Firm-level Trade Diversion

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Abstract: This paper employs the highly-detailed import data in Thailand to examine firm-level trade diversion with regional trade agreements (RTAs). Our dataset allows us to directly identify whether or not a pure form of trade diversion at the firm level occurs; in other words, whether or not a firm's initiation of importing a product from RTA member countries under RTA schemes stops the firm's imports of the product from RTA non-member countries. We find that firm-level trade diversion of import sources is quantitatively small. A much larger amount of imports from non-members disappears in firms that do not start imports from RTA members or that do start imports under the most favoured nation scheme. Also, such switching is even less likely to happen when importing differentiated products rather than homogeneous products.

Keywords: RTA; Trade diversion; Thailand
JEL Classification: F15; F53

1. Introduction

The trade creation and diversion have been key concepts in considering the economic effects of regional trade agreements (RTAs). Viner (1950) is a pioneering study on these concepts though those were discussed in the context of the customs union. Originally, the trade creation effects refer to the start of importing a product, which was formerly not imported at all, from an RTA member country. The trade diversion means the stoppage of importing a product from an RTA non-member country

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by starting to import the product from the member country instead. Such a switch may happen even if before-taxed prices from RTA non-members are cheaper than those from RTA members because RTA members enjoy lower RTA preferential tariff rates than general tariff rates such as most favoured nation (MFN). Trade diversion has for long been regarded as one of the sources for notorious "evils" resided in RTAs. Researchers have tried to quantify these effects since those play a crucial role in evaluating the whole impact of RTAs.

There are several ex-post empirical studies on trade creation and diversion.[1] Those studies mostly estimate the gravity equation by employing the aggregated trade data such as country-level (or country-sector-level) data. The recent examples include Soloaga and Winters (2001), Magee (2008), Carrere (2006), Dai et al. (2014), and Yang and Martinez-Zarzoso (2014). These studies differ particularly by estimation techniques. For example, while Carrere (2006) employs the Hausman-Taylor estimation technique, the multinomial poisson maximum likelihood is used in Yang and Martinez-Zarzoso (2014). These studies introduce various RTA dummy variables to differentiate trade creation and trade diversion effects, into gravity equations. In particular, Magee (2008) more carefully define these effects and quantify those absolute values.[2] As a result, Magee found that trade creation effect is the increase of intra-bloc trade by 89% after being in place for 18 years while there is little evidence of trade diversion.

In this paper, using the firm-level transaction data, we examine the effects of RTAs' enactment on import from non-RTA member countries at the most detailed level. Our dataset is shipment-level customs data on Thai imports during 2007-2011. It carries information not only on firms, source countries, and commodities but also on tariff schemes (e.g., RTA scheme or MFN scheme)[3] used for the imports.[4] With this dataset,

[1] As summarized well in Magee (2008), another strand is the ex-ante studies. The typical is a computable general equilibrium (CGE) model simulation. In particular, many studies based on CGE models use variations of the Global Trade Analysis Project (GTAP) model. Examples of this approach include Brown et al. (1995), Cox (1995), Sobarzo (1995), and the studies surveyed in Baldwin and Venables (1995). There are also some studies that employ the simpler approach, which is based on the partial equilibrium model. Those studies include Karemera and Ojah (1998), Wylie (1995), and Kreinin and Plummer (1992). Although estimates on trade diversion in these studies are severely affected by the assumption on exogenous parameters such as demand elasticity, all papers show some amount of absolute values on trade diversion.

[2] Clausing (2001) directly examine the effects of tariff reduction through RTAs on trade.

[3] The aggregated version of trade data according to tariff schemes has been employed in several papers, including studies on the determinants of utilization rates of preferential trade and the effects of preferential utilization on prices. The former kind of studies include Bureau et al. (2007), Cadot et al. (2006), Francois et al. (2006), Manchin (2006), and Hakobyan (2014). Those studies found that the utilization of preferential schemes is higher in the products with a larger tariff margin, larger volumes, and the less restrictive RoOs. The examples of the latter kind are Cadot et al. (2005), Olarreaga and Ozden (2005), and Ozden and Sharma (2006), which found the rise of export prices

we can empirically investigate whether or not a firm stops importing from non-RTA members when it starts importing from RTA members. The Vinerian trade diversion is derived basically from a simplistic international trade model for a homogenous good under perfect competition. Thus, in the Viner model, we do not need to introduce firm-level perspectives. However, we have well known by now that firms are highly heterogeneous and make their export decisions with considering their idiosyncratic characteristics, experiences, and external economic environment. Firm-level trade diversion is, in this sense, a pure form of trade diversion or import source switching based on time-invariant firm characteristics, compared with trade diversion resulted in complicated interactions among multiple firms. We believe that the introduction of the concept of firm-level trade diversion provides a pure benchmark for our analysis on the effects of RTAs on import from non-RTA members.

Specifically, our firm-level analysis of the effects of RTAs on imports from non-RTA members enables us to examine the following questions that have been never investigated. One is whether or not a firm's stop of importing a product from RTA non-members is really accompanied with a start of importing the product from RTA member countries. The previous country-level studies examine a decrease in imports from RTA non-member countries, separately from an increase in imports from RTA member countries. Therefore, those regard trade diversion as *any* decrease in country-level import values from RTA non-member countries after concluding on RTAs. In other words, even if RTA member countries do not experience any increase in intra-bloc trade, a decrease in imports from non-members is taken as trade diversion. On the other hand, our dataset enables us to identify whether or not such firm-level switches in import sources really occur.

Furthermore, we can check whether or not RTA tariff schemes really contribute to affecting imports from non-RTA members. RTAs enable firms to start importing from RTA members in various ways. As shown in Hayakawa and Kimura (2014), RTAs contribute to reducing not only tariff rates but also non-tariff barriers (NTBs). Such elimination of NTBs will contribute to reducing various costs for trading and thus may enable some firms to start importing from RTA members under MFN schemes. In other words, firms that start importing from RTA members do not necessarily use RTA schemes, i.e., lower rates than MFN rates, particularly due to the existence of various

after RTA schemes are utilized.

[4] Recently, several empirical papers used shipment-level data (e.g. Amiti et al., 2014; Berman et al., 2012; Eaton et al., 2011). However, no studies have used those data that enable us to identify tariff schemes. The exception is Cherkashin et al. (2010), though their dataset includes only the data in apparel industry. Our dataset covers all industries.

costs in the utilization of RTA schemes (e.g., costs for the compliance of rules of origin).[5] All previous studies are based on the dataset that cannot differentiate trade values according to actually applied tariff schemes. In our dataset, it is possible to identify whether or not a stop of imports from non-member countries is really accompanied with a start of imports from members *under* RTA schemes.

Furthermore, we believe that Thailand is a suitable importing country to examine the effects of RTAs on imports from non-RTA member countries. As introduced in the next section, since the latter half of the 2000s, which is our sample period, Thailand and the Association of Southeast Asian Nations (ASEAN), of which Thailand is a member, have actively concluded RTAs with countries outside ASEAN. As a result, imports from RTA partner countries *under* RTA schemes rapidly grow in Thailand during that period. Due to such an increase in imports under RTA schemes, we may potentially observe a high probability of firm-level switches across import sources.[6]

With this dataset, we conduct a comprehensive analysis regarding effects of RTAs on imports from non-RTA members. We first show how many import transactions from RTA non-members are stopped with starting imports from RTA members *under* RTA schemes. We will find that a very trivial amount of imports from RTA non-members disappears with starting imports from RTA members under RTA schemes. Second, we further investigate the statistical significance of such disappearance with controlling for import firms, products, and export country characteristics. In addition, we examine effects of RTA use on not only such extensive margins but also the amount of imports from non-members (i.e., intensive margins). Last, we compare import unit prices from RTA members with those from non-members. This comparison checks whether or not a classical concern of trade diversion is warranted; it has been claimed that import prices inclusive of tariff rates from RTA members may become lower than those from non-members despite the fact that import prices exclusive of tariff rates from RTA members are more expensive, resulting in a welfare loss from trade diversion.

