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JEL Classification: F15; F53

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The Trade Effect of Non-tariff Measures in a High-quality Trade Agreement

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1. Introduction

The Trans-Pacific Partnership (TPP), a mega regional trade agreement (RTA) that would have covered 40 percent of global GDP and whose members would have represented a market of 800 million people, was at the center of global trade discussions. Its negotiation scope was comprehensive, featuring the most ambitious targets among existing RTAs to date. It originally involved the following twelve Asia-Pacific countries: Australia, Brunei, Canada, Chile, Japan, Malaysia, Mexico, New Zealand, Peru, Singapore, the United States, and Vietnam. On 23 January 2017, U.S. President Donald Trump signed a Presidential Memorandum to withdraw the U.S. from the TPP, one of his first acts. The remaining 11 TPP member countries, led by Japan, Australia, and New Zealand, put effort into moving

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the agreement forward without the U.S. by launching a new agreement entitled the Comprehensive and Progressive Agreement for Trans-pacific Partnership (CPTPP). Consensus regarding the CPTPP was reached in January 2018 and, after a formal signing ceremony in Santiago, Chile in March 2018, it went into effect among some of the member countries on 30 December 2018.

The CPTPP is considered a high-quality RTA, in which negotiated coverages go far beyond market access (Mattoo et al., 2020). Although some parts of the original TPP were suspended in the CPTPP in order to revive the regional trade pact, most parts remained. In terms of both numbers and import values, the share of tariff-eliminated products reaches 99% or 100% in all member countries except for Japan (95%). It also incorporates many rules in non-tariff areas, including liberalization of investment and services, intellectual property rights, labor and environmental standards, state-owned enterprises, and government procurement. As of September 2022, the CPTPP has not gone into effect in Brunei, Chile, and Malaysia. Meanwhile, many other countries are expressing their interest in joining the CPTPP. The United Kingdom, China, Taiwan, and Ecuador have applied to join the CPTPP.

The aim of this study is to quantify the trade effects of the CPTPP. Although there are many ex-ante studies using the general equilibrium model (e.g., Li and Shalley, 2021; Park et al., 2021), to our knowledge, no ex-post studies on the CPTPP have been published. The CPTPP is a high-quality RTA because it addresses not only tariff elimination but also commitments regarding non-tariff measures (NTMs). For example, provisions such as reductions in technical barriers to trade, investment agreements, and investor–state dispute settlement could positively affect trade because they could create more business certainty and facilitate trade among members. It is technically difficult to evaluate the effects of these qualitative measures by simulation experiments. Therefore, it is important to examine the trade effects of the CPTPP by using trade data before and after enforcement of the agreement. The results of these effects will be useful not only for member countries to confirm the performance of the agreement but also for other countries considering joining the pact to see what will happen after joining.

Specifically, following the standard approach for the ex-post analysis of the trade creation effect of RTAs, we estimate the gravity equation for worldwide trade. We control for a full set of fixed effects, including exporter–year, importer–year, and exporter–importer fixed effects. Unlike most studies in the literature, we explicitly introduce applied tariffs. By capturing the trade effect of tariff reduction with this variable, we can differentiate between the trade effects of tariff reduction and NTM changes in RTAs. As mentioned above, this differentiation matters because it uncovers the actual effects of NTM changes in the CPTPP on trade. Also, in addition to the RTA dummy variable, which takes a value of 1 if any RTAs exist between trading countries, we also introduce a dummy variable specific to membership in the CPTPP. The estimate in this variable indicates the *additional* effect of NTM changes in the CPTPP on top of their average effects among all RTAs. Due to the data

availability on applied tariffs, our study period is from 2000 to 2019. Thus, we quantify the trade effect in 2019, the first year of the CPTPP.

Our findings are summarized as follows. Our gravity equation results indicate that the trade effect of NTM changes under the CPTPP is insignificant on average and negative for most products. To investigate this unexpected result more closely, we perform three additional kinds of analyses. First, although we cannot differentiate between the effects of tariffs and NTMs due to the data limitation, we extend the study period through 2021 to cover the first three years of the CPTPP period. However, we still found a significantly negative trade effect of the CPTPP on average. Second, we list NTMs introduced by CPTPP member countries after the CPTPP went into effect. Although we do not provide quantitative evidence of their effects on trade, some of those NTMs may lead to a decrease in the trade effects of the CPTPP. Last, we estimate the gravity equation for foreign direct investment (FDI). We find some evidence that the CPTPP increased FDI by a statistically significant amount among member countries. Thus, NTM changes under the CPTPP may increase FDI rather than trade.

This paper contributes to the literature on the trade creation effect in RTAs. There are many studies in this area, such as Baier and Bergstrand (2007). To our knowledge, this is the first ex-post study on the CPTPP. Furthermore, we differentiate the trade effect of tariff reduction from that of NTM changes. Some studies in the literature attempt to identify the latter effect (e.g., Disdier et al., 2008; Bratt, 2017). More recently, Mattoo et al. (2022) regress trade on the depth of RTAs measured by the number of provisions. Naturally, they find that deeper agreements lead to more trade creation. Based on recent developments in the machine learning and variable selection literature, Breinlich et al. (2022) proposed data-driven methods for selecting the most important provisions and quantifying their impact on trade flows. They find that provisions related to anti-dumping, competition policy, technical barriers to trade, and trade facilitation have a positive impact on the trade-enhancing effects of trade agreements.[1] However, for our purposes, we are not interested in which non-tariff rules have the largest trade creation effect. Instead, we target our analysis on the portion of the trade effect that is not due to tariff elimination and collectively quantify the trade creation effect of NTM changes in the CPTPP, which is considered a high-quality trade agreement.

