ρ is estimated to be significant, indicating that FTA use is highly correlated between the cases of exporting and importing. In other words, there remain factors that are not included in our model but which affect both the use of FTA schemes in exporting and those use in importing. We can see statistically significant state dependence in FTA utilization in both exporting and importing. Namely, the past experience of FTA utilization in exporting (importing) encourages firms to use FTA schemes in exporting (importing) in the current year. In the case of FTA utilization in importing, we also see the significant cross effects; the past experience of FTA utilization in exporting encourages firms to use FTA schemes in importing in the current year.

=== Table 4 ===

The results in firm characteristics are as follows. First, we can see that firm size in terms of employment does not matter in using FTA schemes in both exporting and in importing. The insignificant result in the case of exporting is not consistent with the finding in Takahashi and Urata (2010). One likely reason for this is that the lagged dependent variable absorbs the role of firm size. Second, due to the more

experience/knowledge on international activities/institutions particularly in their host countries, the older affiliates are more likely to use FTA schemes only in importing. Third, the local input share has influence on the use of FTA schemes only in importing. Its coefficient is estimated to be significantly negative, indicating that the smaller magnitude of imports may lead to the smaller amount of tariff savings and thus to less incentive to use FTA schemes for firms. Its insignificant result in the case of exporting may be due to the fact that ASEAN adopts a very flexible criterion, an optional criterion, as RoOs: The country of origin of goods is determined by whether to meet either a value-added content criterion or a change in tariff classification criterion.[9]

Column "Random-Univariate" shows the results for the dynamic random-effect univariate probit model. This model controls for firms' unobserved heterogeneity but not for the correlation in FTA utilization between exporting and importing. It includes the longitudinally-averaged-versions of the explanatory variables of firm characteristics. Two variances are significantly estimated, indicating that there is significant unobserved heterogeneity that cannot be explained by our observables. We again find the significant state dependence in FTA utilization in both importing and exporting. In the case of FTA utilization in importing, however, the coefficient for the cross-lagged dependent variable turns out to be insignificant. The results in the explanatory variables of firm characteristics do not change qualitatively.

The results for the dynamic random-effect bivariate probit model are reported in column "Random-Bivariate". This model is our preferred one and takes into account both firms' unobserved heterogeneity and the correlation in FTA utilization between exporting and importing. Both the error correlation ρ and the random-effect correlation ρ_μ are estimated to be significant, indicating the rejection of the hypothesis of independence in the errors and the random effects of the two equations. Also, two variances for unobservable random components are again significantly estimated. In short, when examining the state dependence and cross effects in the FTA utilization in exporting and importing, we should estimate a dynamic random-effect bivariate model, neither a bivariate model without random effects or a dynamic random-effect univariate model.

The results are almost unchanged with those in "Random-Univariate". In particular, there is the significant state dependence in FTA utilization in both importing and exporting but is not the cross effects in FTA utilization between importing and exporting. The interpretation consistent with these two kinds of findings is that there are

[9] Indeed, Cadot and de Melo (2007) point out that RoOs in ASEAN FTAs are much less restrictive than those in other FTAs existing in the world.

not so large impacts of FTA utilization in both exporting and importing on firm performance. Furthermore, a significant fraction of FTA fixed costs in both exporting and importing is sunk costs but is not common between the cases of exporting and importing. The former interpretation is because we should find the cross effects in FTA utilization in exporting (importing) if FTA utilization in importing (exporting) has positive impacts on firm performance. In short, the significant fraction of FTA fixed costs is trade flow-specific sunk costs.

5.2. Robustness Checks

We conduct some kinds of robustness checks. First, column "Exogeneity" shows the estimation results for the model excluding variables that may be regarded as potentially endogenous. This exclusion is because, as mentioned in Section 3, all elements in **x** are required to be strictly exogenous. However, for example, if FTA utilization has some impacts on employment size, our variable of Labor may be endogenous. Also, FTA utilization in exporting and procurement sources (i.e. local inputs) will be simultaneously determined. Although we already take one-year lag of Labor and Local Input to tackle these issues, we also try the estimation for the model excluding these two variables.

Second, we drop affiliates who do not export to and import from FTA partner countries. So far, we implicitly assume that all firms already decide to export and import. Under this assumption, we examine the choice of tariff schemes in exporting and importing. However, from the theoretical point of view, firms will choose one of the three choices including exporting (importing) under FTA schemes, exporting (importing) under MFN schemes, and not exporting (importing). Therefore, in order to focus on the choice of tariff schemes more seriously, we drop affiliates who do not export to and import from FTA partner countries. The estimated results for this kind of sample are reported in column "Trading".