Our paper is related not only to the literature on trade creation/diversion but also to some other literatures. For example, several papers recently examine mechanics on the survival of international transactions (e.g., Besedes and Prusa, 2006a, 2006b; Gorg, Kneller, and Murakozy, 2012; Nitsch, 2009). Those studies found, for example, that

[5] Furthermore, imports from members under MFN schemes based on the elimination of NTBs may not have much advantage if non-members can also enjoy such elimination (Baldwin, 2011).

[6] In addition, our sample period of 2007-2011 includes the global financial crisis. During the crisis, firms may tend to seek the better trading partners, As a result, we may observe more frequent switches of trading partners.

international transactions are likely to survive when those are exported by more productive firms, by countries with larger GDP, or by geographically-closer countries. Our paper is also related to a series of studies on state dependence. Once firms bear sunk costs for starting trading, they do not need to incur those costs in the following years and thus will be able to easily continue their trading activities. This is called "state dependence" and has been empirically confirmed in several previous studies such as Das et al. (2007) and Roberts and Tybout (1997). In particular, the state dependence in importing is found in Aristei et al. (2013) and Muuls and Pisu (2009). In sum, while these previous studies examine the roles of firm, country, or product characteristics in addition to firms' past experience in trading, this paper sheds a new light on the role of firms' starts of imports from other countries under RTA schemes in the survival of international transactions.

The rest of this paper is organized as follows. The next section introduces our dataset and then takes an overview of firm-level trade diversion in Thailand. After presenting our econometric model in Section 3, we report our estimation results in Section 4. Last, Section 5 concludes on this paper.

2. Data Overview

This section provides an overview of firm-level trade diversion in Thailand. Our dataset is obtained from the Customs Office, the Kingdom of Thailand. It is transaction-level import data from 2007 to 2011 and covers all commodity imports in Thailand. In our sample period, we can keep the consistency of Harmonized Commodity Description and Coding System (HS) version for the product classification, i.e. HS2007. Our dataset contains customs clearing date, HS eight-digit code, export country, firm ID, tariff scheme (e.g., RTA, MFN, etc.), and import values in Thai Baht (THB). We use the data on imports aggregated by the years in addition to source countries, HS eight-digit codes, firms, and tariff schemes. We classify tariff schemes into three categories including MFN scheme, RTA scheme, and the other schemes. The tariff payment for imports under "the other schemes" is exempted based on five schemes: bonded warehouses, free zones, investment promotion, duty drawback for raw materials imported for the production of export, and duty drawback for re-exportation.[7]

In our sample period, as listed in Table 1, Thailand has 10 RTAs, most of which are overlapped in their country coverages. Thailand has not only bilateral but also plurilateral RTAs with Japan, Australia, New Zealand, and India. With the members of

[7] See the Appendix for these five schemes.

the ASEAN, of which Thailand is also a member, Thailand has at least five RTA schemes. In this paper, we call the following 15 countries "RTA member countries": Korea, China, Japan, India, Philippines, Viet Nam, Cambodia, Laos, Myanmar, Malaysia, Indonesia, Brunei, Singapore, New Zealand, and Australia. Except for Korea, with which Thailand concludes on an RTA in 2010, all these countries have been RTA partner countries for Thailand at least since the beginning of our sample period, i.e. 2007. The other countries are called "RTA non-member countries".[8]

=== Table 1 ===

Although Thailand had had RTAs since an earlier period than ours, the significant use of RTA schemes in Thailand's import just started during our sample period. Figure 1 reports imports under RTA schemes in addition to their shares in total imports. In this figure, samples are restricted only to combinations of commodity times import origin country in which any RTA rates are lower than MFN rates in 2007. In 2007, imports under RTA schemes still remained at a small magnitude. The share in total imports was only less than 1%. However, both the magnitude and share of imports under RTA schemes have dramatically increased since 2008. The share rises to 16 % in 2008 and further to 31% in 2011. Such a rise is partly because of the rise of the number of countries that can export to Thailand under RTA schemes (e.g., Korea). In short, our sample period is the period when Thailand starts to increase imports under RTA schemes.

=== Figure 1 ===

In our sample period, we examine the firm-level switches of import sources in Thailand. Specifically, we examine import transactions from RTA non-member countries which exist in 2007 at an import firm-product (HS 8-digit level)-export country-level. In order to focus on the firm-level switches of import sources from non-members to RTA members with the use of RTA schemes, we slim down our samples in the following ways: we restrict such transactions to those by firms who did

[8] More precisely, all products do not necessarily have lower RTA rates than MFN rates in any RTAs. Furthermore, it depends on RTAs and thus on export countries which products can be exported to Thailand under the lower RTA rates than MFN rates. Also, RTA preferential rates in some products become available some years after RTAs' entry into force. In this sense, "RTA member countries" should be classified according to not only countries but also products and years. However, such classification is too complicated to examine trade diversion. Thus, we simply classify imports according only to import origin countries.

not import a concerned product from RTA member countries in 2007. Imports from RTA non-member countries do not include those under other schemes in order to focus on those under general tariff schemes, i.e. MFN schemes though we keep imports from RTA member countries under other schemes in our samples. The sample products are restricted only to those in which a preferential rate under at least one of the RTAs is lower than MFN rates in 2008. Such products are called "eligible products" in this paper. The original version of trade diversion can happen only in this restricted category of imports. Within this category, we examine how many import transactions with non-members existing in 2007 survive in 2011, depending on whether or not firms start importing a concerned product from RTA member countries under RTA schemes during 2008-2011.

Before starting the analysis on the firm-level switch of import sources, we check how much of imports for the above-restricted observations occupy in total imports in 2007. Figure 2 depicts the decomposition of import values in Thailand in 2007 classified by the category of transactions. More than a half of total imports come from (future) RTA member countries (59%). As observed in Figure 1, those from RTA member countries in 2007 are mostly under non-RTA schemes. This implies that, without any RTA schemes, Thailand may import mainly from those countries. Namely, these RTA member countries are "natural trading partners" for Thailand. Next, most of the imports from RTA non-members are observed in ineligible products (26%). In other words, non-member countries actively export products in which Thailand does not provide any preferential access.[9] The third largest share can be found in imports from non-member countries in eligible products under other exemption schemes (6%), followed by imports from non-members in eligible products under MFN by firms who import from members only under MFN. The categories with the fourth and fifth largest shares decompose imports from non-member countries in eligible products under MFN schemes according to the status of firms' importing from RTA members. In particular, our target category, which is the imports from non-members in eligible products under MFN by firms without any imports from RTA members in 2007, occupies only 4% in total imports. Since the firm-level switches of import sources from non-members to RTA members through the use of RTA schemes can occur only in this category, it is obvious that its economic impact is trivial.

[9] Some RTAs such as ASEAN-China FTA have a tariff reduction schedule for some commodities in which preferential arrangements start after 2008. However, such commodities are not many. To keep our sample design of "eligible" products simple in our detailed analysis, we stick to the categorization of the trade arrangements on the basis of the year 2008.（(早川へ　これでいい？)）

=== Figure 2 ===

Nevertheless, we start to closely investigate what happens in this "eligible" category. Table 2 reports various statistics on imports from RTA non-members (under MFN schemes) according to various dimensions. "Number" shows the number of import firm-product-export country-level import transactions in 2007 listed in the eligible samples. "Import Values" is the sum of imports in 2007. "Total" in "Share in Total" indicates the sum of import transactions or values from RTA non-member countries (under MFN schemes) in 2007 (i.e. 185,278 + 15,383 + 20,170 + 11,500 in the case of Number). While "Exit" refers to observations that do not exist in 2011, "Stay" indicates those that still appear in 2011. These figures are reported according to the existence of import transactions from RTA member countries during 2008-2011. Furthermore, such transactions from RTA member countries are differentiated among tariff schemes.

