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Agreements in Thailand**

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November 2016

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**Keywords:** RTA; Trade creation; Trade diversion; Thailand

**JEL classification:** F15, F53

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# Firm-Level Trade Creation and Diversion of Regional Trade Agreements in Thailand

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## 1. Introduction

Trade creation and diversion have been key concepts in considering the economic effects of regional trade agreements (RTAs). Viner (1950) performed a pioneering study of these concepts, although they were discussed in the context of customs unions. Originally, the trade creation effects refer to the start of product imports, which were previously not imported, from an RTA member country. Trade diversion means the stoppage of product imports from an RTA non-member country by starting to import these products from a member country instead. Such a switch may happen, even if the before-tax prices from the RTA non-members are cheaper than those from RTA members, because RTA members enjoy lower RTA preferential tariff rates than the general tariff rates (e.g., most-favored-nation (MFN) rates). Trade diversion has long been regarded as one of the consequences of the notorious “evils” associated with RTAs. Researchers have tried to quantify these effects, since they play a crucial role in evaluating the total impact of RTAs.

There are several ex-post empirical studies on trade creation and diversion.<sup>1</sup> These studies mostly estimate the gravity equation by employing aggregated trade data at the country level (or country-sector level). 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 estimation is used in Yang and Martinez-Zarzoso (2014). These studies introduce various RTA dummy variables into gravity equations to differentiate the trade creation and trade diversion effects. In particular, Magee (2008) carefully defines these effects and quantifies their absolute values.<sup>2</sup> As a result, Magee finds that the trade creation effect led to an increase in intra-bloc trade by 89% after RTAs were in place for 18 years and there was little evidence of trade diversion. Also, Cipollina and Salvatici (2010) conduct a meta-analysis of 85 such studies and conclude that trade creation effects exist and they

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<sup>1</sup> As summarized by Magee (2008), another strand is the ex-ante studies. A typical approach 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 by Baldwin and Venables (1995). There are also some studies that employ a 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 the estimates in these studies are severely affected by the assumption of exogenous parameters such as demand elasticity, all papers show certain amounts of the absolute values derived from trade diversion.

<sup>2</sup> Clausing (2001) directly examines the effects of tariff reduction through RTAs on trade.

are significant.

Against this backdrop, our paper is the first to examine trade creation and diversion at the firm level. A firm-level analysis provides microeconomic insights on trade creation and diversion. The Vinerian version 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 any firm-level perspectives. However, a firm-level analysis clarifies the detailed effects of RTAs on firm-level imports that have never been investigated. This paper focuses on an interesting case from the viewpoint of trade creation and diversion, specifically on firm-product pairs, in which firms import a particular product from non-members but not from RTA members. In such firm-product pairs, we define firm-level trade creation as the start of imports from RTA members under RTA schemes. The firm-level trade diversion is simply defined as the termination of imports from RTA non-members.<sup>3</sup> As mentioned above, this definition is slightly different from the Vinerian version's definition of trade creation and diversion. For example, the original definition of trade creation refers to the start of product imports, which were formerly not imported at all. On the other hand, the target of our firm-level trade creation study is firms that used to import from non-members. In short, our interest lies in firm-level switching from the imports of a particular product from non-members to those from members under RTA schemes.

Specifically, using shipment-level import data for Thailand during the period 2007–2011, we quantitatively and qualitatively investigate such firm-(product-)level switching of import sources. Our quantitative analysis examines how much switching is observed in Thailand's imports and presents some important findings, which cannot be obtained from country-level analyses of trade creation/diversion. For example, we can investigate whether new importers simply started their importing activities *per se* or switched their import sources from non-members to RTA members. Similarly, it is possible to examine whether the termination of imports from non-members was the result of simply stopping their importing activity *per se* or switching their import sources to RTA members. On the other hand, one objective of our qualitative analysis is to investigate the determinants of firm-level trade creation and diversion. In particular, we shed light on the roles of MFN rates and RTA rates in the importing country, i.e., Thailand. We present unique empirical evidence that these tariff rates have symmetric effects on firm-level trade creation and diversion, as defined above. In addition to such

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<sup>3</sup> More specifically, we define these firm-level trade creations and diversions at the firm-product level, but we use the terms firm-level trade creation and diversion for brevity.

“extensive margins” of imports from RTA members and non-members, we further investigate the role of “intensive margins,” i.e., the magnitude of imports from RTA members and non-members.

Our dataset enables us to identify the tariff schemes used for each import shipment.<sup>4</sup> It covers all commodity imports for Thailand and includes information not only on firms, source countries, and commodities, but also on the tariff schemes (e.g., an RTA or MFN scheme) applied to these imports. Namely, as is consistent with the above definition on firm-level trade creation, we can identify whether a particular import from RTA members is under an RTA or MFN scheme. Regardless of either the Vinerian country-level version or our firm-level version, the reduction of tariff rates by introducing RTA preferential rates is a major source of “trade creation” for RTAs. Our dataset enables us not to include the start of imports from RTA members under MFN schemes as trade creation, which is not motivated by such tariff reductions. To the best of our knowledge, none of the above-mentioned country-level studies examine trade creation/diversion under different tariff schemes.

Our paper is related not only to the above-mentioned traditional literature on trade creation/diversion but also to some other types of literature. First, several papers have recently examined the mechanisms for the survival of international transactions (e.g., Besedes and Prusa, 2006a, 2006b; Gorg et al., 2012; Nitsch, 2009; Esteve-Perez et al., 2013; Gullstrand and Persson, 2015). These studies find, for example, that international transactions are likely to survive when they are related to exports by more productive firms, countries with larger GDPs, or geographically closer countries. In terms of analyzing the survival of imports from RTA non-members (i.e., firm-level trade diversion), our paper is related to this literature, but it is different in terms of analyzing the roles of RTA rates and MFN rates separately. Such differentiation is important because they have different effects on the survival of imports from non-members, as shown in this paper.

Second, our paper is also related to some firm-level studies on the choice of tariff schemes when exporting. These studies employ the data that can identify tariff schemes,

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<sup>4</sup> The aggregated version of trade data according to tariff schemes has been employed in several papers, including studies on the determinants of the 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 (2015). Those studies find that the utilization of preferential schemes is higher in the products with larger tariff margins, larger volumes, and less restrictive rules of origin. Examples of the latter kind are Cadot et al. (2005), Olarreaga and Ozden (2005), and Ozden and Sharma (2006), which find the rise of export prices after RTA schemes are utilized.

such as preferential schemes or MFN schemes. Employing these unique survey data, for example, Takahashi and Urata (2010) and Hayakawa (2015) examine the role of firm size in terms of the number of employees. By employing the firm-level data on the Generalized System of Preferences (GSP) utilization for exporting apparel products to Europe from Bangladesh, Cherkashin et al. (2015) structurally estimate their model on the firms' choice of tariff schemes. However, these studies only focus on trade with partner countries in terms of preferential schemes and thus do not shed light on trade diversion. Also, although the datasets used in these studies do not include trade for all firms and industries, our dataset covers all commodity trade in Thailand.

Third, there are some studies on the effects of tariff reductions on extensive and intensive margins. For example, employing product-level import data in the United States, Debaere and Mostashari (2010) examine changes in the effect of tariff reductions on the extensive margin (positive exports or zero) and find that tariff reductions have a small effect on the extensive margin relative to the overall growth in international trade. Buono and Lalanne (2012) show the significant role of tariff rates on the number of exporters (extensive margin) and exports per firm (intensive margin) in France. On the other hand, we investigate the role of tariff rates on the firm-(product/country)level probability of importing (extensive margin) and firm-(product/country)level imports (intensive margin). Furthermore, we differentiate between the roles of RTA rates and MFN rates, particularly for the extensive margins. As mentioned above, we will show that these tariff rates have different effects on the start of imports from RTA members and the termination of imports from non-members.

