Do Regional Trade Agreements Really Help

Global Value Chains Develop? Evidence from Thailand

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Abstract: *This paper examines the firm-level nexus between exporting and importing by using firm-level data from Thai customs. We differentiate firms' imports according to the tariff regime used (e.g. regional trade agreements (RTAs)). Our finding is that imports under RTA regimes have a small, though significant, correlation with exports. Greater exports are found in firms with larger imports under the most favoured nation or other preference regimes (e.g. duty drawback for raw materials imported to produce export products). One reason for the result in RTA imports is that active RTA importers mainly target the domestic market rather than the export market. If the main market is abroad, firms tend to use other preference regimes. Thus, the other preference regimes may contribute more greatly to the development of firm-level back-and-forth international transactions than RTAs do*.

Keywords: Export–import nexus; Thailand; Regional trade agreement

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1. Introduction

Trade liberalisation contributes to developing international production networks and global value chains (GVCs). Since the 1990s, tariff rates have been lowered around the world by the Uruguay Round of the World Trade Organization (WTO) and the proliferation of regional trade agreements (RTAs). The tariff rates of the generalised system of preferences (GSP), especially for the least developed countries, were also eliminated in the 2000s. During the same period, multinational enterprises have engaged in active back-and-forth international transactions and have formed international production and distribution networks all over the world. Observing these two phenomena in the same period, we tend to perceive the increase in RTAs as a major source of the development of international production networks. Indeed, several studies have recognised their positive effects (Antràs and Staiger, 2012; Blyde and Faggioni, 2017; Boffa, Jansen, and Solleder, 2019; Osnago, Rocha, and Ruta, 2017; Ruta, 2017).

The rise in imports through trade liberalisation is expected to increase exports through various channels. First, previous studies have found a complementary relationship in start-up costs for exporting and importing. For example, as mentioned in Aristei, Castellani, and Franco (2013), common sunk costs arise when firms establish an organisational structure in charge of international operations or when firms acquire information on foreign markets, which may include both potential buyers (export) and suppliers of intermediate inputs (import). Therefore, the start-up costs for exporting decrease for importers. Second, importing may enhance the competitiveness of export products. For example, firms' productivity may rise due to learning from importing, which lowers production costs (Amiti and Konings, 2007; Bustos, 2011; Kasahara and Rodrigue, 2008). In addition, as found in Bas and Strauss-Kahn (2015); Fan, Li, and

Yeaple (2015); and Hayakawa, Matsuura, and Takii (2017), importing high-quality inputs will raise the quality of export products through the complementarity quality between imports and exports (Antoniades, 2015).

In this paper, we study the association between imports and exports at a firm level by employing Thai customs data. Thailand is a major manufacturing base in the Association of Southeast Asian Nations (ASEAN) and is home to the largest number of Japanese multinationals amongst ASEAN countries. As a member of ASEAN, Thailand has concluded RTAs with neighbouring countries in the Asia-Pacific region. Therefore, Thailand has been both a production and export base in ASEAN. To investigate the firm-level nexus between exports and imports, we employ firm-level trade data from Thai customs for 2007–2014. The import data enable us to identify tariff regimes claimed by importing firms in customs clearance. By using these data, we examine how firms' imports under each tariff regime (e.g. most favoured nation (MFN) or RTAs) change their exports. Such differentiation of imports according to tariff regimes – which has never been done in the literature – enables us to directly examine the export–import nexus in RTA users.

Two competing forces are at work in the association between exports and imports according to tariff regimes. The first is analogous to the recent study on the impact of imports on exports, i.e. imports under RTA regimes may have a positive association with exports, as discussed above. For example, Feng, Li, and Swenson (2016) empirically investigated the firm-level impacts of imports on exports by employing Chinese customs data. They found significantly positive impacts on not only the export value but also the export scope (i.e. the number of export products). To further investigate this nexus between exports and imports, we differentiate imports according to tariff regimes. For example, even when importing the same product, firms can import that product under

RTA regimes more cheaply than under the MFN regime. Thus, the association between imports and exports would be higher in firms that have larger imports under RTA regimes.

The second force is based on the sales strategy. When importing, there are two kinds of preference regimes. One is the RTA regime while the other includes other preference regimes such as duty-drawback regimes or free economic zone regimes.[1] Unlike RTA regimes, the latter regimes do not require imported products to comply with rules of origin. Thus, the utilisation costs of the latter regimes are lower than those of RTA regimes. However, the latter regimes basically require importers to sell their products to the export market. Therefore, export-seeking firms and domestic market-seeking firms, respectively, may tend to choose the other preference regimes and RTA regimes in importing. As a result, RTA importers may tend to sell their products mainly for the domestic market and thus have less exports.