=== Table 2 ===

There are three noteworthy points in this table. First, most of the "Exit" observations are appeared in firms who do *not* start importing from RTA member countries. In terms of the number of transactions, such exit occupies 80% in total. This implies that most of the stops of imports from non-members are not accompanied with starting imports from RTA members. Various kinds of negative shocks will lead to such stops. Note that in our analysis we concentrate on intra-firm switches of import origins as a pinpointed trade diversion. In general, we may have *indirect* or inter-firm trade diversion in a case such that a firm concerned stops importing from non-members with facing competition from its rival firm starting imports from members. We do not include such cases because it is difficult to verify the causality.

Second, a firm-level switch of import sources from non-members to RTA members through the use of RTA schemes is shown in the cell for "Exit" in "Under RTA" in "Positive Imports from Members during 2008-2011". Namely, this cell shows the stop of import transactions of a product from RTA non-members by firms who start importing that product from RTA members under RTA schemes during 2008-2011. In terms of values, it only occupies 0.6% in total imports (of eligible products under MFN schemes by firms without any import from RTA members in 2007). Or, this magnitude is only 0.024% (= 0.006 x 0.04) in total imports in Thailand in 2007.[10]

[10] Please remember that the sample in Table 1 is the one categorized into "Imports from

Third, among import transactions by firms who start to import from RTA members, most of the stops of import transactions from non-members occur in firms who start importing from RTA members under MFN schemes rather than under RTA schemes. In terms of the number of transactions and values, it occupies 8% and 13%, respectively, in the total import of eligible products under MFN schemes by firms without any imports from RTA members in 2007. There are various possible reasons for such a start of imports from RTA members. One of those will be the preferential elimination of various kinds of NTBs in Thailand after the entry of RTAs into force.

These findings in Table 2 can be summarized as follows: from the quantitative point of view, the firm-level switches of import sources from non-members to RTA members with the use of RTA schemes is not significant. Rather, a much larger amount of imports from non-members disappear in firms who do not start importing from RTA members or who do start it under MFN schemes. However, the significance of such firm-level trade diversion differs by exporting country. The share of "Exit" by firms who start importing from RTA members under RTA schemes is reported by export countries in Table 3. Three countries have more than 10% shares. In particular, 12% of imports from South Africa disappear with starting importing from RTA members under RTA schemes.

=== Table 3 ===

3. Empirical Framework

This section explains our empirical framework to examine whether or not the start of imports from RTA members under RTA schemes significantly stops importing from non-member countries, under controlling for several elements. To do that, we simply specify the following probit model:

$$\text{Prob}\ (\text{Exit}_{fipt} = 1) = \alpha\ \text{RTA}_{fpt} + \mathbf{X}_{ft}\ \beta\ + \mathbf{Z}_{pt}\ \gamma\ + \mathbf{W}_{it}\ \delta\ + u_s + u_t + \varepsilon_{fipt} \quad (1)$$

Exit_{fipt} takes the value one if firm f stops importing product p from RTA non-member country i in year t and zero otherwise. RTA_{fpt} is the binary variable taking the value one if firm f starts importing product p from any RTA member countries under RTA schemes in year t and zero otherwise. $\mathbf{X}_{ft}$, $\mathbf{Z}_{pt}$, and $\mathbf{W}_{it}$ are vectors of import firm characteristics, those of product characteristics, and those of export country

Non-members in Eligible Products under MFN by Firms without Any Imports from Members" in Figure 2.

characteristics, respectively. The details of these vectors are explained later. u_s and u_t are sector dummy (defined at Section of HS classification) and year dummy, respectively.

We estimate the above probit model for the restricted sample as in the previous section. Namely, the observations of import transactions from RTA non-member countries are restricted only to those that exist in 2007, those by firms who did not import that product from any RTA member countries in 2007, and those under MFN schemes. The sample products are restricted only to those for which a preferential tariff under at least one of the RTAs is lower than the MFN rate in 2008. Furthermore, we drop observations of import transactions after year t+1 if those are stopped in year t in order to avoid analyzing the complicated appearance of import transactions from RTA non-member countries. Under these restrictions, we estimate the above model for sample years of 2008-2011; i.e., t = 2008, 2009, 2010, and 2011. Then, the positive coefficient for RTA, i.e., α, indicates the firm-level switches of import sources from non-members to RTA members through the use of RTA schemes. Some of these sample restrictions are relaxed in Section 4.2.

We choose control variables by following the previous studies on trade survival. First, following Besedes and Prusa (2006b), for product characteristics, we introduce MFN rates in Thailand. For example, other things being equal, the advantage of importing a product under RTA schemes becomes greater when that product has higher MFN rates. Therefore, firms may be more likely to stop importing from non-member countries in the case of products with the higher MFN rates.[11] Second, we introduce two gravity variables in order to control export country characteristics. While one is exporter's GDP as in Besedes and Prusa (2006b), the other is geographical distance between export country and Thailand following Nitsch (2009). The larger GDP in export countries leads to the lower uncertainty on demand there and thus enables exporters to continue devoting production resources to export activities. Also, trading with the more distant countries obviously increases the uncertainty on fixed export costs and may discourage exporters to continue exporting.

We control two import-firm characteristics, though the previous studies do not examine import-firm characteristics. One is the size of import firms. We introduce firms' total imports from the world. The larger-sized importers may be able to cope better with

[11] One may propose to include the magnitude of preference margin, i.e., the difference between RTA rates and MFN rates, as an explanatory variable. In our study, since we do not differentiate RTA schemes, one way of computing preference margin is to use the difference of MFN rates with the lowest preferential rates among RTA schemes. However, in the case of Thailand, since the lowest preferential rates are zero in almost all products, such a difference is almost the same as MFN rates. Thus, we do not include a variable of preference margin.

various kinds of idiosyncratic shocks (e.g., demand shocks on import countries) and thus to continue importing. The other is the export status of import firms; we introduce Export Dummy, which takes the value one if a firm gets engaged in exporting activities. Two-way traders (i.e., firms conducting both importing and exporting) are likely to be trading companies or large multinational companies. If so, they may be likely to switch import sources relatively easily. These two firm-level variables are one-year lagged to avoid a simultaneity issue among dependent and independent variables.

We also estimate the extended version of the above model. We examine the effects of starting importing from RTA members under MFN and the other schemes by estimating the following model:

$$\text{Prob}(\text{Exit}_{fipt}=1) = \alpha_1 \text{RTA}_{fpt} + \alpha_2 \text{MFN}_{fpt} + \alpha_3 \text{Other}_{fpt} + \mathbf{X}_{ft}\,\beta + \mathbf{Z}_{pt}\,\gamma + \mathbf{W}_{it}\,\delta + u_s + u_t + \varepsilon_{fipt} \quad (2)$$

Importantly, the base import transactions for RTA dummy are different between equations (1) and (2). In the case of (2), those are import transactions by firms who do not start importing from RTA members under any tariff schemes. Furthermore, we also examine the lagged effect of switching by introducing the lagged these variables.

$$\text{Prob}(\text{Exit}_{fipt}=1) = \alpha_1 \text{RTA}_{fpt} + \alpha_2 \text{MFN}_{fpt} + \alpha_3 \text{Other}_{fpt} + \alpha_4 \text{RTA}_{fpt-1} + \alpha_5 \text{MFN}_{fpt-1} + \alpha_6 \text{Other}_{fpt-1} + \mathbf{X}_{ft}\,\beta + \mathbf{Z}_{pt}\,\gamma + \mathbf{W}_{it}\,\delta + u_s + u_t + \varepsilon_{fipt} \quad (3)$$

In addition, as robustness checks, we later control for various kinds of fixed effects such as import firm fixed effects.

The data sources are the following: all firm-level data in addition to the data of MFN rates are obtained from Customs, Kingdom of Thailand, as used in the previous section. The data on GDP, which is deflated by GDP deflator, are drawn from World Development Indicator. We obtain the data on geographical distance from CEPII website. The basic statistics for our sample are provided in Table 4.

