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Do Deep Regional Trade Agreements Facilitate Regional Production Networks in Latin American and Caribbean Countries?

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Abstract: This study analyzes the causal effects of the depth of regional trade agreements (RTAs) measured by the coverage and legal enforceability of WTO-plus and WTO-extra policy areas on the production networks trade in all 33 Latin American and Caribbean (LAC) countries from 1990 to 2016, using a structural gravity model. The study constructs a unique dataset on the indexes of the depth, breadth, and core depth of all RTAs in force that include at least two LAC countries, based on a World Bank database on RTAs' contents. Results indicate that both depth and breadth of RTAs have positive effects on the intra-regional parts and components exports in the LAC region. However, the effects are substantially heterogeneous by the type of agreements and the characteristics of country-pairs. The depth of custom unions among Latin American countries, mainly the Southern Common Market (MERCOSUR), has positive effects, whereas the depth and breadth of plurilateral free trade agreements with developed countries outside the region (e.g., the United States or European countries) have negative effects. These findings are robust to the use of the mirror import data, the use of three-year interval data, and the inclusion of future values that controls for reverse causality.

Keywords: depth and breadth of regional trade agreements; parts and components exports; heterogeneous effects; Latin American and Caribbean countries; structural gravity model

JEL classification codes: F13, F14, F15, O54

1 Introduction

A prominent feature of recent regional trade agreements (RTAs) has been the "deepened" and "widened" nature of the integration, including a wide segment of non-tariff policy areas, such as foreign direct investment (FDI), trade in services, intellectual property rights (IPR) protection, and technical norms and standards, beyond the elimination of tariffs and other obstacles to trade in goods (ECLAC 2014; Jinji, Zhang, and Haruna 2022a; Orefice and Rocha 2014).

RTAs, particularly deep and wide ones, are expected to be pivotal in the formation of international production networks because they tend to address several critical dimensions for the sound functioning of supply chains (Estevadeordal et al. 2013). For example, Antràs and Staiger (2012) theoretically show that trade involving the exchange of customized intermediate inputs requires deep integration, which is beyond integration based on the traditional General Agreement on Tariffs and Trade (GATT) / World Trade Organization (WTO) rules. The depth of integration is typically measured by the coverage of WTO-plus (WTO+) and WTO-extra (WTO-X) areas (Horn, Mavroidis, and Sapir 2010; Hofmann, Osnago, and Ruta 2019).

The Latin American and Caribbean (LAC) region has a long tradition of *de jure* (government-led) regional integration through RTAs since the era of state-led industrialization in the 1960s (Kuwayama 2019). For example, the Latin American Free Trade Association (LAFTA)[1] and Central American Common Market (CACM) entered into force in 1961. The Andean Pact entered into force in 1969, and the Caribbean Community and Common Market (CARICOM) entered into force in 1973. Later, the Andean Pact and CACM became moribund during the late 1970s and 1980s owing to political and economic turmoil as well as armed conflicts between the member countries. Following the unilateral liberalization in the 1980s, LAC countries have, since the 1990s, actively engaged in pursuing reciprocal trade liberalization. Following the revitalization of the Andean Pact and CACM,[2] and establishing the Southern

[1] LAFTA reorganized into the Latin American Integration Association (LAIA), which entered into force in 1981.

[2] In an attempt to revitalize the integration process of the Andean Pacto, the Quito Protocol was signed on May 12, 1987 and entered into force on May 25, 1988 (O'Keefe 1996).

Common Market (MERCOSUR) in 1991, LAC countries have executed various bilateral or plurilateral free trade agreements (FTAs). Until 2015, 22 RTAs that include at least two LAC countries and provide at least one WTO-plus (WTO+) or WTO-extra (WTO-X) area entered into force, excluding partial scope agreements (PSAs) that cover only certain goods (see Table A1 in the Appendix for a full list of the 22 RTAs).[3]

Nevertheless, it has been repeatedly pointed out that the LAC's intra-regional trade has been lackluster relative to that of other regions. In particular, the LAC region has been characterized as having a low degree of regional production integration and limited progress in constructing regional value chains (ECLAC 2014; Kuwayama 2019). The share of parts and components in intra-regional trade has been approximately 10% since 2000 (Kuwayama 2019, 11; ECLAC 2014, 42).