The rest of the paper is organized as follows. The next section provides our conceptual framework on firm-level trade creation and diversion. Section 3 introduces our dataset and then provides an overview of firm-level trade creation and diversion in Thailand. Indeed, we believe that Thailand is a suitable importing country in which to examine the effects of RTAs on imports. As stated in Section 3, Thailand and the Association of Southeast Asian Nations (ASEAN), of which Thailand is a member, have actively terminated RTAs with countries outside ASEAN since the latter half of the 2000s, which represents our sample period. As a result, Thailand's imports from RTA partner countries *under* RTA schemes grew rapidly during that period. In Section 4, we report the results for our econometric analyses. Section 5 concludes.

## 2. Conceptual Framework

This section discusses how MFN rates and RTA preferential rates affect the start

and exit of imports from RTA members and non-members. To simplify our discussion, we examine a firm's imports of a homogenous product, in which the market structure represents perfect competition. That product is imported from two groups of countries: RTA non-member countries and future RTA member countries. We consider the imports at two time points. RTA is not available at the initial time, but RTA schemes are available at the later time.

The possible unit import prices of product  $i$  at time  $t$  are given by

$$\begin{aligned} P_{nit}^{MFN} &= (1 + MFN_{it})p_{ni}, \\ P_{mit}^{MFN} &= (1 + MFN_{it})p_{mi}, \\ P_{mit}^{RTA} &= (1 + RTA_{it} + Compliance)p_{mi}. \end{aligned}$$

$P^S$  indicates the import price under tariff scheme  $S$  (i.e., an RTA scheme or an MFN scheme).  $MFN$  and  $RTA$  are MFN rates and RTA preferential rates, respectively. Subscripts  $n$  and  $m$  refer to non-member countries and member countries, respectively.  $p$  indicates c.i.f. prices (prices inclusive of costs, insurance, and freight), which are assumed to be time-invariant. For simplicity, we assume that the compliance costs of the rules of origin (*Compliance*) enter in an ad valorem fashion against c.i.f. prices.

To consider the effects of tariffs, we categorize the import structure of firms into four cases, based on the import status at the initial time, as shown in Table 1. The first case is that a firm does not import a product from either member or non-member countries at the initial time. We do not discuss this case, since it is unfeasible to empirically examine all of the possible import patterns. Namely, since this case requires us to investigate non-importers at the initial time, we cannot investigate a particular set of firms. Similarly, sets of products and export countries cannot be restricted either. As a result, even if some firms to be examined can be specified, we need to examine whether or not such firms start importing each of *all* products from each of *all* countries through changes in the tariff rates. Such an analysis is empirically unfeasible.<sup>5</sup>

=== Table 1 ===

The second case is that a firm imports a product from member countries but not

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<sup>5</sup> This difficulty may be the reason why there are few empirical studies on the determinants of the start of firm/country/product-level trade. In contrast, as listed in the introductory section, there are several studies on the determinants of exit because we can only restrict the estimation sample to the firm/country/product pairs that existed at the initial time. When examining the start of firm/country/product-level trade, some restrictions are necessary. For example, Fontagné et al. (2015) examine the firm/destination/product-level export probability by restricting the sets of firms and destination countries, and analyzing at the HS four-digit level rather than at the tariff line-level.

from any non-member countries. This case emerges when, even under the initial level of MFN rates, production costs and thus c.i.f. prices are lower for the product from member countries than those from non-member countries, i.e.,  $p_{ni} > p_{mi}$ . In this case, the introduction of RTA preferential rates only encourages firms to continue importing that product from member countries. If MFN rates are sufficiently high or RTA rates are sufficiently low, the applied tariff scheme for imports from RTA members changes from MFN to RTA. However, it does not generate imports from non-member countries, because  $p_{ni} > p_{mi}$ . The same is true for any change or level of the MFN rates. In short, the firms' import patterns do not change in this case.

The interesting case is the third one, in which a firm does not import a product from any member countries, but it does import a product from non-member countries. This case becomes dominant if c.i.f. prices are lower in the product from non-member countries than those from member countries, i.e.,  $p_{ni} < p_{mi}$ . In this case, the firm imports that product from either non-member countries under an MFN scheme or member countries under an RTA scheme, depending on the level of MFN and RTA rates. In particular, if the RTA rates are sufficiently low compared with the MFN rates (including the compliance costs), the firm will start importing that product from member countries under an RTA scheme and stop importing from non-member countries. Namely, firm-level trade creation and diversion emerge. On the other hand, lower MFN rates will discourage such firms from switching the origin of their imports.

The last case is that a firm imports a product from both member and non-member countries. Under the above setting, this case simply emerges if the c.i.f. prices are the same between products from member and non-member countries, i.e.,  $p_{ni} = p_{mi}$ . While the reduction of MFN rates does not change the initial import pattern, low RTA rates would encourage firms to stop importing from non-member countries and to switch their applied tariff schemes for imports from member countries from MFN to RTA.<sup>6</sup>

Our empirical analysis basically focuses on the interesting case, i.e., the third case. Indeed, as mentioned above, it is unfeasible to empirically examine the first case. Furthermore, in the second case, tariff rates play a role of only strengthening the initial import pattern. On the other hand, in the third case, we will see firm-level trade creation and diversion at the same time through changes in the tariff rates. In particular, as

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<sup>6</sup> Furthermore, when assuming that this product is differentiated, this case will emerge if import prices from both types of countries are not sufficiently high and not very different. Also, if the product is not sufficiently differentiated, lower RTA rates may discourage the importing firms to continue their imports from non-member countries. On the other hand, low MFN rates may encourage the continuation of not only imports from non-member countries but also imports from member countries under MFN schemes.

mentioned above, symmetric patterns of tariff effects will emerge. Low RTA rates have positive and negative effects on the start of imports from member countries and the continuation of imports from non-member countries, respectively. In contrast, low MFN rates have the opposite effects. Also, it is feasible to empirically examine this case because we can restrict importers to those who imported from non-members but not from any RTA members, in the initial year. The products to be examined can also be restricted to those that were imported from non-members in the initial year. Lastly, the fourth case is also investigated, to some extent, in our empirical analysis.

### **3. Data Overview**

This section provides an overview of firm-level trade creation and diversion in Thailand. After introducing our dataset, we will show that very few firms switch their import source countries from RTA non-members to RTA members.

#### **3.1. Data Source**

Our dataset is obtained from the Customs Office, Kingdom of Thailand. It represents transaction-level import data from 2007 to 2011 and covers all commodity imports in Thailand. In our sample period, we retain the consistency of the Harmonized Commodity Description and Coding System (HS) version for the product classification, i.e., HS2007. Our dataset includes the customs clearing date, HS eight-digit code, export country, firm identification code, tariff scheme (e.g., RTA, MFN, etc.), and import values in Thai baht (THB). We use the import data aggregated by years, in addition to the source countries, HS eight-digit codes, firms, and tariff schemes. We classify the tariff schemes into three categories, including the MFN and RTA schemes, as well as other schemes. The tariff payment for imports under “other schemes” is exempted on the basis of five categories: bonded warehouses, free zones, investment promotion, duty drawback for raw materials imported for the production of exports, and duty drawback for re-exportation.<sup>7</sup>

As listed in Table 2, Thailand has ten RTAs in our sample period, most of which overlap in terms of their country coverages. Thailand has not only bilateral but also plurilateral RTAs with Japan, Australia, New Zealand, and India. With the members of 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,

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<sup>7</sup> See Appendix A for these five categories within “other schemes.”

Japan, India, Philippines, Vietnam, Cambodia, Laos, Myanmar, Malaysia, Indonesia, Brunei, Singapore, New Zealand, and Australia. Except for Korea, where Thailand concluded an RTA in 2010, all of these countries have been RTA partner countries with Thailand at least since the beginning of our sample period, i.e., 2007. The other countries are called “RTA non-member countries.”<sup>8</sup>

==== Table 2 ====

Although Thailand has had RTAs earlier than our sample period, the significant use of RTA schemes for Thailand’s imports only started during our sample period. Figure 1 reports the imports under RTA schemes, in addition to their share of total imports. In this figure, the samples are restricted to observations in which any RTA rates are lower than MFN rates in 2007. In 2007, imports under RTA schemes remained at a small magnitude. The share of total imports was less than 1%. However, both the magnitude and share of imports under RTA schemes dramatically increased since 2008. The share rises to 16% in 2008 and to 31% in 2011. In sum, our sample period is the period when Thailand started to increase its imports under RTA schemes.