=== Table 4 ===

4. Empirical Results

This section reports our estimation results. We first estimate equations (1)-(3) and conduct a series of robustness checks. Next, we explore whether or not the firm-level switches of import sources are less likely to occur in the case of differentiated products. The effects of starting imports from RTA members on intensive margin are also explored. Last, we compare import prices from RTA members with those from

non-members.

4.1. Trade Diversion

Table 5 shows the beseline results. In the estimation, standard errors are clustered according to HS 4-digit codes and years, though other ways of clustering (e.g. clustering according to import firm) do not qualitatively change our results. Column (I) reports the estimation result for equation (1). Unexpectedly, the coefficient for the RTA dummy is negatively significant, indicating that firms who start importing a product from RTA members under RTA schemes are more likely to continue importing that product from RTA non-members. Although it is difficult to interpret this result, from the practical point of view, for switching of trading partners may take some time, and thus trade relationships with an RTA member and non-member countries may be prone to overlap for a while. On the other hand, all of the control variables have expected signs. Larger-sized importers (in terms of total import values) and the importers getting engaged in exporting are more and less likely to continue their import transactions with RTA non-members, respectively. While the import transactions in products with the higher MFN rates have the higher probability of exit, import transactions from countries with the larger GDP are more likely to survive. The coefficient for geographical distance has significantly positive, indicating that import transactions from countries located far are less likely to survive.

=== Table 5 ===

Column (II) reports the estimation result for equation (2). Remember that, in the case of (2), the base import transactions are those by firms who do not start importing from RTA members under any tariff schemes. All control variables have qualitatively unchanged results. The coefficient for the RTA dummy turns out to be insignificant. The MFN dummy has a negatively significant coefficient while the coefficient for the Other dummy is positively significant.[12] Compared with firms that do not start importing from RTA members at all, firms that start importing a product from RTA members under MFN schemes are more likely to continue importing that product from RTA non-members. On the other hand, import transactions are likely to be stopped

[12] Among the other schemes, investment promotion schemes are basically applied to foreign-owned firms. Thus, our result on "Others" may reflect the tendency that foreign-owned firms are more likely to switch trading partners. In the next subsection, we also estimate this equation under introducing import firm fixed effects, which will contribute to controlling for such time-invariant import firm characteristics.

when firms start importing under other tariff exemption schemes. Such a difference across tariff schemes might be due to the fact that tariff payments are completely exempted in the case of imports under other schemes while RTA rates are lower than MFN rates but are not necessarily zero. Or additional advantages in other schemes such as tax exemption may encourage firms to switch trading partners.

Results with the lagged RTA dummy variable are reported in columns (III) and (IV). In column (III), which introduces the lagged dummy variable only on RTA, all previous variables have qualitatively unchanged results. The coefficient for the lagged RTA dummy variable is still insignificant, implying that significant firm-level switches of import sources through the use of RTA schemes does not occur even one year behind. These results are unchanged even if introducing the lagged dummy variables for MFN and Other (i.e., equation (3)), which are shown in column (IV). While the lagged RTA dummy again has insignificant coefficient, MFN and Other lagged dummy variables have significantly positive coefficients. Although the firm-level switches of import sources through the use of RTA schemes does not occur, switches with starting imports from RTA members under MFN and other tariff exemption schemes are detected at least one year after the start of intra-RTA trade.

4.2. Robustness Checks

Next, we conduct some robustness checks on our above results. In the previous estimation, we control only for Section fixed effects and year fixed effects. In the robustness checks, we first try to include various kinds of fixed effects. However, the inclusion of many dummy variables in the non-linear model like our probit model yields the computation problem. Thus, we estimate our models as a linear probability model, i.e., ordinary least squares (OLS). First, we again estimate the model including only Section and year fixed effects by the OLS method in order to check how our estimates change according to the estimation method. The result is reported in column (I) in Table 6 and shows the almost same results as those in column (IV) in Table 5 in terms of the statistical significance and signs. However we should note that the coefficient for the lagged dummy variable on RTA turns out to be positive at a ten percent significance level.

=== Table 6 ===

We start the inclusion of various fixed effects. Specifically, we try four types of fixed effects including import firm fixed effects, import firm-HS eight-digit product

fixed effects, import firm-export country fixed effects, and import firm-HS eight-digit product-export country fixed effects. There are some variations in estimation results across columns. However, the results for the RTA dummy variable are basically unchanged. While its current year dummy variable consistently has insignificant coefficients, the coefficients for its one-year lagged dummy variable are either insignificant or positive at a ten percent significance level. Also, the coefficients for the MFN and the Other dummy variables are not estimated to be significantly positive. Thus, we may conclude that as a whole, import firms do not stop importing from RTA non-members with starting imports from RTA partners.

Second, we extend our sample of import transactions from RTA non-member countries. In the previous tables including those presented in Section 2, we drop import transactions by firms who import from RTA member countries under MFN schemes in 2007 in order to concentrate on the firm-level *switches* of import sources. In Table 7, we include those import transactions.[13] As a result, the number of observations in this table increases by 44%. Interestingly, we can see significant switches of import sources when RTA use occurs one year after the start of importing from RTA members under RTA schemes. This result indicates that when firms import a product from both RTA members and non-members under MFN schemes, the change of tariff schemes from MFN to RTA schemes in importing from RTA members is likely to stop importing that product from RTA non-members. On the other hand, we cannot find significant switches of import sources with starting imports under MFN schemes even one year after that while significant switches through starting importing under other tariff exemption schemes can be found with one year delay.

=== Table 7 ===

4.3. Differentiated Products

Next, we further examine trade diversion in terms of product characteristics. Specifically, we investigate whether or not firm-level switches of import sources with RTA use are less likely to occur in the case of differentiated products. In the Viner model, trade diversion has been considered in the context of homogeneous products. In the case of homogenous products, if import prices (inclusive of tariffs) from non-member countries are higher than those from RTA members, imports from

[13] In other words, we include the category of "Imports from Non-members in Eligible Products under MFN by Firms with Imports from Members Only under MFN" in Figure 2.

non-members are immediately replaced by imports from RTA members. In order to examine whether or not switches of import sources are less likely to occur in the case of differentiated products, we introduce interaction terms with "Differentiated", which takes the value one for differentiated products in the "liberal" classification of products by Rauch (1999).

$$\text{Prob}(\text{Exit}_{fipt}=1) = \alpha_{11}\text{RTA}_{fpt} + \alpha_{12}\text{RTA}_{fpt} * \text{Differentiated}_p + \alpha_{21}\text{MFN}_{fpt} + \alpha_{22}\text{MFN}_{fpt} * \text{Differentiated}_p + \alpha_{31}\text{Other}_{fpt} + \alpha_{32}\text{Other}_{fpt} * \text{Differentiated}_p + \mathbf{X}_{ft}\boldsymbol{\beta} + \mathbf{Z}_{pt}\boldsymbol{\gamma} + \mathbf{W}_{it}\boldsymbol{\delta} + u_s + u_t + \varepsilon_{fipt} \quad (4)$$

We estimate this model with interaction terms as a linear probability model since in the case of non-linear models, the marginal effect of a change in both interacted variables is not equal to that of changing just the interaction term (Ai and Norton, 2003).

Table 8 reports the estimation results for equation (4). The results for the control variables are again qualitatively unchanged in both columns. Column (I) reports a significantly positive coefficient for the current year RTA dummy variable and a significantly negative coefficient for its interaction term with Differentiated dummy variable. In column (II), a coefficient for the interaction term of the current year RTA dummy is significantly negative while the one for the one-year lagged RTA dummy is positively significant. These results imply the switch of import sources with RTA use only in the case of non-differentiated products. On the other hand, except for the case of current year MFN dummy, interaction terms with the MFN and the Other dummy variables are insignificantly estimated.