We assess which force is more prevalent by examining the association of each type of imports with exports. Feng, Li, and Swenson (2016) investigated the causal impacts of imports on exports by employing the instrument variable (IV) method. However, we do not identify the cause and consequence in our empirical analysis because our model has multiple import variables according to tariff regimes, unlike Feng, Li, and Swenson (2016). Since we examine three types of imports – under MFN, RTAs, and other preference regimes – it would be difficult to find (at least) three instruments for these three import variables. Therefore, we focus on the net effects of imports on exports. Nevertheless, our results by tariff regime are invaluable. Our main finding is that the association between RTA imports and exports is low because RTA importers tend to sell

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[1] For more details on these regimes, see Appendix A.

to the domestic market. Larger exports are found in firms with larger imports under MFN and other preference regimes.

Our results do not necessarily contradict those of some previous studies. As mentioned above, several studies have found positive effects of RTAs on GVCs. However, such studies have shed light on the role of 'deep' trade agreements, e.g. agreements with provisions on non-tariff advanced issues such as investment, intellectual property rights, or dispute settlement. In contrast, this paper focuses on the traditional role of trade agreements, i.e. tariff reduction, and does not investigate the role of such advanced issues. Then, we show that a tariff advantage in RTAs does not necessarily enhance the GVCs compared with other available preference regimes.

The rest of this paper is organised as follows. The next section describes our empirical framework to examine the export–import nexus in addition to our data sources. Section 3 reports our estimation results while section 4 concludes.

2. Empirical Framework

This section describes our empirical framework to investigate the association between imports and exports at a firm level. Our baseline equation to be estimated for firm f in sector s at year t is as follows:

$$\ln Exports_{fst} = \alpha \ln\big(1 + Total\ Imports_{fst}\big) + u_{fs} + u_{st} + \epsilon_{fst}. \qquad (1)$$

Following Feng, Li, and Swenson (2016), to examine intra-sectoral input–output linkages, we investigate the relationship between exports ($Exports_{fst}$) and imports ($Total\ Imports_{fst}$) within the same sector. In addition, like Feng, Li, and Swenson (2016), we add the value 1 for imports before taking the log. We define the sector at a two-digit level of the International Standard Industrial Classification (ISIC) Revision 3.

Firm–sector fixed effects and sector–year fixed effects are also controlled. Firm–sector fixed effects are expected to control for time-invariant firm–sector characteristics (e.g. firms' primary technology level) while time-variant sector characteristics (e.g. wages) are controlled for by sector–year fixed effects. ϵ_{fst} is an error term. As discussed in the previous section and shown in previous studies, we expect a positive coefficient for total imports.

Next, we decompose imports according to tariff regimes. Specifically, we classify them into three categories: imports under the MFN regime ($MFN\ Imports_{fst}$), those under RTA regimes ($RTA\ Imports_{fst}$), and those under other privilege regimes ($Others\ Imports_{fst}$). The estimation equation is modified as follows:

$$\ln Exports_{fst} = \beta_1 \ln\left(1 + MFN\ Imports_{fst}\right) \tag{2}$$
$$+ \beta_2 \ln\left(1 + RTA\ Imports_{fst}\right)$$
$$+ \beta_3 \ln\left(1 + Others\ Imports_{fst}\right) + u_{fs} + u_{st} + \epsilon_{fst}$$

Importing firms in Thailand may enjoy preferential tariff treatments in five other privilege schemes: (i) bonded warehouses, (ii) free zones, (iii) investment promotion, (iv) duty drawback for raw materials imported to produce export products, and (v) duty drawback for re-exportation. Tariffs for imports under these preference regimes are mostly exempted. We add the value 1 before taking logs of these import variables.

As in the case of total imports in equation (1), we expect positive coefficients for all three import variables because of the positive impacts of starting/increasing imports on exports. However, as discussed in the introductory section, there is a negative force in the relationship between RTA imports and exports. In addition, the higher tariff rates in the MFN regime may lower the association between imports and exports. Furthermore, while RTA tariff rates are not necessarily zero, other preference regimes offer mostly duty exemption. This difference in duty payment may alter the magnitude of the

coefficients for RTA imports and other preference imports. In short, various factors affect the relative magnitude of the coefficients amongst the three types of imports. The net magnitude is an empirical question.