==== Figure 1 ====

### 3.2. Overview: Quantitative Analysis

We start from an overview of firm-level trade creation. Table 3 decomposes Thailand’s imports in 2011. For example, total imports are disaggregated into imports from non-members (i) and imports from members (ii). The latter imports represent approximately 60% of total imports in 2011. The case of (iv) shows that, among the imports from members, those in “eligible products” are larger. In this table, the eligible products are defined as products in which the RTA rates are lower than the MFN rates in

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<sup>8</sup> More precisely, all products do not necessarily have lower RTA rates than MFN rates in any RTAs. Furthermore, it depends on the RTAs and thus on the export countries which products can be exported to Thailand under lower RTA rates than MFN rates. Also, RTA preferential rates for some products become available many years after the RTAs have been in force. In this sense, “RTA member countries” should be classified by not only country but also by product and year. However, such a classification is too complicated from which to examine trade creation/diversion. Thus, we simply classify imports according only to the country of origin. However, in our econometric analysis, we impose some restrictions on exporter-product pairs based on RTA eligibility. The number of products with RTA rates lower than MFN rates, i.e., the number of eligible products, is reported in Appendix B. In this appendix, we also provide the product-level distributions of MFN rates, the lowest RTA rates, and their differences, i.e., the preference margin in 2009.

2011. Otherwise, the products are categorized as “ineligible products.” If multiple preference schemes are available (e.g., ASEAN-Japan Comprehensive Economic Partnership (AJCEP) and Japan-Thailand Economic Partnership Agreement (JTEPA) when importing from Japan), the lower preferential rates are used in this categorization. The imports of eligible products from RTA members under RTA schemes only represent about 10% of total imports.

==== Table 3 ====

We further decompose the imports of eligible products from RTA members under RTA schemes in 2011. In the cases of (viii) and (ix), we identify whether or not such imports existed in 2007 (the start year of our dataset). We find that almost all of such imports did not exist in 2007. On the other hand, as shown in the case of (x), most of the RTA users that did not import from members also did not import from non-members in 2007. In other words, such firms are new importers during this period rather than switchers of import source countries from non-members to members. The switching importers can be found in the case of (xiii), which represents only 1% of all imports in Thailand. In sum, at least during our sample period, there are few firms that started to import a product from RTA members under RTA schemes by stopping their imports of that product from non-members, i.e., there was little firm-level trade creation. Almost all (future) RTA users were new importers (x).

Next, we provide an overview of firm-level trade diversion in Table 4. As in Table 3, we decompose imports in 2007 and find that the share of imports from non-members was 40% (ii), which is the same as in 2011. Among these imports, 15% are in eligible products (iv). In this table, the eligible products are defined as those in which the preferential tariffs under at least one of the RTAs are lower than the MFN rates in any year during the period 2007–2011. For such imports of eligible products from non-members, we focus on those under MFN schemes (vi). Such imports from non-members under MFN schemes represent approximately 10% of total imports. About 40% of these imports (i.e., 4% of the 10%) are by firms that did not import the same products from members in 2007 (viii). And in this case, approximately 60% of these imports disappeared in 2011 (x). Almost all transactions categorized in (x) are by firms that also did not import from members in 2011 (xi). Namely, most of the firms that stopped importing from non-members did not start importing from members. Rather, they stopped their importing activity *per se* rather than switching their import sources.

## 4. Econometric Analysis: Qualitative Analysis

This section conducts econometric analyses of firm-level trade creation and diversion. As mentioned in Section 2, we focus on firm-product pairs, in which firms import a particular product from non-members but not from RTA members in the initial year, i.e., case (iii) in Section 2. In particular, we examine the roles of RTA rates and MFN rates on the start of imports from RTA members under RTA schemes and the exit of imports from non-members.

### 4.1. Trade Creation

Setting the initial year as 2007, we examine the existence of imports from RTA members during the period 2008–2011. Specifically, we restrict the sample firm-product pairs to those that imported from any non-members, but did not import from RTA members, in 2007. Then, we examine whether a firm engages in importing a particular product from each member in each year under RTA schemes. We exclude the import transactions under the other schemes. The products are restricted to those in which the available RTA rates are lower than the MFN rates when importing from a certain member country in a certain year.<sup>9</sup>

Our empirical model of firm choice for imports and utilizing RTA schemes is specified as follows. To take into consideration the fact that RTA users are always importers, we employ the Heckman probit model, whose framework is provided in Van de Ven and Van Praag (1981). The selection equation describes the firms' decisions on whether or not to import a product from a member country in a particular year:

$$y_{IM}^* \equiv \max\{\pi_{MFN}, \pi_{RTA}\} = \mathbf{z}\boldsymbol{\gamma} + u_{IM}, \quad y_{IM} = \begin{cases} 1 & \text{if } y_{IM}^* > 0 \\ 0 & \text{if } y_{IM}^* \leq 0 \end{cases} \quad (1)$$

For simplicity, we omit firm, product, export country, and year subscripts.  $\pi_{MFN}$  and  $\pi_{RTA}$  are gross profits from importing under MFN and RTA schemes, respectively. A vector  $\mathbf{z}$  includes various elements that affect gross import profits. A vector  $\boldsymbol{\gamma}$  indicates the coefficients to be estimated. Namely, this equation indicates that firms choose to import if the gross profits from importing under either an MFN scheme or an RTA

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<sup>9</sup> If a firm imports from members under multiple schemes, we only use the observations for the scheme with the largest import values.

scheme become positive.  $u_{IM}$  is a disturbance term.

The elements in a vector  $\mathbf{z}$  are selected on the basis of the simple conceptual framework in Section 2. The profits from importing from a particular member country will not be independent from the profits from importing from other member and non-member countries. In other words, it depends on the characteristics of all export countries. However, we simply assume that a vector  $\mathbf{z}$  mainly includes MFN and RTA rates. These two kinds of tariff rates may have a more direct association with the imports from non-members and members, respectively, although the import profits from each country are simultaneously determined.<sup>10</sup> As discussed in Section 2, we expect that higher MFN rates or lower RTA rates encourage firms to import from RTA members. We also introduce a log of export costs per container for the export country in order to control for the fixed costs of exporting on the export side.<sup>11</sup>

Then, the resulting equation describes the firms' decision on whether to use an MFN scheme or an RTA scheme:

$$y_{RTA}^* \equiv \pi_{RTA} - \pi_{MFN} = \mathbf{x}\boldsymbol{\beta} + u_{FTA}, \quad y_{FTA} = \begin{cases} 1 & \text{if } y_{RTA}^* > 0, y_{IM}^* > 0 \\ 0 & \text{if } y_{RTA}^* \leq 0, y_{IM}^* > 0 \end{cases} \quad (2)$$

A vector  $\mathbf{x}$  includes the various elements that affect the difference between gross import profits under RTA and MFN schemes, and it is assumed to mainly include the preference margin. The larger margin will encourage firms to import under RTA schemes rather than under MFN schemes, as found in previous studies on the determinants of RTA utilization rates.<sup>12</sup> We also introduce a log of the fees for the issuance of certificates of origin (CoOs) in the export country in order to control for the fixed costs of utilizing an RTA on the export side.<sup>13</sup> A vector  $\boldsymbol{\beta}$  indicates the coefficients to be estimated.  $u_{FTA}$  is a disturbance term. This equation indicates that firms choose to import under RTA schemes if the associated gross profits are greater than those under MFN schemes. The disturbances in these two equations are assumed to be as follows:

$$u_{IM} \sim N(0,1), \quad u_{RTA} \sim N(0,1), \quad \text{corr}(u_{IM}, u_{RTA}) = \rho. \quad (3)$$

In addition, as the control variables in both of the  $\mathbf{z}$  and  $\mathbf{x}$  vectors, we include a log of total global imports at the firm-product level ( $\ln$  total imports), a firm-level

<sup>10</sup> If multiple preference schemes are available, the lower preferential rates are used for the import observations under an MFN scheme. For the import observations under RTA schemes, we use preferential rates in the corresponding RTA schemes.