The rest of this paper is organized as follows. The next section provides a brief overview of the CPTPP. After describing our empirical framework in Section 3, we report our empirical results in Section 4. Section 5 concludes this paper.

[1] In terms of identifying the heterogeneous effects of RTAs, Baier et al. (2019) is also related to our study. After obtaining the trade creation effect of each RTA, they regress this effect on various country characteristics.

2. Contents of CPTPP

The CPTPP comprises 30 articles. These articles can be grouped into six categories according to their role in trade and investment liberalization as follows:

(i) General rules (Article 1. Initial Provisions and General Definitions; Article 27. Administrative and Institutional Provisions; Article 29. Exceptions and General Provisions; and Article 30. Final Provisions). This category lays down definitions, general rules, and how enforcement mechanisms would work.

(ii) Market access for goods (Article 2. National Treatment and Market Access for Goods; Article 3. Rules of Origin and Origin Procedures; and Article 4. Textile and Apparel Goods). The market access for goods category covers tariff-reduction schedules among member countries, rules of origin governance, and exceptions (i.e., tariff cuts and special rules of origin for textile and apparel goods). In principle, trade liberalization in manufactured goods must be undertaken immediately after the agreement goes into effect. Nonetheless, trade liberalization of agricultural products is implemented with grace periods. In addition, a rather new feature in the TPP and CPTPP not found in other signed RTAs is the removal of trade barriers on remanufactured goods (Article 2.6).

(iii) Rules related to trade facilitation and remedies (Article 5. Customs Administration; Article 6. Trade Remedies; Article 7. Sanitary and Phytosanitary Measures; Article 8. Technical Barriers to Trade; and Article 28. Dispute Settlement).This category covers rules and regulations requiring member countries that impose NTMs such as sanitary-phytosanitary measures and technical barriers to minimize their adverse effects on trade among member countries. For example, Article 6.4 allows member countries to introduce the so-called "transitional safeguard measure" under a constraint, one year at most (Article 6.4(4)), and to use it only once for all matters (Article 6.4(5)). In addition, member countries introducing transitional safeguard measures must compensate affected member countries (Article 6.7). Another example is that member countries must establish a committee on sanitary-phytosanitary measures (Article 7.5(1)), hold an annual meeting among authorities (Article 7.5(5)), and develop a regional disease-free zone (Article 7.7). This aims to enhance transparency in the use of sanitary-phytosanitary measures among member countries. The legal text regarding technical barriers to trade in Article 8 is similar to that of sanitary-phytosanitary measures.

(iv) Service liberalization. This category starts with mode 3 service supply in the Investment Article (Article 9), while other modes of service supply are covered in cross-border trade in services (Article 10). Rules and regulations related to trade liberalization in three service sectors (the financial sector, telecommunications, and e-commerce) as well as mobility of businesspersons are addressed in separate articles

(Articles 10–14) because of their complexity and sensitivity. Basically, CPTPP uses negative lists in its approach to service liberalization. In some sectors, members can identify non-conforming measures and have flexibility to adopt such measures in certain areas.

(v) Rules related to Regulatory Reform. Articles 15–20 address cumbersome regulations that might restrain market competition. These articles address government procurement, competition policy, and state-owned enterprises (Articles 15–17). Issues related to intellectual property rights, labor, and the environment are also explicitly addressed (Articles 18–20).

(vi) Cooperation and Development. There are six articles in this category relating to strengthening cooperation among member countries, as well as promoting inclusive growth. These articles include cooperation and capacity building (Article 21), competitiveness and business facilitation (Article 22), development (Article 23), small and medium-sized enterprises (Article 24), regulatory coherence (Article 25), and transparency and anti-corruption (Article 26).

Like other RTAs, the CPTPP allows its members to delay compliance with the commitments in these provisions. To do so, members can introduce side instruments with other members on a range of issues, which can be on a bilateral or plurilateral basis. For example, New Zealand has 17 side instruments for CPTPP members individually and eight instruments agreed upon by all CPTPP members.

In addition, some parts of the TPP were suspended in the CPTPP. They include intellectual property rights for pharmaceutical products (Article 18), [2] customs administration, trade liberalization on express shipment and delivery, the establishment of an investor–state dispute settlement process for certain activities (e.g., natural resources, infrastructure services, and the financial sector), and creation of a channel for firms to voice any unfair treatment that national health care authorities operate or maintain procedures for listing new pharmaceutical products or medical devices (Article 26, Annex 26-A).

What remains in force in the CPTPP is service liberalization and regulatory reforms (state-owned enterprises, e-commerce, and government procurement) in addition to market access of goods. These provisions create a more conducive business environment and have a tendency to lower policy discretion, which presents a challenge to many developing countries. For example, service liberalization in the CPTPP is undertaken through a "negative list" approach in which all but a few exceptions will be liberalized after the agreement goes into effect. In addition, any newly invented services that become available will be freely traded among the CPTPP members. This would open new opportunities for

[2] This is considered by some to be the most contentious aspect of TPP negotiations because it led to strong disagreement among various interest groups, including non-government organizations and academia, regarding its adverse effects in terms of medical expenses incurred by the public sector while putting local pharmaceutical firms in a disadvantageous position (Kohpaiboon, 2017; Kuanpoth, 2021).

foreign firms to participate in liberalizing activities. A similar argument applies to state-owned enterprises, e-commerce, and government procurement.