Third, we drop the affiliates that do not have incentives to use FTA schemes due to having different kinds of tariff exemption schemes. The JETRO survey asks affiliates about their reasons for not utilizing FTAs. One of the major reasons is that "importers are exempted from tariffs" in the case of exporting. Actually, in many ASEAN countries, there are various kinds of tariff exemption schemes for promoting inbound investment. Thus, if the partners (i.e. importers) enjoy such schemes, firms do not need to make use of FTAs. Column "Other Schemes" reports the estimation results for the sample dropping such affiliates.

The results for these kinds of robustness checks are reported in Table 5. Some

differences can be found in firm characteristics variables. For example, the coefficient for Local Input is estimated to be significantly positive in the case of exporting in column "Trading". This result will indicate that firms using more local inputs are more likely to comply with RoOs and thus to use FTA schemes in exporting. Our main results are unchanged from those in Table 4. Namely, there is the significant state dependence in FTA utilization in both importing and exporting but is not the cross effects in FTA utilization between importing and exporting. All parameters of variances and covariances are again estimated to be significant.

=== Table 5 ===

6. Concluding Remarks

In this paper, by employing a unique survey data for Japanese affiliates in ASEAN countries, we examined the state dependence of FTA utilization (i.e., FTA utilization in exporting (importing) at the previous year affects that in exporting (importing) at the current year) and the cross-effects in FTA utilization (i.e., FTA utilization in exporting (importing) at the previous year affects that in importing (exporting) at the current year). To do that, we estimate the dynamic random-effect bivariate probit model, which takes into account both firms' unobserved heterogeneity and the correlation in FTA utilization between exporting and importing. As a result, we found the significant state dependence in FTA utilization in both importing and exporting but not the cross effects in FTA utilization between importing and exporting. These results imply that a significant fraction of FTA fixed costs in both exporting and importing is sunk costs but is not common between the cases of exporting and importing.

Our results imply that the policy support for FTA utilization in exporting (importing) does not automatically enable firms to use FTA utilization in importing (exporting) and does just enable to continue the use of FTA utilization in exporting (importing) in the subsequent years. In other words, it is necessary for policy makers to provide firms the assistance for FTA utilization in exporting and importing separately. While the main support for the case of exporting may be to assist procedures to obtain CoOs, that for the case of importing is the eligibility of firms' products and the preferential rates on those. In short, it is important to provide highly detailed assistance according to firms' preference on trading activities (i.e. FTA utilization in exporting or importing).

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Table 1. Number of Years (%)

	FTA^{EXP}	FTA^{IMP}
0	54	61
1	21	19
2	15	12
3	7	7
4	3	1
Total	100	100

Table 2. Probability of FTA Use in Current Year, Conditional on Past Use

	Probability
Prob(FTA^{EXP} at t | FTA^{EXP} at $t-1$)	70
Prob(FTA^{EXP} at t | No FTA^{EXP} at $t-1$)	19
Prob(FTA^{IMP} at t | FTA^{IMP} at $t-1$)	66
Prob(FTA^{IMP} at t | No FTA^{IMP} at $t-1$)	16
Prob(FTA^{EXP} at t | FTA^{IMP} at $t-1$)	51
Prob(FTA^{EXP} at t | No FTA^{IMP} at $t-1$)	27
Prob(FTA^{IMP} at t | FTA^{EXP} at $t-1$)	45
Prob(FTA^{IMP} at t | No FTA^{EXP} at $t-1$)	21

Table 3. Basic Statistics

	No. Obs.	Mean	S.D.	p10	p90
FTA^{EXP} ($t-1$)	1,935	0.2977	0.4574	0	1
FTA^{IMP} ($t-1$)	1,935	0.2465	0.4311	0	1
Labor ($t-1$)	1,935	5.4471	1.4486	3.526	7.226
Age ($t-1$)	1,935	15.7044	10.0654	4	29
Local Input ($t-1$)	1,935	0.4293	0.3373	0	0.95
FTA^{EXP} (1)	1,935	0.2165	0.4120	0	1
FTA^{IMP} (1)	1,935	0.1483	0.3555	0	1
Labor (Average)	1,935	5.4700	1.4354	3.537	7.221
Age (Average)	1,935	16.1893	10.0435	4.5	30
Local Input (Average)	1,935	0.4259	0.3049	0.05	0.888