It is worth noting that our estimates do not show the causal effects of imports on exports. As discussed in the introduction, starting or increasing imports has some impacts on exports. In addition, there are several studies on the self-selection mechanics of firms engaging in trading activities (Muuls and Pisu, 2009; Castellani, Serti, and Tomasi, 2010; Vogel and Wagner, 2010; Aristei, Castellani, and Franco, 2013; Kasahara and Lapham, 2013). Such studies found that (i) importers are more productive than non-importers and (ii) firms that engage in both importing and exporting exhibit higher performance than those that engage in either exporting or importing. Thus, the estimates in equation (1) include not only the impacts of imports but also the difference based on these selection mechanics. A similar issue exists in equation (2). As mentioned in section 1, firm characteristics (e.g. sales strategy) might be different according to tariff regimes in importing. In addition, due to the existence of utilisation costs, MFN users should be different from the users of preference regimes. For example, Hayakawa (2015) found in Japanese affiliates in ASEAN that larger-sized firms are more likely to use RTA regimes in exporting.

One solution to differentiate the impacts and self-selection mechanics is to use the IV method. In our context, since there are potentially three endogenous variables in equation (2), we need to find at least three instruments. In the literature, the changes in tariff rates are often used as instruments. However, MFN tariff rates do not change considerably in Thailand during our sample period. Similarly, tariff duty in the other preference regimes is zero or low and is time-invariant. Although RTA tariff rates change over time, those rates differ by RTA partner countries, and our empirical model does not

have a country dimension in import variables. In short, it is difficult to apply the IV method to our analysis. Therefore, we simply examine the association/correlation between imports and exports by using the ordinary least squares (OLS) method.

Our data sources are as follows. Our main data come from Thai customs from 2007 to 2014. Those data are transaction-level data that cover all commodity imports and exports in Thailand. The import data include information on tariff regimes. The sample firms include those with a record of positive values in either or both exports and imports. The product category is available at an eight-digit level of the Harmonised System (HS). We aggregate these data according to firms, sectors, and years. To convert HS eight-digit codes to two-digit codes of ISIC Revision 3, we use the correspondence table between HS six-digit codes and four-digit codes of ISIC Revision 3 compiled by the World Integrated Trade Solution (WITS, n.d.). To restrict sample firms to manufacturing firms, e.g. exclude trading companies, we use business data compiled by Thailand's Department of Business Development, which include information on the firms' main industry.

As of 2014, five bilateral RTAs and six regional RTAs were in place in Thailand. The bilateral RTAs came into force with Australia in 2005, India in 2004, Japan in 2007, Peru in 2011, and New Zealand in 2005. Amongst regional RTAs, the ASEAN Trade in Goods Agreement (ATIGA) was introduced in 2010 by revising the ASEAN Free Trade Area (AFTA) which became effective amongst 10 ASEAN countries (Brunei Darussalam, Cambodia, Indonesia, the Lao People's Democratic Republic, Malaysia, Myanmar, the Philippines, Singapore, Thailand, and Viet Nam) in the 1990s. In addition, Thailand, together with the other ASEAN members, has concluded five plurilateral RTAs, called ASEAN+1 RTAs: the ASEAN–Australia–New Zealand Free Trade Agreement (AANZFTA) in 2010, the ASEAN–China FTA (ACFTA) in 2005, the ASEAN–India

FTA (AIFTA) in 2010, the ASEAN–Japan Comprehensive Economic Partnership (AJCEP) in 2009, and the ASEAN–Korea FTA (AKFTA) in 2010. The variable of imports under RTA regimes includes those from these RTA partner countries.

Before showing our estimation results, we provide an overview of traders in Thailand. Table 1 reports the number of firms, the sum of exports, and the sum of imports according to the trade type. We classify firms into three types: (i) two-way – firms that engage in both exporting and importing; (ii) export only – firms that engage only in exporting; and (iii) import only – firms that engage only in importing. The largest number of firms are two-way firms, followed by import-only firms. It is also found that most exports and imports are done by two-way firms. Their values are outstanding compared with the number of firms, indicating that the exports and imports per firm are much larger in 'two-way' firms.

Table 1: Number of Firms, Total Exports, and Total Imports by Trade Type, 2014
(฿ billion)

Type	No. of firms	Total exports	Total imports
Two-way	5,294	3,422	2,198
Export only	1,218	23	0
Import only	3,676	0	87
Total	**10,188**	**3,445**	**2,285**

Note: Two-way, export only, and import only refer to firms that engage in both exporting and importing, firms that engage only in exporting, and firms that engage only in importing, respectively.
Source: Thai Customs.