3. Empirical Framework

This section explains our empirical framework to examine the trade effects of the CPTPP. As in most studies on the trade creation effects of RTAs, we estimate the gravity equation for worldwide trade with an RTA dummy variable (*RTA*), which takes a value of 1 if any RTAs exist between trading countries. However, we make two modifications. One is to introduce applied tariffs (*Tariffs*) in addition to the RTA dummy. Because the effect of tariff reduction by RTAs is captured by applied tariffs, we can differentiate this effect with that of NTM changes. The other is to introduce a dummy variable specific to CPTPP membership (*CPTPP*) on top of the RTA dummy. The *CPTPP* dummy variable takes a value of 1 for observations among CPTPP member countries after 2018. Its coefficient indicates the *additional* effect of NTM changes in the CPTPP on top of their average effects among all RTAs.

In our baseline analyses, we examine trade values aggregated at country pairs and years (*Trade*). Specifically, our baseline equation is specified for trade from exporter i to importer j in year t as follows.

$$Trade_{ijt} = \exp\{\alpha_1 \ln(1 + Tariffs_{ijt}) + \alpha_2 \cdot RTA_{ijt} + \alpha_3 \cdot CPTPP_{ijt} + \mathrm{u}_{it} + \mathrm{u}_{jt} + \mathrm{u}_{ij}\} \cdot \epsilon_{ipt} \quad (1)$$

The variable of *Tariffs* is the simple average of applied tariff rates when exporting from country i to country j in year t. For example, when applied tariffs are 5%, the variable of *Tariffs* takes 0.05. Because the tariff reduction by RTAs decreases the value of this variable, the trade effect of tariff reduction in RTAs including CPTPP membership is captured by α_1. Our interest in this study lies in the dummy variables *RTA* and *CPTPP*. Their coefficients do not include the effects of tariff reduction as mentioned above but do indicate the effect of NTM changes by RTAs. By definition, the variable of *RTA* always takes a value of 1 when the variable of *CPTPP* does so.[3]

As in the standard gravity exercises, we control for three kinds of fixed effects. The exporter–year fixed effects (u_{it}) control for all time-variant export country–specific elements such as output sizes and price indices, while the importer–year fixed effects (u_{jt}) control for all time-variant import country–specific elements such as market sizes and price indices. Country-pair fixed effects (u_{ij}) capture the effects of all time-invariant country pair-specific elements, including the geographical distance, language commonality, or cultural ties

[3] All firms do not necessarily claim preferential tariffs due to the existence of rules of origin. If rules of origin in the CPTPP are stricter than those in the world average and the utilization rates of CPTPP preferential tariffs are lower, the coefficient for *CPTPP* decreases.

between trading countries. This type of fixed effect is also known to play a key role in addressing endogeneity bias in RTA variables (Baier and Bergstrand, 2007). We estimate our equation by using the Poisson pseudo-maximum likelihood (PPML) method, as suggested in Santos Silva and Tenreyro (2006).[4]

Next, we decompose the *CPTPP* dummy variable into two dummy variables. One takes a value of 1 in country pairs in which the CPTPP is the first RTA (*New*), and the other does so in country pairs in which any RTAs existed before the CPTPP went into effect (*Add*). Specifically, this status for each country pair is summarized in Table A1 in the Appendix. Our gravity equation is modified as follows.

$$Trade_{ijt} = \exp\{\alpha_1 \ln(1 + Tariffs_{ijt}) + \alpha_2 \cdot RTA_{ijt} + \alpha_4 \cdot New_{ijt} + \alpha_5 \cdot Add_{ijt} + u_{it} + u_{jt} + u_{ij}\} \cdot \epsilon_{ipt} \quad (2)$$

If existing RTAs cover some of the NTM changes caused under the CPTPP, the effects of the CPTPP will be different between the two groups. We examine this difference by estimating the coefficients for the two variables *New* and *Add*. This equation is also estimated by the PPML method.

Our data sources are as follows. Our study period is from 2000 to 2019. We obtain trade data from the BACI database in CEPII[5], which is an updated version of the dataset provided in Gaulier and Zignago (2010). The database offers data on bilateral trade flows for 222 countries at the six-digit level of the harmonized system (HS) nomenclature. We aggregate these trade data up to the total trade by country pair and year. The RTA dummy variable is drawn from Egger and Larch (2008), updated to 2019.[6] We construct our tariff variables in the following manner. First, tariff-line–level data on tariff rates are obtained from the World Integrated Trade Solutions (WITS) database.[7] Second, at the tariff-line level, we identify the lowest tariff rates among all regimes, including not only most favored nation but also RTAs and a generalized system of preferences, available for each country pair. Last, we compute the simple average of tariff rates. In addition, as pointed out in Teti (2020), there are some shortcomings in the WITS database, including missing data and misreporting. We set the missing tariff equal to the nearest preceding observation but do not address the misreporting issue. Finally, our observations include exports from 174 countries to 172 countries.

4. Empirical Analyses

[4] In the estimation, we use the Stata command "PPMLHDFE" (Correia et al., 2019; 2020).
[5] http://www.cepii.fr/CEPII/en/bdd_modele/presentation.asp?id=37
[6] The data are available at https://www.ewf.uni-bayreuth.de/en/research/RTA-data/index.html.
[7] https://wits.worldbank.org/default.aspx.