=== Table 8 ===

4.4. Intensive Margin

This subsection examines the effects of starting importing from RTA members on the intensive margin. Namely, the dependent variable is (a log of) firm *f*'s import amounts of product *p* from RTA non-member country *i* in year *t*; i.e., imports from RTA non-member countries may not be zero but have some decrease. Specifically, we estimate the following equation.

$$\ln \text{Imports}_{fipt} = \alpha_1\text{RTA}_{fpt} + \alpha_2\text{MFN}_{fpt} + \alpha_3\text{Other}_{fpt} + \alpha_4\text{RTA}_{fpt-1} + \alpha_5\text{MFN}_{fpt-1} + \alpha_6\text{Other}_{fpt-1} + \mathbf{X}_{ft}\boldsymbol{\beta} + \mathbf{W}_{it}\boldsymbol{\delta} + \mathbf{X}_{ft}\boldsymbol{\beta} + \mathbf{Z}_{pt}\boldsymbol{\gamma} + \mathbf{W}_{it}\boldsymbol{\delta} + u_s + u_t + \varepsilon_{fipt} \quad (5)$$

We impose the sample restriction similar to the case of Table 5. The result is reported in column (I) in Table 9. While the dummy variables on Others have insignificant

coefficients, the coefficients for those on RTA and MFN are estimated to be significantly positive. The latter result implies that firms starting importing from RTA partners under RTA or MFN schemes increase the imports from RTA non-members. This is not consistent with the trade diversion story. The results in other variables are as follows: the larger-sized importers have significantly larger imports from RTA non-members while those are significantly smaller in two-way traders. Also, the imports from RTA non-members are larger when importing products with the lower MFN rates and when importing from the geographically-closer non-member countries.

=== Table 9 ===

We further estimate this model of intensive margin. First, as in Table 6, we include import the firm-export country-product dummy in addition to the year dummy. Column (II) in Table 9 shows this result. The coefficients for the current and one-year lagged RTA dummy variables are estimated to be respectively positive and negative, but both are insignificant. Although our inclusion of import firm-export country-product fixed effects succeeds in controlling the nature that RTA users in general have larger imports, we do not still find the significant decrease of imports from RTA non-members with the start of RTA use. The coefficient for the current MFN dummy is again estimated to be significantly positive. This result will be consistent with results in Tables 5 and 6 that firms starting importing from RTA members under MFN schemes are more likely to continue to import from RTA non-members. Except for GDP, the other variables have insignificant coefficients.

Second, as in Table 7, we estimate this model with the expanded samples including import transactions by firms who import from RTA member countries under MFN schemes in 2007. The estimation results are reported in columns (III) and (IV) and are not changed much compared with those in columns (I) and (II). In particular, we do not find a significant decrease of imports from non-members through the start of importing under RTA schemes. In Table 7, we found significant switches through RTA use occur one year after the start of importing from RTA members under RTA schemes. Thus, our result here implies that such stops of importing from non-members are not gradually achieved. Rather, a scheme change for imports from RTA members stops importing from non-members with a one-year lag.

4.5. Relative Prices

Last, we take a brief look at the relative import prices from RTA members to

those from RTA non-members. A key issue in trade diversion is the start of importing more expensive products from RTA members than from non-members due to the lower tariff rates in importing under RTA schemes. Such an import is an important source of welfare loss in RTA member countries. To see this, we compare import prices from RTA members (P_{RTA}) with those from non-members (P_{NON}). These prices are computed by dividing import values by import quantities. Such computed price measures are obviously not perfect to this analysis because those include various elements such as quality differences or markup. Nevertheless, those will be useful when roughly examining whether or not firms really substitute cheaper products from RTA non-members for products from RTA members.

We restrict observations only to those categorized into "Exit" in "Under RTA" for "Positive Imports from Members during 2008-2011" in Table 2, i.e., trade diversion. While P_{NON} is evaluated in 2007, P_{RTA} is import prices from an RTA member country under RTA schemes in the earliest year among years in which imports under RTA schemes are observed. Furthermore, in order to eliminate biases based on differences in sample year, P_{RTA} is deflated by using consumer price index in Thailand. These prices not including tariff duty are called pre-tariff prices in this paper. In order to compute import prices inclusive of tariff duty (called post-tariff prices), we multiply import prices by corresponding tariff rates. "MFN" and "RTA" indicate MFN rates in 2007 and RTA rates in the earliest year. The observations are restricted only to those in which quantity unit is same between P_{NON} and P_{RTA}. In addition, we drop observations in which the information on import quantities is not available (i.e., import prices cannot be computed). As a result, the number of observations for switching import sources through RTA use in this table is reduced compared with that in Table 2.[14]

The results are reported in Table 10. The important case is that with both lower post-tariff prices from RTA members and higher pre-tariff prices from RTA members, in which the number of observations is 23, accounting just 5% in total. This fact indicates that even among observations in which firms stop importing a product from RTA non-members with starting imports that product from RTA members, few has the order of import prices from RTA members and non-members consistent with the original concept of trade diversion. In other words, from a quantitative viewpoint, the welfare loss from the switch of import sources through RTA use is rather trivial. On the other hand, the highest share can be found in the case of the lower pre- and post-tariff

[14] The number of those observations is too small to examine for differentiated products and non-differentiated products separately. Also, even if doing that, we did not find any remarkable differences between two types of products.

prices from RTA members, which accounts for 62%. As a result, from the viewpoints of only prices, the major reason for our sample firms' stop of imports from RTA non-members with starting importing from RTA members would be simply to import cheaper products.

=== Table 10 ===

5. Concluding Remarks

Using highly-detailed import data in Thailand, this paper examined the firm-level switch of import sources from RTA non-members to RTA members accompanied with the use of RTA schemes. We obtained a number of new findings. First, from the quantitative point of view, firm-level switches of import sources from non-members to RTA members with the use of RTA schemes, in our wording, the pure form of "firm-level trade diversion," are not observed often. Rather, a much larger amount of imports from non-members disappear in firms who do not start importing from RTA members or who do start importing under MFN schemes. The latter suggests the existence of compliance costs in using RTA preferential schemes as well as possible trade facilitation with RTAs even in utilizing MFN schemes. Second, the start of importing from RTA members under RTA schemes does not stop importing from non-members much. It does not even reduce the amount of imports from non-members in many cases. Third, nevertheless, significant switches are observed when importing non-differentiated products, in contrast with the cases of differentiated products. Fourth, when firms initially import a product from both RTA members and non-members under MFN schemes, a change in tariff schemes from MFN to RTA schemes in importing from RTA members is likely to stop importing that product from RTA non-members with a one-year lag. Such stops end up with the concentration of import sources on RTA partners.

The case of Thailand in 2008-2011 provides an ideal sample set to assess the significance of trade diversion at the micro level because this is at the timing of introducing RTA schemes in usage. How far we can generalize this case for other parts of the world at different timings is of course a matter of discussion. However, at least we can say that trade diversion in the RTA formation may be over-emphasized in both the past academic literature and policy debates.

Appendix: The Other Schemes

In addition to RTAs, there are five other privilege schemes in which importing firms in Thailand could enjoy preferential tariff treatments; namely, bonded warehouses, free zones, investment promotion, duty drawback for raw materials imported for the production of export, and duty drawback for re-exportation. While benefits under the first three are realized immediately at the time of importation, those under the latter two schemes are essentially the refund of the duty already paid which is collected when the exportation or re-exportation is achieved. The benefits offered under these five schemes, which may also vary among schemes, are different from those under RTAs at least in the following six aspects.

First, beneficiaries are different. Under RTAs, beneficiaries can be any importers, no matter what such goods are used for. In other words, they can be either manufacturers for domestic market, manufacturers for export markets, traders who import and distribute goods to customers, or final users of importing goods. Unlike RTAs, beneficiaries under bonded warehouses, free zones, and duty drawback schemes are required to be firms that import goods only for their production and exporting activities. For imports under investment promotion, beneficiaries are mixed depending upon the imported goods. For imports of machinery, beneficiaries could be manufacturers for either domestic or export markets. On the other hand, only manufacturers for export markets benefit from the investment promotion scheme during the importation of raw materials.