Next, Table 2 focuses on importers and then shows the statistics according to the status of imports under each regime. For example, the first line indicates firms that have positive import values under all of the MFN, RTA, and other preference regimes. The largest number of firms can be found in the firms that import only under the MFN regime, followed by those that import under both the MFN and RTA regimes. Firms that

import under all three types of regimes have the third-largest number but the largest import values. Thus, it is expected that all-regime importers have much larger imports per firm.

Table 2: Number of Firms and Total Imports by Import Type, 2014

(฿ billion)

MFN	RTA	Others	No. of firms	Total imports
X	X	X	1,297	1,457
X	X		2,328	214
X		X	986	498
	X	X	31	3
X			3,671	105
	X		581	6
		X	76	2

MFN = most favoured nation, RTA = regional trade agreement.
Note: "X" indicates that firms have positive import values under the respective regime.
Source: Thai Customs.

Firms use multiple tariff regimes for various reasons. For example, firms import multiple products. RTA regimes may be available for some products, but not others. Even if firms import only one product, they may import from multiple producers to minimise the risk of delays in the arrival of products, which results in production delays. Some producers may be productive enough to pay for the utilisation costs of RTAs or other preference regimes while others may not. Due to these product or producer mixes in importing, firms may end up using multiple tariff regimes.

3. Empirical Results

This section presents our estimation results. To interpret our results and understand the mechanism behind them, we also investigate the share of domestic sales out of total sales.

3.1. Estimation Results on Export–Import Nexus

The results of our various estimations are shown in Table 3. Column (I) reports the result in equation (1) using the OLS. The standard errors are clustered by sectors. The result shows a significantly positive coefficient for total imports, as is consistent with our expectation. We also estimate this equation by the Poisson pseudo maximum likelihood (PPML) technique. In this estimation, observations with zero-valued exports are also included. The result is shown in column (II) and again indicates a significantly positive coefficient. Thus, larger imports are associated with larger exports. In columns (III) and (IV), we estimate equation (2), i.e. the decomposition of imports. In the OLS result, all three import variables have significantly positive coefficients. The coefficient for RTA imports is smaller than not only the coefficient for other preference imports but also the coefficient for MFN imports. In the PPML result, the coefficient for RTA imports is no longer significant.

Table 3: Baseline Results

Variable	(I)	(II)	(III)	(IV)
ln (1 + total imports)	0.038***	0.026**		
	[0.002]	[0.011]		
ln (1+ MFN imports)			0.027***	0.014**
			[0.002]	[0.007]
ln (1+ RTA imports)			0.013***	0.000
			[0.003]	[0.001]
ln (1+ Other imports)			0.024***	0.005**
			[0.002]	[0.002]
Method	OLS	PPML	OLS	PPML
No. of observations	132,027	217,976	132,027	217,976
Adjusted R-squared	0.808		0.808	
Log pseudo-likelihood		-1.8E+12		-1.8E+12

MFN = most favoured nation, OLS = ordinary least squares, PPML = Poisson pseudo maximum likelihood.
Notes: The dependent variable is total exports. It is logged in the case of OLS estimation. ***, **, and * indicate 1%, 5%, and 10% significance, respectively. The standard error, clustered by sector, is in square brackets. In all specifications, we control for firm–sector fixed effects and sector–year fixed effects. This table includes all manufacturing firms.
Source: Authors.

We conduct seven kinds of robustness checks. First, we exclude non-importers from our sample. In the estimation above, we include non-importers, i.e. firms that have no imports, by adding the value 1 before taking logs. However, as mentioned in the previous sections, there would be differences in ex-ante characteristics between importers and non-importers. As a robustness check, therefore, we estimate only for importers. Notice that our sample here does not include firms that have a zero value for total imports, but such firms still may have a zero value for imports under some regimes. Thus, we keep adding the value 1 for import variables before taking their logs. The result is provided in column (I) of Table 4. Only the other preference imports have a significant and positive coefficient. The coefficient for RTA imports is estimated to be negative, though it is insignificant.

Table 4: Robustness Checks by PPML

Variable	(I)	(II)	(III)	(VI)	(V)	(VI)	(VII)
ln (1+ MFN imports)	0.016	0.014*	0.020***	0.008	0.023*	0.011**	0.012***
	[0.010]	[0.007]	[0.007]	[0.012]	[0.013]	[0.005]	[0.005]
ln (1+ RTA imports)	-0.001	0.002	-0.001	0.001	0.017***	0.002	0.001
	[0.001]	[0.003]	[0.002]	[0.003]	[0.006]	[0.001]	[0.002]
ln (1+ Other imports)	0.005**	0.003	0.006	0.005**	0.019***	0.007	0.008***
	[0.002]	[0.005]	[0.005]	[0.002]	[0.007]	[0.005]	[0.002]
No. of observations	167,703	191,576	71,698	128,584	217,976	120,739	327,803
Log pseudo-likelihood	-1.6E+12	-5.3E+11	-1.2E+12	-7.9E+11	-1.8E+12	-8.0E+11	-1.9E+12

ASEAN = Association of Southeast Asian Nations, ISIC = International Standard Industrial Classification, MFN = most favoured nation, PPML = Poisson pseudo maximum likelihood, RTA = regional trade agreement.