Subsequently, the member countries established an intra-regional free trade area with common external tariff. The Trujillo protocol was signed on March 10, 1996, which formally launched the Andean community (CAN), and entered into force on August 1, 1997 (O'Keefe 2009). As for CACM, the Tegucigalpa Protocol was signed on December 13, 1991, which formally launched the Central American Integration System (SICA), and entered into force on July 23, 1992 (O'Keefe 2009). Note that Baier, Bergstrand, and Vidal (2007) and Sánchez-Albornoz and Timini (2021) consider that CACM was revived on July 30, 1990, when the meeting for reviving CACM started. However, it is more plausible and consistent to consider the entry into force as the revitalization.

[3] The data are from the Regional Trade Agreements Database (https://rtais.wto.org/UI/PublicMaintainRTAHome.aspx, accessed on August 8, 2022). We exclude two RTAs (EU-CARIFORUM States and EU-Central America) are not included for which "Deep Trade Agreements Database 1.0" does not provide the information on the depth indexes.

Notably, intra-regional trade among LAC countries comprises differentiated manufacturing products with higher value added and technological intensity. Thus, intra-regional trade can be a platform for exporting such products to extra-regional markets (Kuwayama 2019). Therefore, the promotion of regional production linkages through regional integration is expected to provide member countries with more opportunities for diversifying their exports toward higher value-added goods and tasks, thereby bring about structural changes in LAC countries (ECLAC 2014; Moreira 2018). Accordingly, from a policy perspective, an empirical analysis revealing the determinants of regional production network formation is urgently required.

Several studies analyze the effects of major RTAs in the LAC region on trade between member countries (i.e., well-known trade creation effects). For example, Martin-Mayoral, Carofilis, and Guijarro (2016) find trade creation effects for CACM, MERCOSUR, and CAN (in this order of magnitude) in bilateral exports from 19 Western hemisphere countries to their main trading partners in the world (40 countries) from 1970 to 2014. Additionally, they find that export diversification contributes the most to trade creation in MERCOSUR, followed by CACM and CAN, while intra-industry trade contributes to trade creation in CAN. Similarly, Stender (2018) finds trade creation effects for MERCOSUR among the MERCOSUR's four original member countries and their 26 major import partners from 1989 to 2012. However, these studies, which use binary dummy variables taking a value of 1 if both exporter and importer countries have an RTA in force, to measure the effects of RTAs, fail to consider potential heterogeneity in the contents of those major RTAs. Furthermore, they do not analyze the effects on production networks trade, typically measured by parts and components trade.

Other studies analyze the effects of intermediate goods imports on intra-regional exports among selected LAC countries. For example, Florensa et al. (2015) find that imports of intermediate goods from MERCOSUR and LAIA member countries are positively correlated to intra-bloc exports of intermediate and final goods in the 11 LAIA countries from 1991 to 2008. Similarly, Chang (2017) finds that imports of machinery parts and components from other countries in the region are positively correlated with intra-regional machinery exports in 17 Latin American countries from 1996 to 2011. Although those studies focus on production networks trade in the LAC region, the effects of the depth of those RTAs on the intra-regional intermediate goods exports are not the focal point of their main analysis.[4] Additionally, Gómez-Mera and Varela (2021) find that the depth of RTAs has positive effects on the country's FDI inflows in the 29 LAC countries from 2001 to 2015. Although Gómez-Mera and Varela (2021) focus on the depth of RTAs measured by the number of provisions of WTO+ and WTO-X policy areas, the effects on production network trade are beyond the scope of their analysis.