This section first reports the estimation results of equations (1) and (2), which show no additional trade effects of NTM changes under the CPTPP. Next, we discuss the possible reasons for this finding.

4.1. Estimation Results

We report the estimation results of equations (1) and (2).[8] The standard errors are clustered by country pair. In column (I) in Table 1, we introduce only tariffs, the coefficient of which is significantly negative. Specifically, a 1% decrease of applied tariffs increases trade values by 0.5%. Only the RTA dummy is included in column (II) and it has a significantly positive coefficient. Note that because this specification does not control for tariffs, the coefficient for the RTA dummy indicates the trade effect of changes in both tariffs and NTMs by RTAs. On average, RTAs increase trade among member countries by 10%. Column (III) introduces both tariffs and the RTA dummy. The coefficient for tariffs is again negative but insignificant. The RTA dummy has a significantly positive coefficient, which indicates that NTM changes by RTAs increase trade values by 9% on average. Thus, RTAs have trade-enhancing effects through not only tariff reduction (though insignificant in our estimation) but also by changing NTMs. The estimation results of equation (1) are shown in column (IV). The results for tariffs and the RTA dummy are almost the same as those in column (III). The coefficient for the *CPTPP* dummy is estimated to be insignificant and negative. Similarly, column (V) reports the estimation result of equation (2) and shows insignificant coefficients for both *New* and *Add*. These results imply that the CPTPP does not yield additional benefits from changes in NTMs. The trade-enhancing effect of NTM changes by the CPTPP is the same level as the average effect in all RTAs.

=== Table 1 ===

We conduct one robustness check on the results above. Specifically, we change the source of trade data to the International Trade and Production Database for Estimation (ITPD-E) from the U.S. International Trade Commission (Borchert et al., 2021; 2022)[9]. This dataset includes both international and domestic trade data, the latter of which enables us to capture any diversion of domestic sales to imports from countries with tariff reduction.[10] With this dataset, we again estimate the specifications in Table 1. The study observations include exports from 181 countries to 181 countries from 2000 to 2019. In this estimation, we focus on trade in manufacturing industries. The results by the PPML method are reported in Table 2.[11] There are some notable differences with the results in Table 1. The first is the

[8] The basic statistics are reported in Table A2 in the Appendix.

[9] https://www.usitc.gov/data/gravity/itpde.htm

[10] For other benefits, see Yotov (2021).

[11] The basic statistics are reported in Table A3 in the Appendix.

robust result for the significantly negative coefficients for applied tariffs. Second, RTA dummy variables have insignificant coefficients for all columns. Third, the coefficient for *CPTPP* is significantly negative. This negative effect appears mainly among the member countries that already had any RTAs.

=== Table 2 ===

Next, we estimate equation (2) for disaggregated trade because the effects of RTAs, including the CPTPP, may differ across products. Also, the simple average of applied tariffs among all industries may yield aggregation bias in the estimates. Indeed, we obtained insignificant coefficients for tariffs in some columns in Table 1. The use of less-aggregated tariffs can minimize this bias. Therefore, the analysis is undertaken at a three-digit HS level of disaggregation, consisting of 173 products. Undertaking at the four-digit HS level results in much zero-valued trade, while the two-digit HS level might be too aggregate. We compute the simple average of tariffs in each HS three-digit code and estimate equation (2) for 173 products separately.

The summary statistics of estimates performed using the PPML method are presented in Table 3. Their distributions are depicted in Figures 1 and 2. The results for each variable are as follows. Most products have negative coefficients for tariffs. The median value is −0.76. The RTA dummy has positive coefficients in most products, while the median value of its coefficient is 0.04. In both dummy variables *New* and *Add*, the median values are negative, indicating that the additional effects of NTM changes by the CPTPP are negative in more than half of products. Among the three dummy variables, *New* has the largest standard deviation, followed by *Add*. In summary, although we conduct our analysis at a disaggregated level, we still find the negative effects of NTM changes caused by the CPTPP in most products.

=== Table 3, Figures 1&2 ===

4.2. Discussion

In the previous subsection, we found an unexpected result, that is, the negative or insignificant effects of NTM changes caused by the CPTPP. In this subsection, we discuss some possible reasons for this result. First, although the analysis above covers only the first year of the CPTPP (i.e., 2019), it may take some time to realize the trade-enhancing effects of non-tariff provisions. There are two reasons for our focus on the first year of the CPTPP in the previous subsection. One is the availability of tariff data, and the other is to exclude the period of the COVID-19 pandemic. Nevertheless, it will be worth extending our study period to see whether or not the sample period affects our results. To cover as recent data as possible, we obtained trade data from the Global Trade Atlas managed by S&P Global.

The study period covers 2002 to 2021. Although we use import data for 174 countries, figures for 2021 are available for only 88 countries as of September 2022. Our observations include exports from 222 countries to 174 countries. In this estimation, we do not introduce a variable for tariffs due to the lack of available data. The exporter–year and importer–year fixed effects are expected to control for possible effects of the COVID-19 pandemic.