Notes: The dependent variable is total exports. We estimate all models by the PPML. ***, **, and * indicate 1%, 5%, and 10% significance, respectively. The standard error, clustered by sector, is in square brackets. In all specifications, we control for firm–sector fixed effects and sector–year fixed effects. In column (I), we exclude non-importers. In column (II), firm–year fixed effects are introduced. In column (III), we restrict sample firms only to those that import under either RTA or other preference regimes. In column (IV), we restrict sample export destination countries only to ASEAN countries. In column (V), we control for the number of tariff regimes used for importing, which ranges from zero to three. In column (VI), we include only finished products in export products and only intermediate products in import products. In column (VII), we redefine 'sector' at a four-digit level of the ISIC rather than its two-digit level.

Source: Authors.

The second check controls for firm–year fixed effects. Since we do not have enough firm-level production data to examine the role of firm characteristics, our empirical model does not include non-trade-related variables on firm characteristics. However, there are significant drivers of firm-level exports such as total factor productivity. To control for these time-variant firm characteristics, we introduce firm-year fixed effects in our model. One drawback of this estimation is to focus on firms that engage in exporting in multiple sectors. In all estimations below, we again include non-importers though excluding them does not qualitatively change our results. The result is shown in column (II). Compared with those in Table 3, the number of observations decreases slightly. Only the MFN imports have a significant and positive coefficient.

Third, we restrict sample firms to those that import under either RTA or other preference regimes. As found in Table 2, a significant number of firms have zero values for those two kinds of preference regimes. In other words, the largest number of importers use only the MFN regime. Since some of these importers may not be aware of the availability of preference regimes, we drop them. The result is shown in column (III). Again, only the MFN imports have a significant and positive coefficient. In addition, as in column (I), the coefficient for RTA imports is estimated to be negative though it is insignificant.

Fourth, we restrict export destination countries to ASEAN countries. In exports from Thailand, the most frequently used RTA is ATIGA. For example, according to the certificates of origin, the share of exports under ATIGA out of total exports under all RTAs in 2013 accounted for 36%. Although we do not have firm-level information in the tariff regimes in exporting, our focus on exports to ASEAN may enable us to examine the association between RTA imports and RTA exports. Imports are not restricted to those

from ASEAN. The result is shown in column (IV) and indicates that only the other preference imports are significantly and positively associated with exports.

Fifth, we control for the number of tariff regimes used for importing, which ranges from zero to three. As mentioned in section 2, firms use multiple tariff regimes for various reasons. In general, the use of a larger number of regimes seems to require firms to incur higher management costs. Thus, the number of tariff regimes may be associated with firm characteristics, including firm size. To control for such characteristics, we introduce the dummy variable on each number of tariff regimes. The result is shown in column (V). In this estimation, all three import variables have significant and positive coefficients. The result is similar to the one by OLS shown in column (III) of Table 3. The magnitude is the smallest in RTA imports and the largest in MFN imports.

Sixth, so far, we have simply examined the export–import nexus within the same two-digit ISIC code. To identify the input–output relationship between imports and exports more directly, we include only finished products in export products and only intermediate products in import products. Finished products are defined as items categorised into 112, 122, 41, 51, 52, 61, 62, or 63 in the Broad Economic Categories (BEC) classification while the rest are intermediate products. Using the converter table between HS and BEC, we link the BEC code with the ISIC code and then again examine the export–import nexus within the same two-digit ISIC code. Column (VII) reports the result of this estimation and shows a significant coefficient only for MFN imports.

The last check is to redefine the sector at a four-digit level of the ISIC rather than the two-digit level. Feng, Li, and Swenson (2016) examined the export–import nexus at this level, i.e. four-digit level. For example, in the analysis at a two-digit level, we can incorporate the production pattern of importing parts and accessories for motor vehicles and their engines (3430) and exporting motor vehicles (3410). This pattern is not

captured in the estimation when examining at a four-digit level because these two products are categorised into different four-digit codes. In the four-digit level, we focus on, for example, the pattern of importing and exporting parts and components. Specifically, at a four-digit level, we examine the export–import nexus within a narrower sectoral level. The result is shown in column (VIII) and is similar to the one in column (VI). While RTA imports have an insignificant coefficient, the coefficients are significantly positive in MFN imports and other preference imports.[4]

In sum, we have consistently found that imports under RTA regimes are not considerably associated with exports. Although it is statistically insignificant, the coefficient for RTA imports is even negative in some estimations. On the other hand, many estimations show significantly positive results for MFN imports and other preference imports, though it is unclear which of these two types of imports has a greater association with exports. In short, the correlation with exports is rather weak in RTA imports. This result may indicate the strong domestic market-seeking nature of RTA importers.