<sup>11</sup> Fixed export costs will have a significant effect on importers' profits if we take into consideration the matching between exporters and importers. See, for example, Sugita et al. (2015).

<sup>12</sup> See footnote 4.

<sup>13</sup> We do not introduce this variable into the selection equation, because of its high correlation with the export costs per container. Also see footnote 11.

dummy variable taking the value one if a firm becomes engaged in exporting (export dummy), a log of GDP, and a log of the geographical distance between the export country and Thailand. The former two firm-level variables are one-year lagged.<sup>14</sup> Also, we include year fixed effects to control for the import country's specific time-variant elements, such as demand size, for both vectors. Since our variable for CoOs fees is a time-invariant export country-specific variable, we do not include fixed effects for the exporting countries. Also, the export costs per container do not change much over time. Similarly, the reason for not including product fixed effects is because MFN rates, which are one of our main variables, do not change for almost all products (99%) during our sample period. The nature of this variable also implies that our estimation results for MFN rates come from the variations across products, not over time.<sup>15</sup>

The results are reported in column (I) in Table 5. We can find the significant results in “Rho,” indicating the existence of selection bias in the estimates of the RTA use equation when estimating this equation using a simple probit model rather than a Heckman probit model. In the equation for imports, the coefficients for RTA and MFN rates are significantly negative and positive, respectively, which is consistent with our prior expectations. Namely, lower RTA rates or higher MFN rates encourage firms to start importing from RTA members. In the equation of RTA use, the coefficient for the preference margin is estimated to be significantly positive, as is also consistent with our expectations. Namely, when starting to import products with a larger preference margin for RTA members, firms are more likely to use RTA schemes than MFN schemes.

==== Table 5 ====

The results for the other variables are as follows. First, firms are more likely to import from RTA members with lower export costs and then to utilize RTA schemes when importing from RTA members with the lower CoO fees. Second, larger-sized firms in terms of total imports are more likely to import from RTA members, but they are less likely to utilize RTA schemes when importing. Although we did not consider the

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<sup>14</sup> When specifying firm-level characteristics, we must rely on customs data-based measures, since we do not have information on turnovers, employment, or capital for the universe of Thai importers.

<sup>15</sup> 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 the GDP deflator, are drawn from the World Development Indicator. We obtain the data on geographical distance from the CEPII website. The data on export costs per container and CoOs fees are drawn from the Doing Business Database at the World Bank and Table 1 in Hayakawa et al. (2015). The basic statistics for our sample are provided in Appendix D.

existence of fixed costs for switching import sources in Section 2, larger-sized firms may be more likely to afford paying such costs. However, the result for RTA utilization is puzzling. When using RTA schemes when importing, firms only need to submit the CoOs prepared by the exporting firms to customs. Namely, importers always prefer to use an RTA if the exporters can afford to use an RTA scheme. Nevertheless, it is unclear why smaller-sized firms are more likely to utilize RTA schemes when importing. Third, another puzzling result is that non-exporters are more likely to import from RTA members and then to utilize RTA schemes. Fourth, firms are more likely to import from RTA members that are larger economically (i.e., in terms of GDP) or from the less distant members, but they are less likely to utilize RTA schemes when importing from such RTA members.

We present one kind of robustness check on the above results. In the above analysis, we employ balanced panel data on imports from each RTA member by year. For example, the dataset includes observations for all years (i.e., 2008–2011) for each firm/product-RTA member country pair, even if the positive imports in the corresponding pair appear in the middle year (e.g., 2009) and disappear in a later year (e.g., 2010).<sup>16</sup> However, the decision process by firms may be different before and after the first imports from members (at least in our sample period) begin. Therefore, in this robustness check, we drop the firm-product pairs from the estimation sample after those pairs record the first positive imports from any RTA member. The results are reported in column (II) in Table 5 and show the qualitatively same results as those in column (I).<sup>17</sup>

## 4.2. Trade Diversion

Next, we examine the cessation of imports from non-members. Specifically, we examine whether the import transactions from non-members by firms importing a product from a non-member country, but not from any member countries in 2007, continue to exist during the period 2008–2011. The products are restricted to those in which the preferential rates of at least one RTA are lower than the MFN rates, as of 2008. We estimate a simple probit model on the above-mentioned existence of import transactions from non-member countries. As in the above case for trade creation, the import profits from non-members are not independent from the import profits from RTA members.<sup>18</sup> Again, we simply assume that the explanatory variables in this probit model

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<sup>16</sup> See Appendix C1, which introduces the structure of our dataset for trade creation.

<sup>17</sup> Appendix E reports the results of examining the start of imports from RTA members for the fourth case in Section 2. The results are similar to those reported in this subsection.

<sup>18</sup> In this sense, the disturbance in the model specified in (1) may be correlated with that in this

are the same as the  $\mathbf{z}$  vector, except for the log of the export costs that was used as one of the excluded variables in the analysis on trade creation. Another noteworthy difference is that the lowest RTA rates among all of the available RTAs in Thailand are used as the variable for RTA rates.

The results are reported in column (I) of Table 6. As is consistent with our discussion in Section 2, the coefficient for MFN rates is estimated to be significantly positive, indicating that firms are more likely to stop importing products with higher MFN rates from non-members. In contrast, RTA rates have a significantly negative coefficient. Namely, firms are more likely to stop importing products with lower RTA rates. In Table 6, we find that firms are more likely to start importing from RTA members in the case of products with higher MFN rates or lower RTA rates. In particular, the larger difference between MFN rates and RTA rates encourages firms to import from RTA members under RTA schemes. Combining these results with those for imports from members, we could say that firms are more likely to switch import sources from non-members to members under RTA schemes when importing products with higher MFN rates or lower RTA rates.

==== Table 6 ====

The other results are as follows. First, the significantly negative coefficient for “Total Imports” indicates that the larger-sized importers are better able to cope with various kinds of idiosyncratic shocks (e.g., demand shocks on the import countries) and thus they will continue importing from non-members. Second, the coefficient for the “Export dummy” is significantly positive. In the analysis for trade creation, we find a significantly negative coefficient for this variable. Therefore, we can say that exporters are more likely to exit from the import market *per se* rather than to switch import sources. Third, as found by Besedes and Prusa (2006b), the coefficient for the exporter’s GDP is significantly negative. A larger GDP in the export countries leads to the lower uncertainty of demand in their home countries and thus enables the exporters to continue devoting their productive resources to export activities. Last, the coefficient for distance is significantly positive, which is consistent with the result by Nitsch (2009). Trading with more distant countries obviously increases the uncertainty of the fixed trade costs and may discourage firms from continuing to trade.

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probit model, according to the firm-product pairs. However, we simply make separate estimates of these two models on trade creation and diversion.

As in the case of trade creation, we present one kind of robustness check on the above results. Namely, we drop the firm-product pairs after they record their first import exit from any non-members because the decision-making process by firms may be different before and after the first such exit (at least in our sample period).<sup>19</sup> The results are reported in column (II) in Table 6 and they show the same qualitative results as those in column (I). In particular, the coefficients for the MFN and RTA rates are estimated to be significantly positive and negative, respectively.<sup>20</sup>

### 4.3. Intensive Margin

In this subsection, we examine the magnitude of imports from RTA members under RTA schemes and those from RTA non-members.<sup>21</sup> The former magnitude is explored by estimating the Heckman model. The selection equation is formalized, as in the outcome equation for the analysis of trade creation in Section 4.1. Namely, imports from an RTA member under RTA schemes can only be observed if the gross profits from importing under RTA schemes are greater than those from importing under MFN schemes. As in Section 4.1, this relationship is specified as follows.

$$\mathbf{x}\boldsymbol{\beta} + u_{Extensive} > 0. \quad (4)$$

Again, we omit firm, product, export country, and year subscripts for simplicity. The outcome equation is a simple linear equation:

$$\ln \text{Imports} = \mathbf{z}\boldsymbol{\gamma} + u_{Intensive}. \quad (5)$$

The dependent variable is the natural log of imports from an RTA member under RTA schemes. Here we do not include the log of export costs per container in the  $\mathbf{z}$  vector, because the fixed costs for exports are not expected to affect the intensive margin (Helpman et al., 2008). Also, the MFN rates are not included in this analysis of the imports under RTA schemes in order to focus on the effect of corresponding tariff rates on the intensive margin.<sup>22</sup>

The results are shown in the “Trade Creation” column in Table 7. The most important result in the outcome equation (i.e., “Intensive”) is that the RTA rates have a significantly negative coefficient. Namely, the imports of products with lower RTA rates

<sup>19</sup> See Appendix C2, which introduces the structure of our dataset for trade diversion.