The estimation results by the PPML method are shown In Table 4.[12] In column (I), we introduce only the *RTA* dummy variable, which has a significantly positive coefficient. As in column (I) in Table 1, the coefficient for this dummy indicates the trade effects of both tariffs and NTMs. In column (II), we add the *CPTPP* dummy variable. As in column (IV) in Table 2, its coefficient is negative and significant. Furthermore, the magnitude of the coefficient for *CPTPP* is larger than that for *RTA* in absolute terms. Assuming that the effect of tariff reduction is at least not trade-hurting, this result implies that the NTM changes caused by the CPTPP decrease trade values among member countries. In column (III), we decompose *CPTPP* into *New* and *Add*. The coefficient only for *Add* is significant but has a negative sign. Thus, as in column (V) in Table 2, the trade-decreasing effect of the CPTPP is observed among member countries that already had any RTAs before the CPTPP. In summary, although we extend the study period and cover more years during the CPTPP period, we still find negative effects of NTM changes caused by the CPTPP.

=== Table 4 ===

Second, to maintain trade barriers, member countries may introduce new NTMs after the CPTPP goes into effect. Although the CPTPP enhances transparency in the process of their introduction, it does not mean that member countries cannot introduce them. In the academic field, many studies have investigated the relationship between tariffs and NTMs. The results of empirical analyses are mixed.[13] If CPTPP member countries introduce trade-hurting NTMs against other member countries after the CPTPP goes into effect, the coefficient for the *CPTPP* dummy variable in our framework will decrease and may even become negative. To investigate this possibility, we check the NTMs of CPTPP member countries reported in the Integrated Trade Intelligence Portal by the World Trade Organization[14]. Because the importer–year fixed effects in our equations absorb the effects of NTMs against the world, we focus on NTMs against specific countries that include at least one CPTPP member country.

Table 5 lists the number of NTMs introduced by CPTPP member countries between 2018 and 2021. As shown in the table, some countries introduced new NTMs, mostly

[12] The basic statistics are reported in Table A4 in the Appendix.

[13] Examples of empirical studies in this literature include Beverelli et al. (2019), Dean et al. (2009), Goldberg and Pavcnik (2005), Lee and Swagel (1997), Moore and Zanardi (2011), Bown and Tovar (2011), Ketterer (2016), Orefice (2017), Herghelegiu (2018), Broda et al. (2008), Ronen (2017), and Niu et al. (2020).

[14] http://i-tip.wto.org/goods/default.aspx?language=en.

sanitary-phytosanitary measures, after the CPTPP went into effect. Australia and Canada also imposed anti-dumping duties. The example of anti-dumping measures in Australia includes high-density polyethylene from China and Singapore in 2019 and aluminum micro-extrusions from China and Singapore in 2020. One way to uncover the trade effect of these NTMs is to identify the existence of NTMs in all countries and all products and then estimate the gravity model with dummy variables on the existence of NTMs at a product level. However, such an analysis is beyond the scope of this paper. Nevertheless, some NTMs in the table might decrease trade values among the member countries.

=== Table 5 ===

Last, the CPTPP may increase FDI rather than trade among member countries. In other words, among CPTPP member countries, FDI may substitute for trade. This will occur if the CPTPP contributes to reducing fixed costs for FDI more greatly than those for exporting. For example, the trade facilitation chapter directly reduces the fixed costs of exporting due to the improvement in customs-clearance procedures. The provisions on the movement of natural persons, intellectual property rights, investments, and improvements in the business environment will reduce fixed costs, especially for FDI, because these provisions encourage the movement of businesspersons, minimize investment risk, and alleviate uncertainty for investment. Indeed, Baek and Hayakawa (2022) compute the ratio of fixed costs for exporting to those for FDI from Japan to 68 countries from 2002 to 2018. They regress this ratio on the *RTA* dummy and find a significantly negative coefficient, which indicates that RTAs contribute to reducing fixed costs of FDI more greatly than those of exporting.

To see the effect of the CPTPP on FDI, we estimate the following equation.

$$FDI_{ijt} = \exp\{\beta_1 \cdot RTA_{ijt} + \beta_2 \cdot CPTPP_{ijt} + \mathrm{u}_{it} + \mathrm{u}_{jt} + \mathrm{u}_{ij}\} \cdot \epsilon_{ipt} \qquad (3)$$

The dependent variable is FDI from countries i to j in year t. Specifically, we use FDI positions from 2005 to 2020, the data of which are obtained from OECD.Stat.[15] Our FDI data cover all industries including services. The outward and inward FDI positions against 240 partner countries are reported by 37 OECD countries. Among the CPTPP member states, only Singapore and Vietnam are not OECD countries. We estimate equation (3) for outward and inward FDI separately. *CPTPP* is also decomposed into *New* and *Add*, as in the trade analysis above.

The estimation results by the PPML method are shown in Table 6.[16] The standard errors are clustered by country pairs. In columns (I) and (II), we use the data on inward FDI, while outward FDI is examined in columns (III) and (IV). The coefficient for the *RTA* dummy

[15] https://stats.oecd.org/Index.aspx?DataSetCode=FDI_POSITION_PARTNER.

[16] The basic statistics are reported in Table A5 in the Appendix.

is insignificant in all columns, indicating that on average, RTAs do not have significant effects on FDI. The three dummy variables for the CPTPP have insignificant coefficients in the inward FDI but significantly positive coefficients in the outward FDI. Due to the qualitative difference in our data between FDI positions and trade values, we cannot closely examine the substitution relation between FDI and trade. Nevertheless, we find at least some evidence on the positive effect of the CPTPP on FDI among member countries. These results do not change even if we exclude observations in 2020, as shown Table A6 in the Appendix.