3.2. Share of Domestic Sales

In the previous subsection, the estimation results suggested the strong domestic market-seeking nature of RTA importers. To investigate this nature directly, we examine at a firm-year level how the share of domestic sales out of total sales (*DomShare*) is related to RTA imports. Specifically, we estimate the following equation:

$$DomShare_{ft} = \gamma_1 RTA\ Dummy_{ft} + \gamma_2 Import\ Dummy_{ft} + u_f + u_t + \epsilon_{ft}. \quad (3)$$

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[4] We also estimate our models by industry. The results are shown in Appendix B and are qualitatively unchanged.

RTA Dummy and *Import Dummy* take the value 1 if firm *f* in year *t* has any imports under RTA regimes and under any regimes, respectively. We also control for firm fixed effects and year fixed effects. The data on total sales are obtained from the business data. Notice that we have those data only for 2010 and 2014, i.e. 2 years. The domestic sales are computed by subtracting exports from total sales. The results by OLS are shown in column (I) of Table 5. The coefficients for *RTA dummy* and *Import dummy* are significantly positive and negative, respectively. These results imply that importers generally have a higher share of export sales, but RTA importers have a higher share of domestic sales amongst importers.

Table 5: Share of Domestic Sales in Total Sales

	OLS			Fractional logit		
Variable	**(I)**	**(II)**	**(III)**	**(IV)**	**(V)**	**(VI)**
RTA dummy	0.009**			0.009		
	[0.004]			[0.034]		
Import dummy	-0.025***			-3.295***		
	[0.006]			[0.054]		
RTA import share		0.007	0.000		0.800***	0.203***
		[0.008]	[0.008]		[0.054]	[0.070]
Other import share			-0.046***			-1.990***
			[0.015]			[0.060]
Import = 0	Including	Excluding	Excluding	Including	Excluding	Excluding
Firm FE	X	X	X			
Year FE	X	X	X	X	X	X
Adjusted R-squared	0.9005	0.8938	0.8943			
Log pseudo-likelihood				-5583.75	-3539.23	-3228.87
No. of observations	41,000	7,880	7,880	41,000	7,880	7,880

OLS = ordinary least squares, RTA = regional trade agreement.
Notes: The dependent variable is the share of domestic sales of total sales. ***, **, and * indicate 1%, 5%, and 10% significance, respectively. The robust standard error is in square brackets. Firm FE and Year FE refer to firm fixed effects and year fixed effects, respectively.
Source: Authors.

We also examine the share of RTA imports out of total imports (*RTA import share*) by restricting sample firms to importers. Specifically, we estimate the following equation:

$$DomShare_{ft} = \delta_1 RTA\ import\ share_{ft} + u_f + u_t + \epsilon_{ft}. \tag{4}$$

The OLS result is presented in column (II) but shows an insignificant coefficient. In column (III), we add the share of other imports (*Other import share*) to this equation. While *RTA import share* again has an insignificant coefficient, the coefficient for *Other import share* is significantly negative and indicates that active importers under other regimes have a higher share of exports amongst importers. Columns (IV)–(VI) show estimation results employing the fractional logit model proposed by Papke and Wooldridge (1996), which may be a suitable estimation technique for a model with a unit-interval dependent variable. In this non-linear estimation, we do not include firm fixed effects to avoid the incidental parameter problem. *RTA dummy* turns out to have an insignificant coefficient while the coefficients for *RTA import share* are significantly positive. The latter result implies that active RTA importers have a higher share of domestic sales. The coefficient for other import share is again estimated to be significantly negative.

These results from additional analyses conducted in this subsection suggest that RTA importers mainly target the domestic market rather than the export market. Some other preference regimes require importers to export their products to receive those preferences in importing. Thus, it is natural to find that active importers under the other regimes have a higher share of export sales. These results suggest that firms choose tariff regimes in importing, depending on their sales destination. If their sales target is the domestic (export) market, they may import their inputs under RTA (other preference) regimes. This choice is reasonable because utilisation costs for firms are lower in other

preference regimes than in RTA regimes. The other preference regimes do not require compliance with rules of origin. However, those regimes are not available unless exporting the products produced by using the imported inputs. Thus, when not exporting, firms choose RTA regimes for importing.