Second, lists of eligible goods are different. Under RTAs, eligible goods can be any goods tagged in the inclusion list. In other words, subject to negotiations among RTA members, they can be either raw materials, machinery, or final products. Unlike RTAs, eligible goods are mainly raw materials in most of the five schemes. Machinery to be used in the production process is ineligible under all except for free zones and investment promotion schemes. Imported goods to be used as final products are ineligible under all schemes. It is noted that duty drawback for re-exportation is applicable to any goods – either raw materials, machinery, or final products, provided that such goods do not undergo any transformation since the time they are imported until they are exported.

Third, the depths of customs duty reduction are different. Under RTAs, while tariffs for a large portion of traded goods are totally eliminated, some are still non-zero subject to their sensitiveness in liberalization and RTA's maturity. Tariff reductions under the five schemes vary, but most of them are deeper than RTAs. Tariffs for all raw materials imported under free zones, investment promotion, and bonded warehouses

schemes are virtually exempted. For machinery, imports under free zones are tariff-free while those under the investment promotion scheme may be either tariff-free or subject to a 50% tariff reduction, depending upon the decision by the Board of Investment of Thailand. Under the duty drawback schemes, firms may ask either for a full refund if raw materials are imported for the production of export or for nine-tenth or the excess of one thousand Thai baht of the duty already paid, whichever is higher, if goods are imported for re-exportation.

Fourth, benefits from exemption of other duties are different. On top of tariff reduction, certain schemes grant additional duty privileges to firms. The exemption of excise tax exists for goods imported under bonded warehouse and duty drawback for raw materials imported for the production of export. Privileges for firms in the free zones are among the top since imported goods are free of tariff, excise tax, and value-added tax.

Fifth, qualification is different. Under RTAs, qualified goods are required to be produced in the RTA-member countries and meet the relevant originating criteria specified in the rules of origin. Failure to do so turns such goods unqualified and causes the denial of benefits under RTAs. On the other hand, it is totally not an issue for the importation under the five privilege schemes. It means that goods qualified for the schemes may be produced in and exported from anywhere in the world.

Last but not least, burdens on importers to prove the eligibility are different. In order to claim benefits under the five schemes, importers are required to submit evidence of compliance to the authority in charge. The evidence of compliance includes production formula, necessity claim that explains why imports are preferred to locally produced goods, and other relevant documents. To some extent, this inevitably results in higher compliance cost. On the other hand, this evidence is not required for importers claiming for preferential benefits under RTAs. The only evidence needed is the certificate of origin issued by a competent authority in the exporting country. As a result, the burden and cost of proving the eligibility under RTAs is imposed mainly on exporters.

In conclusion, benefits offered and costs imposed vary among import schemes. Such differences may either encourage or discourage firms to switch their imports among RTAs, other privilege schemes, and MFN scheme. In addition to the lower cost of compliance, the broader coverage of eligible goods and beneficiaries who are able to claim preferential tariff treatments are advantages of the import switching to RTAs. On the contrary, the depths of customs duty reduction, the offer of other kinds of duty reduction, and the goods originating status requirement are among the top reasons why

firms either switch to or remain in the other privilege schemes.

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Table 1. RTAs by Thailand during Our Sample Period

FTAs	Members	Implementation
ASEAN Free Trade Area (AFTA)	Brunei, Cambodia, Indonesia, Laos, Malaysia, Myanmar, Philippines, Singapore, Viet Nam, and Thailand	1993
Thailand-India FTA (TIFTA): Early harvest	India and Thailand	2004
Thailand-Australia FTA (TAFTA)	Australia and Thailand	2005
ASEAN-China FTA (ACFTA)	Brunei, Cambodia, China Indonesia, Laos, Malaysia, Myanmar, Philippines, Singapore, Viet Nam, and Thailand	2005
Thailand-New Zealand Closer Economic Partnership Agreement (TNZCEP)	New Zealand and Thailand	2005
Japan-Thailand Economic Partnership Agreement (JTEPA)	Japan and Thailand	2007
ASEAN-Japan Economic Partnership Agreement (AJCEP)	Brunei, Cambodia, Indonesia, Japan, Laos, Malaysia, Myanmar, Philippines, Singapore, Viet Nam, and Thailand	2009
ASEAN-Republic of Korea FTA (AKFTA)	Brunei, Cambodia, Indonesia, Laos, Malaysia, Myanmar, Philippines, Korea, Singapore, Viet Nam, and Thailand	2010
ASEAN-Australia-New Zealand FTA (AANZFTA)	Australia, Brunei, Cambodia, Indonesia, Laos, Malaysia, Myanmar, New Zealand, Philippines, Singapore, Viet Nam, and Thailand	2010
ASEAN-India FTA (AIFTA)	Brunei, Cambodia, India, Indonesia, Laos, Malaysia, Myanmar, Philippines, Singapore, Viet Nam, and Thailand	2010

Source: Legal texts of RTAs

Table 2. Exit of Import from RTA Non-member Countries: Number of Observations and Import Values (Million THB) in 2007

	Exit		Stay	
	Number	Values	Number	Values
No Imports from Members during 2008-2011				
	185,278	103,629	15,383	29,368
(Share in Total)	0.80	0.55	0.07	0.16
Positive Imports from Members during 2008-2011				
All Schemes	20,170	26,802	11,500	28,541
(Share in Total)	0.09	0.14	0.05	0.15
Under RTA	485	1,089	756	3,110
(Share in Total)	0.002	0.006	0.003	0.017
Under MFN	18,632	23,836	11,282	27,669
(Share in Total)	0.08	0.13	0.05	0.15
Under Others	2,273	5,004	657	2,159
(Share in Total)	0.01	0.03	0.003	0.011

Source: Authors' computation.

Note: "Exit" indicates that observations do not exist in 2011 while "Stay" does that those exist in 2011. "Number" is the number of firm-product-country observations. "Values" are those import values.

Table 3. Large Trade Diversion Countries (Thousand THB)

	Imports by Future RTA Importers	Total Imports	Share
South Africa	59,447	474,138	0.1254
Ecuador	2,607	21,305	0.1223
Bulgaria	6,968	66,929	0.1041
Belgium and Luxe	107,475	2,869,940	0.0374
Kenya	92	2,584	0.0356
Chile	24,341	1,010,907	0.0241
Ukraine	2,520	126,143	0.0200
Korea, Dem. Peop	2,620	160,424	0.0163
Czech Republic	10,706	789,468	0.0136
France	126,306	9,528,737	0.0133
Taiwan	241,691	18,520,099	0.0131

Source: Authors' computation.

Notes: "Imports by Future RTA Importers" show, among import values in 2007 that do not exist in 2011, those by firms who start importing from RTA partners under RTA schemes during 2008-2011. "Total Imports" is the total import values of Thailand from each country in 2007.

Table 4. Basic Statistics

	Obs	Mean	Std. Dev.	Min	Max
Exit	376,041	0.546	0.498	0	1
RTA (t)	376,041	0.005	0.068	0	1
RTA ($t-1$)	376,041	0.002	0.046	0	1
MFN (t)	376,041	0.125	0.331	0	1
MFN ($t-1$)	376,041	0.070	0.255	0	1
Other (t)	376,041	0.009	0.096	0	1
Other ($t-1$)	376,041	0.004	0.063	0	1
ln Total Imports	376,041	17.461	2.708	4.143	26.412
Export Dummy	376,041	0.677	0.467	0	1
ln (1 + MFN Rates)	376,041	0.089	0.073	9E-07	1.297
ln GDP	376,041	31.973	1.326	22.298	33.806
ln Distance	376,041	8.982	0.593	7.339	9.889
RTA (t) * Differentiated	376,041	0.003	0.058	0	1
RTA ($t-1$) * Differentiated	376,041	0.002	0.040	0	1
MFN (t) * Differentiated	376,041	0.103	0.304	0	1
MFN ($t-1$) * Differentiated	376,041	0.058	0.233	0	1
Other (t) * Differentiated	376,041	0.007	0.086	0	1
Other ($t-1$) * Differentiated	376,041	0.003	0.056	0	1