<sup>20</sup> Appendix E reports the results of examining the exit of imports from RTA non-members for the fourth case in Section 2. The results are similar to those reported in this subsection.

<sup>21</sup> We again focus on firms that import a particular product from non-members but do not import from RTA members, i.e., case (iii) in Section 2.

<sup>22</sup> Furthermore, for simplicity, we do not take into account the selection on whether or not to import in the estimation (i.e., the model specified in (1)) and the existence and magnitude of imports from non-members. The same is also true for the model that examines the intensive margin when importing from non-members.

are larger. The noteworthy results for the other variables are as follows. First, in the selection equation (i.e., “RTA Use”), GDP has a significantly positive coefficient, unlike the case of the outcome equation in Table 5, which takes into account the selection of importing. Namely, our results for the export country’s GDP in RTA utilization are not robust and they are unclear. Furthermore, the coefficient for GDP is significantly negative in the outcome equation. This result is not consistent with the typical results for gravity studies, though the dimension of analysis is different (i.e., firm-product level versus national level). Second, the significantly positive coefficient for “Total Imports” under “Intensive” will be a natural result.

==== Table 7 ====

Next, the magnitude of imports from non-members is examined by estimating the above outcome equation by the ordinary least squares (OLS) method. However, in contrast to the above analysis, RTA rates are not included in this analysis on the imports from non-members. Instead, we introduce MFN rates into the  $\mathbf{z}$  vector. The results are reported in the “Trade Diversion” column of Table 7. Naturally, the coefficient for MFN rates is estimated to be significantly negative, indicating that the imports of products with lower MFN rates are larger. The other variables have coefficients similar to the case of “Trade Creation” in terms of signs.

## 5. Concluding Remarks

Using highly detailed import data for Thailand, this paper examined firm-level trade creation and diversion of RTAs. Specifically, by focusing on firms that imported a particular product from non-members but not from RTA members in the initial year, we empirically investigated the start of imports from RTA members under RTA schemes and the cessation of imports from non-members at the firm level. Our findings can be summarized as follows. Economic mechanisms work in the firm-level trade creation and diversion of RTAs. Namely, firms are more likely to stop importing products from non-member RTA countries with lower RTA rates or higher MFN rates and to start importing such products from RTA member countries. The magnitude of firm-level imports from RTA members and non-members is larger when importing products with lower RTA rates and lower MFN rates, respectively.

However, from the quantitative point of view, there are very few firms that switch import sources from non-members to RTA members. Most future RTA users are new

importers, i.e., firms that had never imported from either RTA members or non-members. Also, most of the firms that stopped importing from non-members do not start importing from members; instead, they stop their importing activity *per se*. In sum, firm-level switching of import sources rarely happens. Switching from non-members to members directly reduces the imports from non-members, whereas a rise in imports from members by new importers (at least directly) does not occur, though it may discourage existing importers to continue importing from non-members. Therefore, our result denoting only a few “switching importers” may be one of the reasons why existing studies at a country level do not find significant trade diversion, though it is unclear as to how far the results for Thailand can be generalized.

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Table 1. Import Pattern

	Import Status in the Initial Time	
	From RTA Members	From Non-members
(i)	NO	NO
(ii)	YES	NO
(iii)	NO	YES
(iv)	YES	YES

Table 2. RTAs for 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 3. Decomposition of Imports in 2011: Trade Creation (Million THB)

	Value	Share
(i) Imports from non-members in 2011	2,798,638	0.42
(ii) Imports from members in 2011	3,873,102	0.58
(iii) of an ineligible product as of 2011	1,486,225	0.22
(iv) of an eligible product as of 2011	2,386,877	0.36
(v) Scheme of imports from members in 2011 = MFN	946,411	0.14
(vi) Scheme of imports from members in 2011 = Others	825,607	0.12
(vii) Scheme of imports from members in 2011 = RTA	614,860	0.09
(viii) Existence of import of that product from that member in 2007 = YES	59,741	0.01
(ix) Existence of import of that product from that member in 2007 = NO	555,118	0.08
(x) Existence of import of that product from non-members in 2007 = NO	395,772	0.06
(xi) Existence of import of that product from non-members in 2007 = YES	159,347	0.02
(xii) Existence of import of that product from non-members in 2011 = YES	115,684	0.02
(xiii) Existence of import of that product from non-members in 2011 = NO	43,662	0.01
(xiv) Total	6,671,740	1.00

Source: Authors' computation.

Table 4. Decomposition of Imports in 2007: Trade Diversion (Million THB)

	Value	Share
(i) Imports from members in 2007	2,898,477	0.60
(ii) Imports from non-members in 2007	1,969,455	0.40
(iii) of an ineligible product as of any year during 2007-2011	1,237,313	0.25
(iv) of an eligible product as of any year during 2007-2011	732,142	0.15
(v) under Others	278,611	0.06
(vi) under MFN	453,531	0.09
(vii) Existence of import of that product from any members in 2007 = YES	259,421	0.05
(viii) Existence of import of that product from any members in 2007 = NO	194,110	0.04
(ix) Existence of that import from that non-member in 2011 = YES	84,233	0.02
(x) Existence of that import from that non-member in 2011 = NO	109,878	0.02
(xi) Existence of import of that product from any members in 2011 = NO	109,878	0.02
(xii) Existence of import of that product from any members in 2011 = YES	0.001	0.00
(xiii) Scheme of that import from members in 2011 = MFN	0.001	0.00
(xvi) Total	4,867,932	1.00

Source: Authors' computation.

Table 5. Trade Creation: Extensive Margin

	(I)		(II)	
	Import	RTA Use	Import	RTA Use
ln (1+MFN rates)	0.547*** [0.022]		0.247*** [0.030]	
ln (1+RTA rates)	-0.534*** [0.053]		-0.225*** [0.068]	
Preference Margin		0.147*** [0.056]		0.536*** [0.104]
ln Total Imports	0.064*** [0.001]	-0.058*** [0.002]	0.051*** [0.001]	-0.039*** [0.003]
Export dummy	-0.013*** [0.004]	-0.070*** [0.010]	0.020*** [0.006]	-0.113*** [0.018]
ln GDP	0.313*** [0.002]	-0.291*** [0.006]	0.284*** [0.002]	-0.233*** [0.012]
ln Distance	-0.188*** [0.006]	0.550*** [0.011]	-0.152*** [0.007]	0.573*** [0.023]
ln CoO Fee		-0.029*** [0.005]		-0.028*** [0.010]
ln Export Cost	-0.427*** [0.007]		-0.433*** [0.009]	
Rho		-0.936 [0.007]		-0.914 [0.014]
Chi-squared statistics		1014.7		1014.7
Number of observations		9,166,871		8,292,312
Censored observations		9,107,223		8,263,932
Uncensored observations		59,648		28,380
Log pseudolikelihood		-318194		-168697

Notes: Robust standard errors are in parentheses. \*\*\*, \*\*, and \* indicate 1%, 5%, and 10% significance, respectively. In all specifications, we include year dummy variables.