4. Policy Implication

In this paper, we studied the export–import nexus at a firm level by employing Thai customs data. We differentiated imports according to tariff regimes. As a result, we found that imports under RTA regimes are not considerably associated with exports. Rather, larger exports are found in firms with larger imports under the MFN regime or other preference regimes. One reason for the result in RTA imports is because active RTA importers mainly target the domestic market rather than the export market. If the main market is abroad, firms tend to use other preference regimes. Thus, the other preference regimes (e.g. duty drawback for raw materials imported to produce export products) contribute more to the development of firm-level back-and-forth international transactions than RTAs do.

One caveat is that we should not interpret our results as indicating a general relationship between RTAs and GVCs since our results are based solely on Thailand. Indeed, Thailand actively introduces various types of preference regimes to attract foreign companies. Nevertheless, the duty drawback regime or the free economic zone regime is available in many countries, especially developing countries, since it contributes to increasing their exports and foreign currency (e.g. United States dollars). In countries with other preference regimes, RTAs may play a minor role in the development of GVCs simply because of the availability of better regimes. Firms

optimally choose other preference regimes for the development of their international production networks. Nevertheless, RTAs still play a key role – especially in importing products sold to the domestic market or in importing inputs used to produce products for the domestic market.

To enhance the utilisation of RTAs, it is important to encourage firms to enjoy cumulation rules of RTAs by reducing the utilisation costs in RTAs. There are two kinds of costs. To utilise an RTA regime, firms must comply with rules of origin and obtain certificates of origin. Compliance with rules of origin may require exporters to change their procurement sources. For example, to comply with rules of origin, exporters may be forced to switch from intermediate inputs sourced from a country outside the RTA to more expensive local inputs. Such switching costs become a burden for firms to utilise the RTA regime. Policymakers could reduce these costs by setting more business-friendly rules of origin such as co-equal rules where firms can choose between two (or more) alternative rules such as a change-in-heading rule or a regional value content rule.

On the other hand, to obtain certificates of origin, exporters must submit various documents, such as a list of inputs, a production flow chart, production instructions, invoices for each input, and contract documents. Since exporters are required to provide these documents for each transaction regardless of the value of exports, such documentation requirements represent substantial fixed costs for firms wishing to utilise RTA regimes. To reduce these fixed costs, policymakers could introduce more concise and transparent procedures for certifying the origin of goods. If these kinds of costs decrease greatly and become low enough compared with those in other preference regimes, firms may prefer the use of RTAs in both exporting and importing by enjoying the cumulation rules of RTAs.

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Appendix A. Other Privilege Regimes

Importing firms in Thailand may enjoy preferential tariff treatments through five other privilege schemes: (i) bonded warehouses, (ii) free zones, (iii) investment promotion, (iv) duty drawback for raw materials imported to produce export products, and (v) duty drawback for re-exportation. While benefits under items (i)–(iii) are realised immediately at the time of importation, those under items (iv)–(v) are essentially the refund of 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 amongst schemes, are different from those under regional trade agreements (RTAs) at least in the following six aspects.

First, the beneficiaries are different. Under RTAs, beneficiaries can be any importers, regardless of how such goods are used. In other words, they can be either manufacturers for the 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 on 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, the 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 amongst RTA members, they can be either raw materials, machinery, or final products. Unlike

RTAs, eligible goods under the other privilege schemes are mainly raw materials. Machinery to be used in the production process is ineligible under all schemes except for free zones and investment promotion schemes. Imported goods to be used as final products are ineligible under all schemes. Duty drawback for re-exportation applies to any goods – 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.

Thirdly, the depths of customs duty reduction are different. Under RTAs, while tariffs for a large portion of traded goods are eliminated, some are still non-zero because of their sensitiveness in liberalisation and the RTA's maturity. For these sensitive goods, tariff reductions under the other privilege schemes vary, but most of them are typically deeper than RTAs. Tariffs for all raw materials imported under free zones, investment promotion, and bonded warehouse 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 on the decision of the Thailand Board of Investment. Under the duty drawback schemes, firms may ask either for a full refund if raw materials are imported to produce the export or for 90% or the excess of ฿1.000 of the duty already paid, whichever is higher, if goods are imported for re-exportation.

Fourth, benefits from the exemption of other duties are different. On top of tariff reduction, certain schemes grant additional duty privileges to firms. Excise tax is exempted for goods imported under bonded warehouses and duty drawback for raw materials imported to produce exports. Privileges for firms in the free zones are most generous since imported goods are free of the tariff, excise tax, and value-added tax.