Table 4. Baseline Results

	Bivariate		Random-Univariate		Random-Bivariate	
	FTA^{EXP}	FTA^{IMP}	FTA^{EXP}	FTA^{IMP}	FTA^{EXP}	FTA^{IMP}
FTA^{EXP} ($t-1$)	1.296***	0.228***	0.661***	0.081	0.706***	0.072
	(0.083)	(0.087)	(0.171)	(0.145)	(0.169)	(0.172)
FTA^{IMP} ($t-1$)	0.042	1.164***	0.007	0.506***	-0.092	0.475***
	(0.092)	(0.090)	(0.135)	(0.183)	(0.165)	(0.183)
FTA^{EXP} (1)			0.969***	0.277	0.910***	0.317*
			(0.214)	(0.178)	(0.207)	(0.179)
FTA^{IMP} (1)			-0.020	0.901***	0.058	0.876***
			(0.172)	(0.234)	(0.173)	(0.222)
Labor ($t-1$)	0.008	-0.012				
	(0.028)	(0.029)				
Age ($t-1$)	0.006	0.013***				
	(0.004)	(0.004)				
Local Input ($t-1$)	0.084	-0.227**				
	(0.105)	(0.107)				
Labor (Average)			0.006	-0.029	0.006	-0.031
			(0.043)	(0.045)	(0.041)	(0.047)
Age (Average)			0.007	0.019***	0.007	0.018***
			(0.006)	(0.006)	(0.006)	(0.007)
Local Input (Average)			0.051	-0.358*	0.035	-0.336*
			(0.179)	(0.198)	(0.173)	(0.200)
ρ	0.827***				0.924***	
	(0.058)				(0.131)	
$\sigma_{\mu 1}$			0.741***		0.728***	
			(0.137)		(0.136)	
$\sigma_{\mu 2}$				0.858***	0.876***	
				(0.136)	(0.140)	
ρ_{μ}					0.690***	
					(0.195)	
Number of observations	1,935	1,935	1,935	1,935	1,935	1,935
Log-likelihood	-1656	-1656	-915.0	-837.6	-1622	-1622

Notes: *** and ** indicate 1% and 5% significance, respectively. In the parenthesis is the robust standard error. All specifications also include industry dummy, year dummy, and country dummy.

Table 5. Robustness Check: A Dynamic Random-effect Bivariate Probit Model

	Exogeneity		Trading		Other Schemes	
	FTA^{EXP}	FTA^{IMP}	FTA^{EXP}	FTA^{IMP}	FTA^{EXP}	FTA^{IMP}
FTA^{EXP} ($t-1$)	0.696***	0.085	0.736***	0.135	0.780***	0.239
	(0.166)	(0.172)	(0.177)	(0.189)	(0.184)	(0.194)
FTA^{IMP} ($t-1$)	-0.084	0.477***	-0.061	0.436**	-0.130	0.474**
	(0.163)	(0.183)	(0.180)	(0.205)	(0.196)	(0.198)
FTA^{EXP} (1)	0.921***	0.282	0.661***	0.131	1.009***	0.291
	(0.204)	(0.178)	(0.196)	(0.184)	(0.234)	(0.205)
FTA^{IMP} (1)	0.052	0.906***	0.086	0.974***	0.012	0.907***
	(0.172)	(0.223)	(0.172)	(0.239)	(0.203)	(0.247)
Labor (Average)			-0.031	-0.041	-0.039	-0.049
			(0.040)	(0.048)	(0.045)	(0.052)
Age (Average)	0.008	0.015***	0.006	0.010	0.007	0.016**
	(0.005)	(0.006)	(0.006)	(0.007)	(0.007)	(0.008)
Local Input (Average)			0.379**	0.211	0.022	-0.371
			(0.182)	(0.216)	(0.197)	(0.227)
ρ	0.931***		0.986***		0.975***	
	(0.131)		(0.140)		(0.158)	
$\sigma_{\mu 1}$	0.732***		0.529***		0.711***	
	(0.134)		(0.153)		(0.151)	
$\sigma_{\mu 2}$	0.878***		0.729***		0.845***	
	(0.138)		(0.159)		(0.153)	
ρ_{μ}	0.665***		0.735**		0.615***	
	(0.187)		(0.308)		(0.221)	
Number of observations	1,935	1,935	1,500	1,500	1,535	1,535
Log-likelihood	-1624	-1624	-1308	-1308	-1227	-1227

Notes: *** and ** indicate 1% and 5% significance, respectively. In the parenthesis is the robust standard error. All specifications also include industry dummy, year dummy, and country dummy. The samples in "Trading" and "Other Schemes" exclude the non-trading affiliates and the affiliates any of whose partners enjoy some kind of tariff exemption schemes, respectively.