Table 6. Trade Diversion: Extensive Margin

	(I)	(II)
ln (1+MFN rates)	0.280*** [0.021]	0.459*** [0.032]
ln (1+RTA rates)	-1.143*** [0.105]	-1.131*** [0.127]
ln Total Imports	-0.055*** [0.001]	-0.057*** [0.001]
Export dummy	0.164*** [0.004]	0.116*** [0.006]
ln GDP	-0.053*** [0.001]	-0.044*** [0.002]
ln Distance	0.028*** [0.003]	0.037*** [0.005]
Number of observations	851,572	347,253
Pseudo R-squared	0.0126	0.1243
Log pseudolikelihood	-482312	-207913

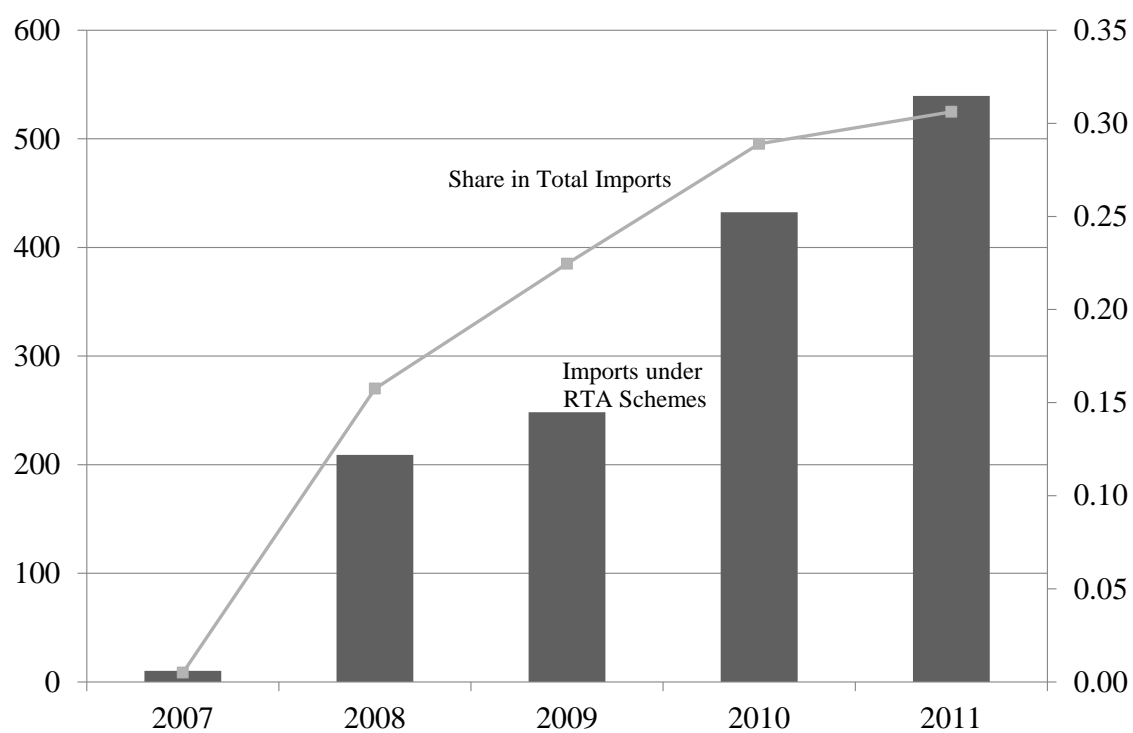
*Notes:* Robust standard errors are in parentheses. \*\*\*, \*\*, and \* indicate 1%, 5%, and 10% significance, respectively. In all specifications, we include year dummy variables.

Table 7. Trade Creation and Diversion: Intensive Margin

	Trade Creation				Trade Diversion	
	RTA Use		Intensive		Intensive	
	Coef.	S.E.	Coef.	S.E.	Coef.	S.E.
ln (1+MFN rates)					-2.032***	[0.097]
ln (1+RTA rates)			-2.946**	[1.297]		
Preference Margin	1.787***	[0.104]				
ln Total Imports	-0.015***	[0.004]	0.264***	[0.020]	0.168***	[0.003]
Export dummy	-0.214***	[0.022]	-0.240***	[0.085]	-0.376***	[0.015]
ln GDP	0.100***	[0.009]	-0.084**	[0.035]	-0.036***	[0.006]
ln Distance	0.442***	[0.028]	0.033	[0.104]	0.029**	[0.013]
ln CoO Fee	-0.150***	[0.010]				
Rho			0.184	[0.073]		
Chi-squared statistics			6.03			
Number of observations			59,648		170,821	
Censored observations			55,972			
Uncensored observations			3,676			
R-squared					0.0371	
Log pseudolikelihood			-20664			

Notes: “Coef.” and “S.E.” show coefficients and the robust standard errors. \*\*\*, \*\*, and \* indicate 1%, 5%, and 10% significance, respectively. In all specifications, we include year dummy variables.

Figure 1. RTA Imports for Thailand (Billion THB)



Source: Authors' computations.

## **Appendix A. The Other Schemes**

In addition to RTAs, there are five additional privileged schemes in which importing firms in Thailand can enjoy preferential tariff treatments; namely, bonded warehouses, free zones, investment promotion, duty drawback for raw materials imported for the production of exports, 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 duties already paid, which is collected when 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, the beneficiaries are different. Under RTAs, beneficiaries can be any importer, no matter what the goods are used for. In other words, they can be either manufacturers for the domestic market, manufacturers for the export markets, traders that import and distribute goods to customers, or final users of the imported goods. Unlike RTAs, the beneficiaries under bonded warehouses, free zones, and duty drawback schemes are required to be firms that only import goods for their own production and exporting activities. For imports under investment promotion, the beneficiaries are mixed, depending upon the imported goods. For imports of machinery, the beneficiaries could be manufacturers for either the domestic or export markets. On the other hand, only manufacturers for the export markets benefit from the investment promotion scheme during the importation of raw materials.

Second, the lists of eligible goods are different. Under RTAs, eligible goods can be any goods tagged within the inclusion list. In other words, subject to negotiations among RTA members, they can be 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 schemes, with the exception of free zones and investment promotion. 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 from the time they are imported until they are exported.

Third, the extent of customs duty reductions is different. Under RTAs, while tariffs for a large portion of traded goods are totally eliminated, some remain non-zero subject to their sensitivity to liberalization and RTA maturities. Tariff reductions under the five schemes vary, but most of them are greater than those for RTAs. Tariffs for all raw materials imported under free zones, investment promotion, and bonded warehouse

schemes are virtually exempt. For machinery, imports under free zones are tariff free, whereas 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 the raw materials are imported for the production of exports, or for nine-tenths or the excess of one thousand Thai baht of the duty already paid, whichever is higher, if the goods are imported for re-exportation.

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

Fifth, the qualifications are 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 makes such goods unqualified and results in the denial of benefits under RTAs. On the other hand, this is not an issue for importations under the five privilege schemes. It means that the goods that have qualified for these schemes may be produced in and exported from anywhere in the world.

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

In conclusion, the 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 schemes. In addition to the lower cost of compliance, the broader coverage of eligible goods and the beneficiaries, who are able to claim preferential tariff treatments, are some of the advantages of import switching to RTAs. On the contrary, the extent of customs duty reductions, the offer of other kinds of duty reductions, and the goods' originating status requirements are among

the main reasons why firms either switch to or remain in the other privileged schemes.