It is worth noting that the following three studies are particularly related to our study as they systematically analyze the effects of all RTAs involving at least one of selected LACs. First, Florensa, Márquez-Ramos, and Recalde (2015) analyze the effects of the depth of all economic integration agreements (including nonreciprocal preferential trade agreements such as the generalized system of preferences) involving at least one of 11 LAIA countries on bilateral exports from the 11 LAIA countries to

[4] Although Chang (2017) includes the depth of RTAs between member countries, measured by the number of legally enforceable provisions, to control for non-tariff barriers, he does not find any significant effect on the intra-regional exports.

their trading partners in the world (161 countries) from 1962 to 2009. They find that the custom unions (CUs) in the 11 countries (i.e., CAN and MERCOSUR) have the largest positive effects, particularly on the exports of manufacturing goods. Similarly, Sanguinet, Alvim, and Atienza (2022) analyze the effects of the depth of all RTAs involving at least one of 20 LAC countries on trade in value added among the 20 countries and their 141 trading partners from 1995 to 2015. They find that RTAs with European countries induce the LAC countries to increase value-added imports from those countries, while deeper agreements do not have significant effects on intra-regional value-added trade among the LAC countries. However, given that both studies define the depth of RTAs based on a simple categorization by the type of RTAs (e.g., CUs, FTAs, and PSAs), rather than the coverage and legal enforceability of WTO+ and WTO-X policy areas. Sánchez-Albornoz and Timini (2021) analyze the effects of all RTAs involving at least one of 21 LAC countries on bilateral exports among the 21 countries and their 32 major trading partners from 1984 to 2015. Considering heterogeneous effects of those RTAs by the characteristics of country-pairs, they find that RTAs among the LAC countries, particularly MERCOSUR and CAN, have positive and economically significant effects. However, the heterogeneity in the depth of those RTAs and the effects on the production networks trade are beyond the scope of their analysis. Furthermore, given that these three studies include many non-LAC import partner countries while excluding more than 10 LAC countries, they do not analyze the determinants of intra-regional trade among the full set of LAC countries.

Finally, several recent studies analyze the effects of the depth of RTAs measured by the coverage and legal enforceability of WTO+ and WTO-X policy areas on bilateral exports (Falvey and Foster-McGregor 2022; Kohl, Brakman, and Garretsen 2016; Mattoo, Mulabdic, and Ruta 2022), international technology spillovers (Jinji, Zhang,

and Haruna 2019; 2022a), and trade in value added (Boffa, Jansen, and Solleder 2019; Laget et al. 2020). However, those studies do not systematically focus on the LAC region.

Therefore, this study aims to analyze the causal effects of the depth of RTAs measured by the coverage and legal enforceability of WTO+ and WTO-X policy areas on production networks trade in all 33 LAC countries from 1990 to 2016. For this purpose, it employs the recently developed Deep Trade Agreements Database 1.0 by the World Bank,[5] which provides information on the coverage and legal enforceability of WTO+ and WTO-X policy areas for all RTAs notified to the WTO and in force as of December 2015 (Hofmann, Osnago, and Ruta 2019). With this database, this study constructs a unique dataset on the indexes on the depth of all RTAs in force that include at least two LAC countries. Furthermore, this study measures production network trade by trade in parts and components rather than trade in value added, because the data are available for all the 33 LAC countries.[6] Consequently, this study is first, to the best of our knowledge, to systematically focus on the heterogeneous effects of RTAs on production networks trade in all the 33 LAC countries, including the period before and after most of RTAs in LAC countries entered into force. This study focuses on the heterogeneous effects by the coverage and legal enforceability of WTO+ and WTO-X policy areas, type of agreements, and characteristics of country-pairs, which is a novel contribution of this study to the literature. Furthermore, this study systematically applies

[5] https://datacatalog.worldbank.org/search/dataset/0039575, accessed on June 27, 2022.

[6] In general, the data on trade in parts and components are available for more countries than the data on trade in value added (Laget et al. 2020). The data on trade in value added are not available for all the 33 LAC countries from UNCTAD-Eora GVC Database.

recent methodological improvements in gravity equations to the estimation of the heterogeneous effects of RTAs, thereby showing the robustness of our estimation results.[7]

The remainder of this study is organized as follows. Section 2 explains the data used in the analysis and presents the descriptive statistics. Section 3 presents the empirical specifications of the study. Section 4 presents the estimation results. Section 5 performs several robustness checks, and the final section concludes the study and presents some policy implications.