=== Table 6 ===

5. Concluding Remarks

This study empirically examined the trade effect of the CPTPP, which is considered to be a high-quality RTA. Our gravity analyses showed that the trade effects of NTM changes under the CPTPP are insignificant on average and negative in most products. We pointed out two possible sources of this negative effect. One is the introduction of new NTMs by CPTPP member countries after the agreement went into effect. In future analyses, we will introduce indicators of NTMs explicitly to the empirical framework and examine how those NTMs contribute to decreasing trade among member countries. The other key finding is that FDI was substituted for trade. That is, NTM changes in the CPTPP increased FDI rather than trade among member countries. To more closely investigate the effects on FDI versus trade, additional work is needed to develop an empirical framework integrating these two modes.

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Table 1. PPML Estimation Results for Total Trade Values

	(I)	(II)	(III)	(IV)	(V)
ln (1+ Tariffs)	-0.500**		-0.278	-0.28	-0.28
	[0.247]		[0.246]	[0.246]	[0.246]
RTA		0.095***	0.090***	0.091***	0.090***
		[0.024]	[0.025]	[0.025]	[0.025]
CPTPP				-0.063	
				[0.056]	
New					0.004
					[0.062]
Add					-0.079
					[0.063]
Number of obs.	531,764	531,764	531,764	531,764	531,764
Pseudo R-squared	0.993	0.993	0.993	0.993	0.993

Source: Authors' estimation.

Notes: The dependent variable is trade values defined by country pair and year. Estimation results were obtained using the PPML method. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively. Standard errors clustered by country pairs are shown in brackets. In all specifications, we control for exporter–year, importer–year, and country-pair fixed effects.

Table 2. PPML Estimation Results for Manufacturing Trade Values

	(I)	(II)	(III)	(IV)	(V)
ln (1+ Tariffs)	-2.000***		-2.042***	-2.046***	-2.045***
	[0.357]		[0.356]	[0.357]	[0.357]
RTA		0.007	-0.021	-0.021	-0.022
		[0.037]	[0.036]	[0.036]	[0.036]
CPTPP				-0.180***	
				[0.064]	
New					0.011
					[0.058]
Add					-0.228***
					[0.072]
Number of obs.	424,235	424,235	424,235	424,235	424,235
Pseudo R-squared	0.995	0.995	0.995	0.995	0.995

Source: Authors' estimation.

Notes: The dependent variable is manufacturing trade values defined by country pair and year. Estimation results were obtained using the PPML method. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively. Standard errors clustered by country pairs are shown in brackets. In all specifications, we control for exporter–year, importer–year, and country-pair fixed effects.

Table 3. Statistics on the PPML Estimates by Three-digit HS Code

	N	Mean	S.D.	p25	p50	p75	Min	Max
ln (1+Tariffs)	173	-0.88	2.39	-1.54	-0.76	-0.04	-13.34	11.32
RTA	173	0.03	0.15	-0.04	0.04	0.11	-0.71	0.68
New	173	-0.07	0.59	-0.33	-0.03	0.22	-3.87	1.80
Add	173	-0.01	0.30	-0.17	-0.03	0.18	-1.33	0.89

Source: Authors' estimation.

Note: This table reports the basic statistics of estimates when estimating equation (2) for three-digit HS codes separately.

Table 4. PPML Estimation Results for Total Trade Values

	(I)	(II)	(III)
RTA	0.062**	0.063**	0.055*
	[0.030]	[0.029]	[0.030]
CPTPP		-0.087*	
		[0.047]	
New			0.026
			[0.057]
Add			-0.113**
			[0.051]
Number of obs.	271,364	271,364	271,364
Pseudo R-squared	0.996	0.996	0.996

Source: Authors' estimation.

Notes: The dependent variable is trade values defined by country pair and year. Estimation results were obtained using the PPML method. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively. Standard errors clustered by country pairs are shown in brackets. In all specifications, we control for exporter–year, importer–year, and country-pair fixed effects.

Table 5. Number of Non-tariff Measures against Other CPTPP Member Countries

	Year	AD	CV	SPS	Total
Australia	2018	0	0	3	3
	2019	1	0	2	3
	2020	4	3	1	8
	2021	0	0	3	3
Canada	2018	4	2	0	6
	2019	4	2	0	6
	2020	4	1	0	5
Japan	2020	0	0	1	1
Mexico	2018	0	0	2	2
	2019	0	0	2	2
	2021	0	0	1	1
New Zealand	2018	0	0	7	7
	2019	0	0	6	6
	2020	0	0	2	2
	2021	0	0	4	4

Source: Integrated Trade Intelligence Portal (I-TIP)

Notes: AD, CV, and SPS represent anti-dumping measures, countervailing duties, and sanitary-phytosanitary measures, respectively.