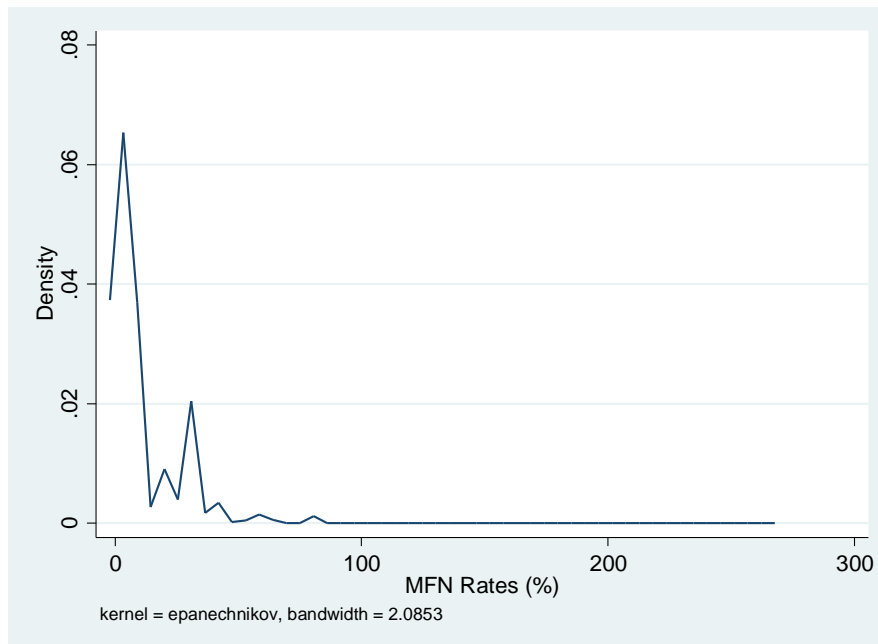
## Appendix B. Tariff Rates in Thailand

Table B1. Number of Products with Lower Preferential Rates than MFN Rates

	2007	2008	2009	2010	2011
AANZFTA				5,963	5,963
ACFTA	2,415	2,415	4,897	5,893	5,893
AFTA	5,809	6,267	6,273	6,672	6,672
AIFTA				4,191	4,191
AJCEP				5,466	5,466
AKFTA				5,773	5,773
JTEPA	4,990	5,147	5,505	5,705	5,705
TAFTA	5,481	5,783	6,117	6,567	6,577
TIFTA	238	238	238	238	238
TNZCEP	5,482	5,784	6,148	6,635	6,656

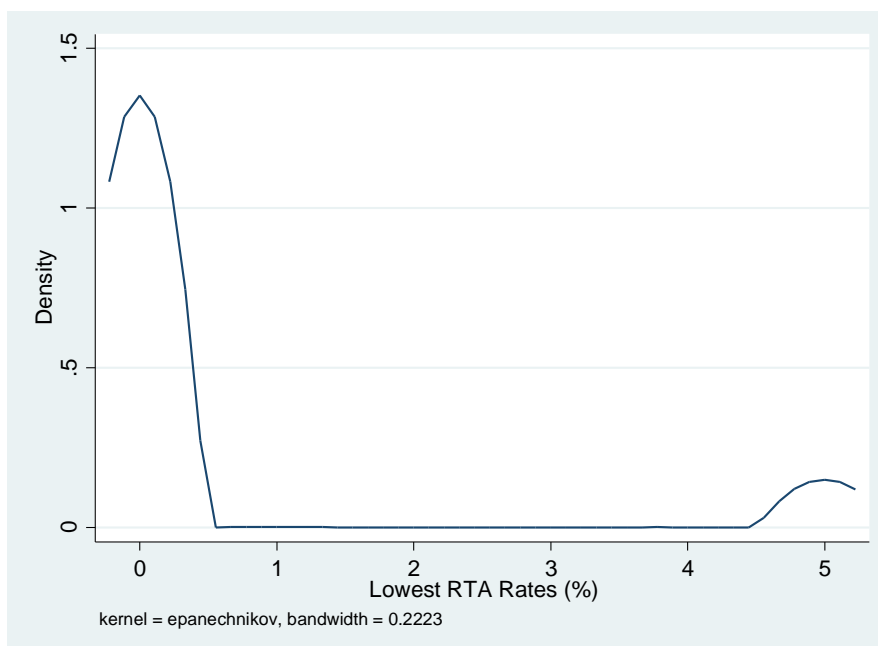
Source: Authors' compilations

Figure B1. Distribution of MFN Rates in 2009



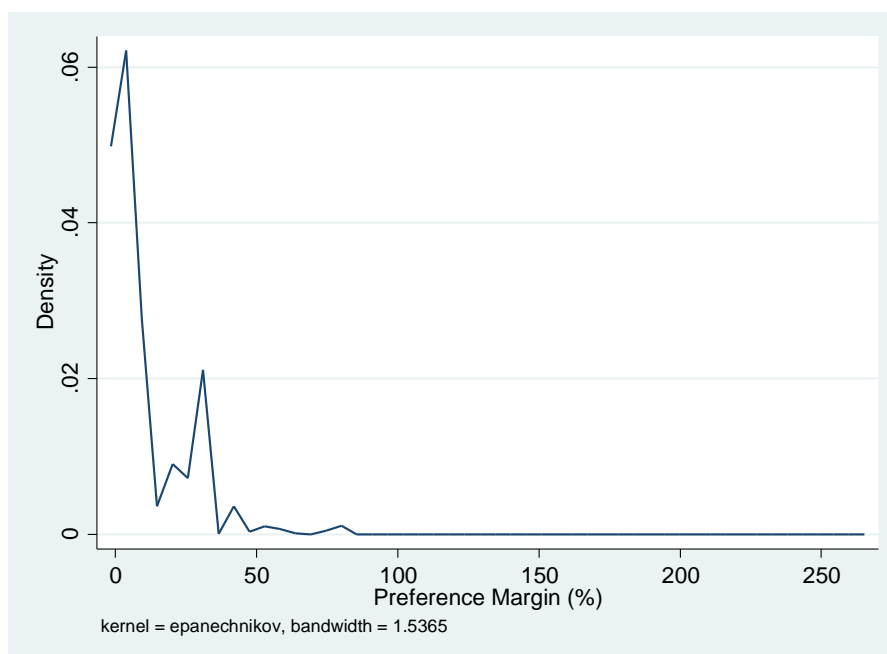
Source: Customs, Kingdom of Thailand

Figure B2. Distribution of the Lowest RTA Rates in 2009



Source: Customs, Kingdom of Thailand

Figure B3. Distribution of the Preference Margin in 2009



Source: Customs, Kingdom of Thailand

## Appendix C. Construction of the Dataset for Our Estimations

This appendix explains how we construct our datasets for econometric analyses. Such datasets for trade creation and diversion are introduced separately.

### C1. Dataset for Trade Creation

We start by identifying the importers from non-members in 2007. Thus, we restrict the import data to the import transactions from non-members in 2007, in which we have information on firm IDs, export countries (Exporter), HS codes, and import values (Values). In this dataset, only observations with positive import values are kept. Next, using this information, we construct a list of import firm–HS code pairs that existed in 2007, an example of which is shown in Dataset 1 in Figure C1. Then, for each pair, we make a balanced panel dataset in terms of RTA member countries (15 countries in total) and years (2007–2011).<sup>23</sup> As a result, we obtain the dataset shown in Dataset 2. Taking this dataset as the master data, we merge the data on imports from RTA members according to firm, HS code, export country, and year. Finally, while we put a zero value for the imports in the unmatched part of the master data, we drop the unmatched part of the data on imports from RTA members. As explained in Section 4.1, we further exclude some observations.

Figure C1. Dataset for Trade Creation

Dataset 1		Dataset 2			
Firm ID	HS code	Firm ID	HS code	Exporter	Year
1	XXXX	1	XXXX	Country 1	2007
1	YYYY	1	XXXX	Country 2	2007
3	ZZZZ	1	XXXX	:	2007
:	:	1	XXXX	Country 15	2007
		1	XXXX	Country 1	2008
		1	XXXX	Country 2	2008
		1	XXXX	:	2008
		1	XXXX	Country 15	2008
		1	XXXX	Country 1	2009
		1	XXXX	:	:
		1	XXXX	Country 15	2011
		1	YYYY	Country 1	2007
		1	YYYY	:	:
		1	YYYY	Country 15	2011
		3	ZZZZ	Country 1	2007
		3	ZZZZ	:	:
		3	ZZZZ	Country 15	2011
		:	:	:	:

<sup>23</sup> More precisely, as mentioned in Section 3.1, 14 countries are included as RTA member countries during the period 2007–2009, in which Korea is not included. For 2010 and 2011, we have a total of 15 countries.