2 Data and descriptive statistics

2-1. Data on production network trade

Following empirical studies that capture production networks trade using parts and components trade (e.g., Hayakawa and Yamashita 2011; Martinez-Zarzoso, Voicu, and Vidovic 2015; Orefice and Rocha 2014), this study defines parts and components as codes 22 (processed industrial suppliers not elsewhere specified), 42 (parts and accessories of capital goods [except transport equipment]), and 53 (parts and accessories of transport equipment) of the Broad Economic Categories (BEC).[8] It

[7] Kohl (2014) points out that studies that pursue a "specialist approach," which focus on specific geographical area and heterogeneous effects of individual RTAs, like this study, do not tend to systematically apply the methodological improvements in the estimation of the effects of RTAs at an aggregate level.

[8] Note that Hayakawa and Yamashita (2011) and Martinez-Zarzoso, Voicu, and Vidovic (2015) define parts and components as codes 22, 42, and 53 of the BEC, which also corresponds to codes 7 (machinery and transport equipment) and 8 (miscellaneous manufactured articles) of

sources the data from the World Integrated Trade Solution (WITS) database.[9] Given that this study conducts a causal analysis on the effects of RTAs by analyzing the periods before and after major RTAs entered into force, the focus is on the period from 1989 to 2015. Moreover, as we employ one-year lagged variables for the depth of RTAs to address potential endogeneity issues and allow time for parts and components trade to adjust changes in the depth of RTAs, we make use of the data on parts and components trade from 1990 to 2016.

Although the database provides the data for all the 33 LAC countries, there are missing values in some years. Following Linders and Groot (2006), we replace observations originally reported as missing with zero, unless a country in a given year does not report any export data in the database.[10] This replacement can be justified because trade flows below minimum reporting levels (thus very small values), varying across countries, are usually unreported (Kehoe and Ruhl 2013). Alternatively, we can use mirror import flows (i.e., imports from partner countries) as the measure of exports

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the Standard International Trade Classification (SITC) Revision 3. However, trade flows classified by SITC are missing in LAC countries especially before 1994 in the WITS database.

[9] https://wits.worldbank.org/, accessed on July 23, 2022.

[10] Consequently, the observations of following years in given countries are missing: Antigua and Barbuda: 1990-1998, 2001-2004, 2006, and 2008; Bahamas: 1990-1994 and 1996; Belize: 1990-1991; Cuba: 1990-1998 and 2007-2016; Dominica: 1990-1992, 1998, 2011, and 2013-2016; Dominican Republic: 1990-1991 and 1998-2000; Grenada: 1992 and 2009; Guyana: 1990-1996; Haiti: 1998-2016; Honduras: 2008 and 2013; Saint Kitts and Nevis: 1990-1992 and 1998; Saint Vincent and the Grenadines: 1990-1992; Suriname: 1993; and Venezuela: 2007 and 2014-2016.

from origin countries, because import data are usually recorded with more accuracy and fewer missing observations than export data (Feenstra et al. 2005; Linders and Groot 2006). However, the use of mirror data is not recommended in cases where the import country applies high tariffs and has weak monitoring capability at customs (Yotov et al. 2016).[11] Considering both cases apply to some LAC countries, we use only export data in our main analysis. However, to show that our findings are not affected by the missing observations, following, Falvey and Foster-McGregor (2022), Kohl, Brakman, and Garretsen (2016), Orefice and Rocha (2014), we use the mirror import data in the robustness check performed in Section 5-1.

After the replacement, 8,842 observations in code 22, 15,434 observations in code 42, and 16,890 observations in code 53 have zero values, including the original zero values. Consequently, 8585 (30.1%) and 3136 (11.0%) observations of this study's dependent variable (the sum of export values in codes 22, 42, and 53) take on zero values and remain missing.