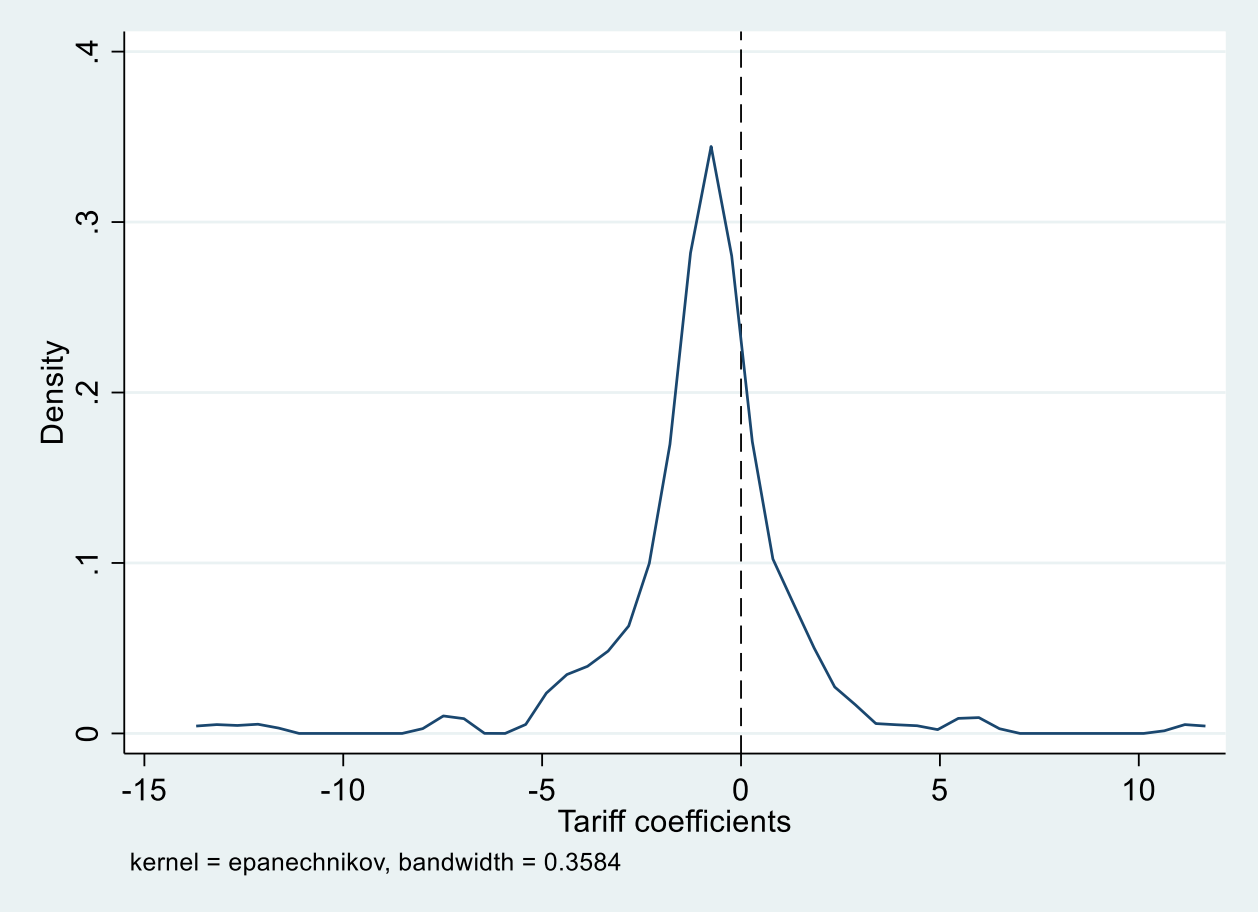
Table 6. PPML Estimation Results for FDI Positions

	(I)	(II)	(III)	(IV)
RTA	0.086	0.086	0.028	0.029
	[0.065]	[0.066]	[0.054]	[0.055]
CPTPP	0.153		0.258***	
	[0.120]		[0.071]	
New		0.154		0.225**
		[0.168]		[0.101]
Add		0.152		0.272***
		[0.136]		[0.078]
Flow	Inward	Inward	Outward	Outward
Number of obs.	44,379	44,379	50,398	50,398
Pseudo R-squared	0.984	0.984	0.986	0.986

Source: Authors' estimation.

Notes: The dependent variable is FDI positions defined by country pair and year. Estimation results were obtained using the PPML method. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively. Standard errors clustered by country pairs are shown in brackets. In all specifications, we control for exporter–year, importer–year, and country-pair fixed effects.