Table 5. Baseline Results: Probit

	(I)	(II)	(III)	(IV)
RTA (t)	-0.218***	-0.031	-0.057	-0.068
	[0.044]	[0.044]	[0.047]	[0.047]
RTA ($t-1$)			0.101	0.091
			[0.064]	[0.064]
MFN (t)		-0.556***	-0.556***	-0.567***
		[0.014]	[0.014]	[0.014]
MFN ($t-1$)				0.046***
				[0.014]
Other (t)		0.078***	0.078***	0.047*
		[0.027]	[0.027]	[0.027]
Other ($t-1$)				0.234***
				[0.041]
ln Total Imports	-0.053***	-0.046***	-0.046***	-0.046***
	[0.003]	[0.003]	[0.003]	[0.003]
Export Dummy	0.108***	0.113***	0.113***	0.112***
	[0.007]	[0.008]	[0.008]	[0.008]
ln (1 + MFN Rates)	0.746***	0.801***	0.801***	0.798***
	[0.121]	[0.119]	[0.119]	[0.119]
ln GDP	-0.047***	-0.051***	-0.051***	-0.051***
	[0.003]	[0.003]	[0.003]	[0.003]
ln Distance	0.047***	0.051***	0.051***	0.051***
	[0.007]	[0.007]	[0.007]	[0.007]
Number of Obs.	376,041	376,041	376,041	376,041
Log pseudolikelihood	-222449	-219180	-219178	-219145

Notes: The dependent variable is a binary variable that takes the value one if import values are zero. ***, **, and * indicate 1%, 5%, and 10% significance, respectively. In the parenthesis is the standard error clustered according to HS 4-digit and year. In all specifications, we include year dummy variables.

Table 6. Robustness Checks: Various Fixed Effects

	(I)	(II)	(III)	(IV)	(V)
RTA (t)	-0.014	-0.009	-0.015	-0.001	-0.019
	[0.013]	[0.013]	[0.018]	[0.013]	[0.018]
RTA ($t-1$)	0.032*	0.021	-0.022	0.029*	-0.018
	[0.016]	[0.017]	[0.022]	[0.017]	[0.023]
MFN (t)	-0.191***	-0.200***	-0.091***	-0.218***	-0.086***
	[0.006]	[0.006]	[0.005]	[0.006]	[0.005]
MFN ($t-1$)	0.027***	-0.028***	-0.112***	-0.035***	-0.077***
	[0.005]	[0.004]	[0.007]	[0.005]	[0.007]
Other (t)	0.012	-0.077***	-0.0003	-0.090***	-0.007
	[0.009]	[0.009]	[0.017]	[0.009]	[0.017]
Other ($t-1$)	0.077***	0.009	0.005	0.018	0.029*
	[0.014]	[0.013]	[0.018]	[0.014]	[0.018]
ln Total Imports	-0.015***	-0.007***	-0.031***	-0.010***	-0.043***
	[0.001]	[0.002]	[0.003]	[0.002]	[0.003]
Export Dummy	0.038***	0.014***	0.009**	0.014***	0.010**
	[0.002]	[0.004]	[0.004]	[0.004]	[0.004]
ln (1 + MFN Rates)	0.252***	0.149***		0.135***	
	[0.037]	[0.039]		[0.045]	
ln GDP	-0.016***	-0.021***	-0.045***	-0.071***	0.017
	[0.001]	[0.001]	[0.003]	[0.024]	[0.035]
ln Distance	0.016***	0.012***	0.015*		
	[0.002]	[0.003]	[0.008]		
Year Dummy	YES	YES	YES	YES	YES
Section Dummy	YES	NO	NO	YES	NO
Firm Dummy	NO	YES	NO	NO	NO
Firm-Product Dummy	NO	NO	YES	NO	NO
Firm-Country Dummy	NO	NO	NO	YES	NO
Firm-Country-Product Dummy	NO	NO	NO	NO	YES
Number of Obs.	376,041	376,041	376,041	376,041	376,041
Adjusted R-squared	0.1987	0.2651	0.3963	0.2774	0.5392

Notes: The dependent variable is a binary variable that takes the value one if import values are zero. ***, **, and * indicate 1%, 5%, and 10% significance, respectively. In the parenthesis is the standard error clustered according to HS 4-digit and year. All models are estimated as a liner probability model.

Table 7. Exit of Import from RTA Non-member Countries: Including the Case of Importing from RTA Members under MFN schemes in 2007

	(I)	(II)	(III)	(IV)
RTA (t)	-0.322***	-0.078***	-0.115***	-0.117***
	[0.021]	[0.020]	[0.023]	[0.024]
RTA ($t-1$)			0.104***	0.105***
			[0.031]	[0.031]
MFN (t)		-0.597***	-0.597***	-0.597***
		[0.013]	[0.013]	[0.012]
MFN ($t-1$)				-0.007
				[0.009]
Other (t)		0.030*	0.030*	-0.004
		[0.017]	[0.017]	[0.017]
Other ($t-1$)				0.268***
				[0.027]
ln Total Imports	-0.056***	-0.035***	-0.035***	-0.035***
	[0.002]	[0.002]	[0.002]	[0.002]
Export Dummy	0.083***	0.096***	0.096***	0.096***
	[0.007]	[0.007]	[0.007]	[0.007]
ln (1 + MFN Rates)	0.740***	0.800***	0.799***	0.796***
	[0.111]	[0.106]	[0.106]	[0.106]
ln GDP	-0.053***	-0.068***	-0.068***	-0.068***
	[0.003]	[0.003]	[0.003]	[0.003]
ln Distance	0.044***	0.049***	0.049***	0.050***
	[0.006]	[0.006]	[0.006]	[0.006]
Number of Obs.	542,691	542,691	542,691	542,691
Log pseudolikelihood	-327787	-317652	-317644	-317521

Notes: The dependent variable is a binary variable that takes the value one if import values are zero. ***, **, and * indicate 1%, 5%, and 10% significance, respectively. In the parenthesis is the standard error clustered according to HS 4-digit and year. In all specifications, we include year dummy variables.

Table 8. Exit of Import: Differentiated Products versus Non-differentiated Products

	(I)		(II)	
	Coef.	S.E.	Coef.	S.E.
RTA (t)	0.045*	[0.025]	0.033	[0.025]
* Differentiated	-0.075**	[0.029]	-0.066**	[0.029]
RTA ($t-1$)	0.081**	[0.037]	0.073**	[0.037]
* Differentiated	-0.058	[0.041]	-0.055	[0.041]
MFN (t)	-0.164***	[0.010]	-0.174***	[0.011]
* Differentiated	-0.025**	[0.011]	-0.022*	[0.012]
MFN ($t-1$)			0.037***	[0.010]
* Differentiated			-0.012	[0.012]
Other (t)	0.012	[0.021]	-0.005	[0.023]
* Differentiated	0.014	[0.023]	0.021	[0.025]
Other ($t-1$)			0.085***	[0.030]
* Differentiated			-0.012	[0.034]
ln Total Imports	-0.015***	[0.001]	-0.015***	[0.001]
Export Dummy	0.038***	[0.002]	0.038***	[0.002]
ln (1 + MFN Rates)	0.256***	[0.037]	0.254***	[0.037]
ln GDP	-0.016***	[0.001]	-0.016***	[0.001]
ln Distance	0.016***	[0.002]	0.015***	[0.002]
Number of Observations	376,041		376,041	
R-squared	0.1986		0.1988	

Notes: The dependent variable is a binary variable that takes the value one if import values are zero. ***, **, and * indicate 1%, 5%, and 10% significance, respectively. In the parenthesis is the standard error clustered according to HS 4-digit and year. In all specifications, we include year dummy variables. "Differentiated" takes the value one if a product is categorized into differentiated products and zero otherwise.