## C2. Dataset for Trade Diversion

When constructing the dataset for trade diversion, we first restrict our original dataset to include only the observations of imports from RTA non-members, as shown in Dataset 3 in Figure C2. Next, after deleting firm/HS code/exporter pairs that did not exist in 2007, we construct a balanced panel between the firm/HS code/exporter pair and year. The example is presented in Dataset 4. Notice that an observation for “Firm 3-ZZZZ-USA” is dropped in Dataset 4 because of its non-existence in 2007. In this dataset, we put zero for “Values” in the newly created years. Then, we construct a list of firm/HS code pairs that have positive imports from RTA members in 2007, which is like Dataset 1 in Figure C2. Finally, we merge this list with Dataset 4, according to firm-HS codes. The unmatched part of the list is deleted. As explained in Section 4.2, we further drop some observations.

Figure C2. Dataset for Trade Diversion

Dataset 3					Dataset 4				
Firm ID	HS code	Exporter	Year	Values	Firm ID	HS code	Exporter	Year	Values
1	XXXX	USA	2007	40	1	XXXX	USA	2007	40
1	XXXX	USA	2008	10	1	XXXX	USA	2008	10
1	XXXX	USA	2009	14	1	XXXX	USA	2009	14
1	XXXX	USA	2010	39	1	XXXX	USA	2010	39
1	XXXX	USA	2011	32	1	XXXX	USA	2011	32
1	YYYY	France	2007	54	1	YYYY	France	2007	54
1	YYYY	France	2009	25	1	YYYY	France	2008	0
2	XXXX	UK	2007	75	1	YYYY	France	2009	25
3	ZZZZ	USA	2009	42	1	YYYY	France	2010	0
:	:	:	:	:	1	YYYY	France	2011	0
					2	XXXX	UK	2007	75
					2	XXXX	UK	2008	0
					2	XXXX	UK	2009	0
					2	XXXX	UK	2010	0
					2	XXXX	UK	2011	0
					:	:	:	:	:

## Appendix D. Basic Statistics

Table D1. Basic Statistics in Trade Creation

	Obs	Mean	Std. Dev.	Min	Max
Statistics for (I) in Table 6					
Import	9,166,871	0.007	0.080	0	1
RTA Use	59,648	0.062	0.240	0	1
ln (1+MFN rates)	9,166,871	0.089	0.072	0.000	1.297
ln (1+RTA rates)	9,166,871	0.013	0.028	0	1.140
Preference Margin	9,166,871	0.083	0.080	0.000	2.657
ln Total Imports	9,166,871	17.407	2.721	4.143	26.412
Export dummy	9,166,871	0.694	0.461	0.000	1.000
ln GDP	9,166,871	29.307	2.038	25.839	32.882
ln Distance	9,166,871	7.609	0.884	6.264	9.198
ln CoO Fee	9,166,871	1.917	1.271	0.000	3.932
ln Export Cost	9,166,871	6.444	0.417	5.748	7.473
Statistics for (II) in Table 6					
Import	8,292,312	0.003	0.058	0	1
RTA Use	28,380	0.042	0.201	0	1
ln (1+MFN rates)	8,292,312	0.089	0.072	0.000	1.297
ln (1+RTA rates)	8,292,312	0.013	0.028	0	1.140
Preference Margin	8,292,312	0.082	0.080	0.000	2.657
ln Total Imports	8,292,312	17.320	2.733	4.143	26.412
Export dummy	8,292,312	0.686	0.464	0.000	1.000
ln GDP	8,292,312	29.294	2.036	25.839	32.882
ln Distance	8,292,312	7.606	0.885	6.264	9.198
ln CoO Fee	8,292,312	1.920	1.271	0.000	3.932
ln Export Cost	8,292,312	6.445	0.417	5.748	7.473
Statistics for Table 8					
RTA Use	59,648	0.062	0.240	0	1
ln Imports	59,648	10.668	2.644	0	20.669
Preference Margin	59,648	0.084	0.076	0.000	0.750
ln Total Imports	59,648	18.464	2.399	7.641	26.412
Export dummy	59,648	0.773	0.419	0.000	1.000
ln GDP	59,648	31.522	1.476	25.839	32.882
ln Distance	59,648	7.946	0.528	6.264	9.198
ln CoO Fee	59,648	1.977	0.974	0.000	3.932

Table D2. Basic Statistics in Trade Diversion

	Obs	Mean	Std. Dev.	Min	Max
Statistics for (I) in Table 7					
Import Exit	851,572	0.739	0.439	0	1
ln (1+MFN rates)	851,572	0.087	0.071	0.000	1.297
ln (1+RTA rates)	851,572	0.005	0.015	0	0.049
ln Total Imports	851,572	17.497	2.687	4.143	26.412
Export dummy	851,572	0.702	0.457	0	1
ln GDP	851,572	31.917	1.339	22.101	33.806
ln Distance	851,572	8.972	0.603	7.339	9.889
Statistics for (II) in Table 7					
Import Exit	347,253	0.568	0.495	0	1
ln (1+MFN rates)	347,253	0.089	0.073	0.000	1.297
ln (1+RTA rates)	347,253	0.008	0.018	0	0.049
ln Total Imports	347,253	17.373	2.729	4.143	26.412
Export dummy	347,253	0.668	0.471	0	1
ln GDP	347,253	31.975	1.327	22.298	33.806
ln Distance	347,253	8.970	0.604	7.339	9.889
Statistics for Table 8					
ln Imports	170,821	11.737	2.481	0	22.885
ln (1+MFN rates)	170,821	0.085	0.069	0.000	1.297
ln Total Imports	170,821	17.832	2.274	7.080	26.412
Export dummy	170,821	0.693	0.461	0	1
ln GDP	170,821	32.037	1.261	24.522	33.806
ln Distance	170,821	9.001	0.573	7.339	9.889

## Appendix E. Extensive Margin for Case (iv)

This appendix reports the estimation results for firms categorized into the fourth case in Section 2. Specifically, we examine the start of imports from RTA members and the exit of imports from RTA non-members. Explanatory variables are the same as in Section 4. For the former analysis, we keep the firm-product pairs that existed in 2007 in the dataset for trade creation, which is explained in Appendix C1. As in the baseline analysis in Section 4.1, we do not drop the firm-product pairs after such pairs record their first positive imports from any RTA member, because all pairs existed in 2007 in this estimation. The estimation results are reported in the “RTA Members” column. For the latter analysis, we keep the firm-product pairs, in which any positive imports from RTA members were recorded in 2007, in the dataset for trade diversion, as explained in Appendix C2. And as in the analysis for the robustness check in Section 4.2, we drop the firm-product pairs after they record their first exit of imports from any non-member. The estimation results are reported in the “RTA Non-members” column.

Table E1. Extensive Margin for Case (iv)

	RTA Members				RTA Non-members	
	Import		RTA Use		Coef.	S.E.
	Coef.	S.E.	Coef.	S.E.		
ln (1+MFN rates)	0.644***	[0.023]			0.383***	[0.050]
ln (1+RTA rates)	-0.611***	[0.042]			-0.513***	[0.190]
Preference Margin			0.287***	[0.037]		
ln Total Imports	0.078***	[0.001]	-0.080***	[0.001]	-0.011***	[0.002]
Export dummy	0.015***	[0.005]	-0.114***	[0.007]	0.033***	[0.010]
ln GDP	0.456***	[0.002]	-0.417***	[0.003]	-0.099***	[0.003]
ln Distance	-0.344***	[0.006]	0.596***	[0.007]	0.036***	[0.006]
ln CoO Fee			0.001	[0.002]		
ln Export Cost	-0.345***	[0.007]				
Rho			-0.980	[0.002]		
Chi-squared statistics			3315.24			
Number of observations			2,342,424		149,922	
Censored observations			2,217,284			
Uncensored observations			125,140			
Pseudo R-squared					0.0628	
Log pseudolikelihood			-411539		-95809	

Notes: “Coef.” and “S.E.” show coefficients and the robust standard errors. \*\*\*, \*\*, and \* indicate 1%, 5%, and 10% significance, respectively. In all specifications, we include year dummy variables.