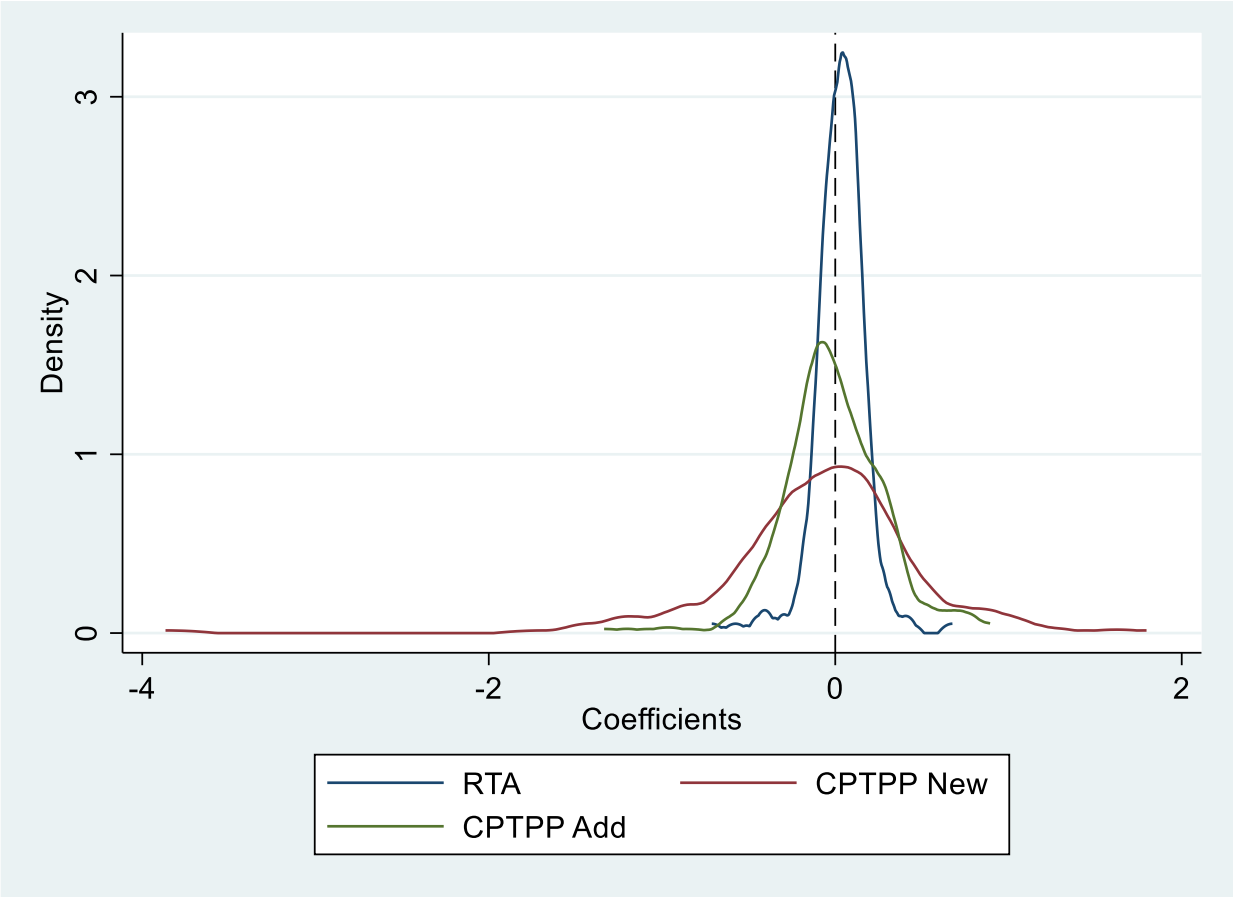
Figure 1. Distribution of Tariff Coefficients by Three-digit HS Code



Source: Authors' estimation.

Note: This figure shows the kernel distribution of estimates in tariffs when estimating equation (2) for three-digit HS codes separately.

Figure 2. Distribution of Dummy Coefficients by Three-digit HS Code



Source: Authors' estimation.

Note: This figure shows the kernel distribution of estimates in three RTA variables when estimating equation (2) for three-digit HS codes separately.

Appendix. Other Tables

Table A1. RTA Membership among CPTPP Member Countries

	AUS	CAN	JPN	MEX	NZL	SGP	VNM
AUS		New	Add	New	Add	Add	Add
CAN	New		New	Add	New	New	New
JPN	Add	New		Add	New	Add	Add
MEX	New	Add	Add		New	New	New
NZL	Add	New	New	New		Add	Add
SGP	Add	New	Add	New	Add		Add
VNM	Add	New	Add	New	Add	Add	

Source: Authors' compilation.

Table A2. Basic Statistics for Table 1

	Obs	Mean	Std. Dev.	Min	Max
Value	531,764	460,854	4,967,387	0	5.01E+08
ln (1+ Tariffs)	531,764	0.082	0.062	0	0.533
RTA	531,764	0.201	0.400	0	1
CPTPP	531,764	0.000	0.009	0	1
New	531,764	0.000	0.006	0	1
Add	531,764	0.000	0.006	0	1

Source: Authors' compilation.

Table A3. Basic Statistics for Table 2

	Obs	Mean	Std. Dev.	Min	Max
Value	424,235	1,209	52,366	0	1.32E+07
ln (1+ Tariffs)	424,235	0.080	0.070	0	1.615
RTA	424,235	0.233	0.423	0	1
CPTPP	424,235	0.000	0.009	0	1
New	424,235	0.000	0.006	0	1
Add	424,235	0.000	0.007	0	1

Source: Authors' compilation.

Table A4. Basic Statistics for Table 4

	Obs	Mean	Std. Dev.	Min	Max
Value	271,364	7.2.E+08	1.0.E+10	0	2.16E+12
RTA	271,364	0.248	0.432	0	1
CPTPP	271,364	0.000	0.022	0	1
New	271,364	0.000	0.015	0	1
Add	271,364	0.000	0.016	0	1

Source: Authors' compilation.

Table A5. Basic Statistics for Table A6

	Obs	Mean	Std. Dev.	Min	Max
Inward	44,379	4,687	25,462	0	647,718
Outward	50,398	5,274	29,880	0	929,746

Source: Authors' compilation.

Table A6. PPML Estimation Results for FDI Positions: Excluding 2020

	(I)	(II)	(III)	(IV)
RTA	0.065	0.062	0.018	0.019
	[0.061]	[0.062]	[0.054]	[0.055]
CPTPP	0.107		0.223***	
	[0.104]		[0.079]	
New		0.171		0.218**
		[0.156]		[0.107]
Add		0.07		0.225**
		[0.108]		[0.088]
Flow	Inward	Inward	Outward	Outward
Number of obs.	41,079	41,079	46,527	46,527
Pseudo R-squared	0.985	0.985	0.987	0.987

Source: Authors' estimation.

Notes: The dependent variable is FDI positions defined by country pair and year. Estimation results were obtained using the PPML method. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively. Standard errors clustered by country pairs are shown in brackets. In all specifications, we control for exporter–year, importer–year, and country-pair fixed effects.