Fifth, the origin of goods has different impacts on eligibility. Under RTAs, qualified goods are required to be produced in the RTA member countries and meet the

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relevant originating criteria specified in the rules of origin. Failure to do so disqualifies such goods and precludes benefits under RTAs. On the other hand, the origin is not an issue for importation under the five privilege schemes. This means that goods that qualify for the schemes may be produced in and exported from anywhere in the world.

Lastly, burdens on importers to prove eligibility are different. To claim benefits under the five schemes, importers are required to submit evidence of compliance to the authority in charge. Such evidence of compliance – including the production formula, the necessity claim explaining why the imports are preferred to locally produced goods, and other relevant documents – may result in higher compliance costs. However, this evidence is not required for importers to claim preferential benefits under RTAs. The only evidence needed is a certificate of origin issued by a competent authority in the exporting country. As a result, exporters mainly bear the burden and cost of proving eligibility under RTAs.

In conclusion, the benefits offered and costs imposed vary amongst import schemes. Such differences may either encourage or discourage firms from switching their imports amongst RTAs, other privilege schemes, and most favoured nation schemes. In addition to the lower cost of compliance, the broader coverage of eligible goods and beneficiaries that can claim preferential tariff treatment is an advantage of the import switching to RTAs. In contrast, the depth of customs duty reduction, the offer of other kinds of duty reduction, and the origin requirement of goods are amongst the top reasons why firms either switch to or remain in the other privilege schemes.

Appendix B. Estimation by Industry

Table B1: Estimation by Industry

Variable	1	2	3	4	5	6	7	8
ln (1+ MFN imports)	0.010***	0.014***	0.005	0.008	0.022***	0.030***	0.008	0.030***
	[0.003]	[0.002]	[0.006]	[0.006]	[0.008]	[0.009]	[0.010]	[0.005]
ln (1+ RTA imports)	-0.001	0.004**	0.012**	0.001	0.004	-0.003	-0.006*	-0.002
	[0.002]	[0.002]	[0.005]	[0.003]	[0.003]	[0.003]	[0.003]	[0.004]
ln (1+ Other imports)	0.002	0.015***	0.018**	0.002	0.003	0.015***	-0.003	0.013***
	[0.003]	[0.002]	[0.008]	[0.003]	[0.005]	[0.004]	[0.003]	[0.003]
No. of observations	5,880	22,534	24,023	44,284	41,208	59,970	6,493	13,584
Log pseudo-likelihood	-1.11E+11	-8.31E+10	-3.03E+10	-4.31E+11	-2.94E+11	-6.14E+11	-1.08E+11	-8.23E+10

MFN = most favoured nation, PPML = Poisson pseudo maximum likelihood, RTA = regional trade agreement.
Notes: The dependent variable is exports. We estimate all models by the PPML. ***, **, and * indicate 1%, 5%, and 10% significance, respectively. The standard error, clustered by sector, is in square brackets. In all specifications, we control for firm–sector fixed effects and sector–year fixed effects. Column numbers indicate industries, which are indicated in Table B2.
Source: Authors.

Table B2: Industry Classification

Industry	ISIC 2-digit
1	15 - Manufacture of food products and beverages
1	16 - Manufacture of tobacco products
2	17 - Manufacture of textiles
2	18 - Manufacture of wearing apparel, dressing, and dyeing of fur
2	19 - Tanning and dressing of leather
3	20 - Manufacture of wood and of products of wood and cork
3	21 - Manufacture of paper and paper products
3	22 - Publishing, printing and reproduction of recorded media
4	23 - Manufacture of coke, refined petroleum products, and nuclear fuel
4	24 - Manufacture of chemicals and chemical products
4	25 - Manufacture of rubber and plastics products
5	26 - Manufacture of other non-metallic mineral products
5	27 - Manufacture of basic metals
5	28 - Manufacture of fabricated metal products
6	29 - Manufacture of machinery and equipment n.e.c.
6	30 - Manufacture of office, accounting, and computing machinery
6	31 - Manufacture of electrical machinery and apparatus n.e.c.
6	32 - Manufacture of radio, television, and communication equipment
6	33 - Manufacture of medical, precision, and optical instruments
7	34 - Manufacture of motor vehicles, trailers, and semi-trailers
7	35 - Manufacture of other transport equipment
8	36 - Manufacture of furniture; manufacturing n.e.c.

ISIC = International Standard Industrial Classification, n.e.c. = not elsewhere classified.
Source: Authors.

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