Table 9. Intensive Margin

	(I)	(II)	(III)	(IV)
RTA (t)	0.967***	0.011	0.941***	0.051**
	[0.076]	[0.046]	[0.049]	[0.023]
RTA ($t-1$)	0.307***	-0.080	0.297***	-0.029
	[0.101]	[0.060]	[0.064]	[0.026]
MFN (t)	0.419***	0.126***	0.391***	0.158***
	[0.021]	[0.016]	[0.017]	[0.012]
MFN ($t-1$)	0.151***	-0.009	0.183***	0.040***
	[0.026]	[0.015]	[0.016]	[0.010]
Other (t)	0.035	-0.0005	0.128**	-0.004
	[0.073]	[0.067]	[0.052]	[0.033]
Other ($t-1$)	0.021	0.023	0.081	-0.066**
	[0.090]	[0.068]	[0.056]	[0.029]
ln Total Imports	0.128***	0.007	0.114***	0.035**
	[0.005]	[0.014]	[0.006]	[0.014]
Export Dummy	-0.245***	-0.001	-0.255***	-0.004
	[0.026]	[0.014]	[0.024]	[0.011]
ln (1 + MFN Rates)	-3.503***		-4.372***	
	[0.478]		[0.508]	
ln GDP	-0.006	0.504***	0.009	0.364***
	[0.011]	[0.066]	[0.010]	[0.055]
ln Distance	-0.110***		-0.084***	
	[0.033]		[0.028]	
Year Dummy	YES	YES	YES	YES
Section Dummy	YES	NO	YES	NO
Firm-Country-Product Dummy	NO	YES	YES	YES
Number of Obs.	170,821	170,821	274,426	274,426
Adjusted R-squared	0.1194	0.8140	0.1282	0.8097

Notes: The dependent variable is a log of import values. ***, **, and * indicate 1%, 5%, and 10% significance, respectively. In the parenthesis is the standard error clustered according to HS 4-digit and year. In columns (I) and (II), we drop import transactions by firms who import from RTA member countries under MFN schemes in 2007. Those transactions are included in columns (III) and (IV).

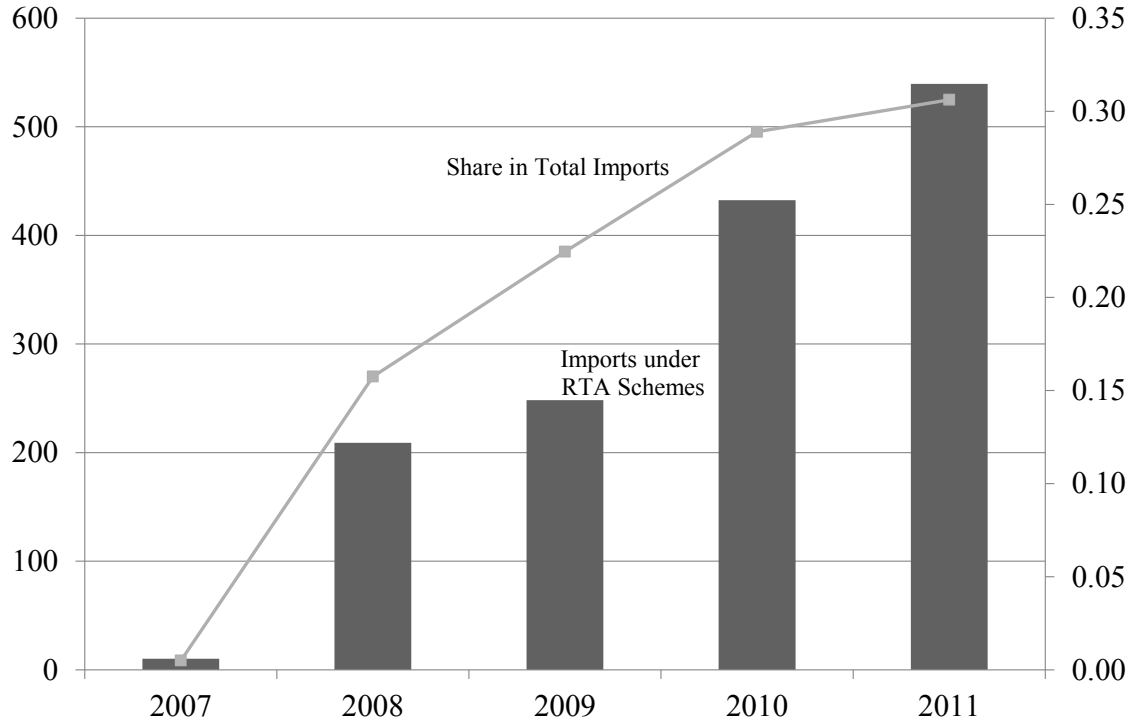
Table 10. Relative Prices: Number of Observations and Share

	$P_{NON} \geq P_{RTA}$	$P_{NON} < P_{RTA}$
$(1 + MFN) * P_{NON} \geq (1 + RTA) * P_{RTA}$	295	23
	62%	5%
$(1 + MFN) * P_{NON} < (1 + RTA) * P_{RTA}$	0	160
	0%	33%

Source: Authors' computation.

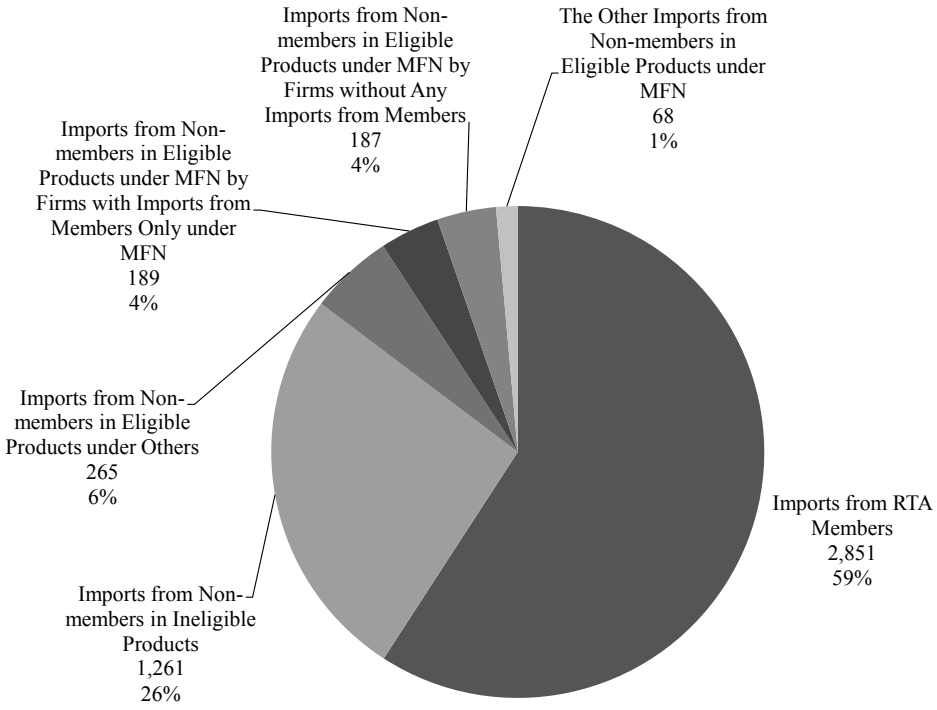
Notes: P_{NON} is import prices from an RTA non-member country in 2007. The observations of import from RTA non-members are restricted to those that do not exist in 2011 and do have positive imports from RTA members under RTA schemes during 2008-2011. P_{RTA} is import prices from an RTA member country under RTA schemes in the earliest year among years in which imports under RTA schemes are observed. P_{RTA} is deflated by using consumer price index in Thailand. "MFN" and "RTA" indicate MFN rates in 2007 and RTA rates in the earliest year. The observations are restricted only to those in which quantity unit is same between P_{NON} and P_{RTA}.

Figure 1. RTA Imports in Thailand (Billion THB)



Source: Authors' computation.

Figure 2. Decomposition in Imports in Thailand in 2007 (Billion THB)



Source: Authors' computation.

Notes: This figure shows import values and those shares in total. "Eligible Products" mean the products that have lower RTA preferential rates than MFN rates in 2008. "Others" refer to other tariff exemption schemes.