Table A3 in the Appendix shows the descriptive statistics of the parts and components exports from 1990 to 2016 by country. From the table, we find that countries with larger economies, such as Brazil, Argentina, Mexico, and Chile, have larger intra-regional parts and components exports in the LAC region.

2-2. Data on the depth of RTAs

This study sources the data on the depth of RTAs from the "Deep Trade Agreements

[11] Imports are reported at insurance and freight (CIF) prices, while exports are reported at free on board (FOB) prices, in the WITS database. Thus, if import countries apply higher tariffs, the difference between imports and exports is larger.

Database 1.0" by the World Bank. Recent studies including Boffa, Jansen, and Solleder (2019), Falvey and Foster-McGregor (2022), Jinji, Zhang, and Haruna (2019; 2022a), Laget et al. (2020), and Mattoo, Mulabdic, and Ruta (2022) use the data from this database for the measures of the depth of RTAs. The database was originally provided by Horn, Mavroidis, and Sapir (2010) and was extended by Hofmann, Osnago, and Ruta (2017; 2019). Thus, the database follows Horn, Mavroidis, and Sapir (2010), who propose a systematic method for measuring the depth and nature of RTAs. They identify 52 policy areas covered by RTAs and classify them into WTO+ and WTO-X categories. The WTO+ category, containing 14 policy areas, corresponds to provisions that fall under the current mandate of the WTO but go beyond the commitments accepted at the multilateral level. The WTO-X category, containing 38 policy areas, comprises RTA provisions that address issues beyond the current WTO mandate (Horn, Mavroidis, and Sapir 2010).

Furthermore, Horn, Mavroidis, and Sapir (2010) propose a method to evaluate the coverage and legal enforceability of the 52 policy areas by using legally enforceable (LE) index. The LE index evaluates the legal enforceability of a policy area on a three-point scale: 0 for not being mentioned in the agreement or not legally enforceable, 1 for legally enforceable but explicitly excluded by a dispute settlement provision, and 2 for legally enforceable (Hofmann, Osnago, and Ruta 2017, 10 Figure 1; Jinji, Zhang, and Haruna 2022a). Therefore, the database provides detailed information on the LE indexes of the 52 policy areas in each of the 279 RTAs from 1958 to 2015 (Hofmann, Osnago, and Ruta 2017; 2019).

Moreover, Limão (2016) re-categorizes WTO+ and WTO-X policy areas in terms of the depth and breadth of RTAs. He considers that the depth of RTAs evaluates the level of bilateral economic policy cooperation, while the breadth evaluates the width

of its coverage. Among the 52 policy areas, he identifies 29 policy areas as related to the depth, and 23 policy areas as related to the breadth. Regarding the depth, lower applied tariffs are typically considered a deeper level of economic policy cooperation. Various non-tariff measures including contingent protection (e.g., anti-dumping, countervailing measures, and export taxes), which affect market access, are also considered to characterize the depth of economic policy cooperation. Similarly, given that behind-the-border policies that invalidate national treatment (e.g., state aid, procurement, and competition policies) affect market access, they are considered to characterize the depth. Finally, other policies that may also affect market access (e.g., regional, industrial, and agricultural cooperation and financial assistance) are considered to be related to its depth (Limão 2016, 288). On the breadth of economic policy cooperation, Limão (2016) divides the policy areas into the following four fields based on their impact: the type of trade (trade in services), technology (IPR and innovation/diffusion), production factors (investment/capital and labor), and non-economic policies (environmental laws, health, human rights, political dialogue, illicit drugs, money laundering, and terrorism) (Limão 2016, 290-292). Table A2 shows the list of the policy areas of the depth and breadth in RTAs.[12]

Consequently, in line with Jinji, Zhang, and Haruna (2022b), this study constructs the following indexes of the depth and breadth of RTAs to which exporter country *i* and importer country *j* belong in year *t*:

$$RTA\_depth_{ijt} = \frac{\sum_{p=1}^{29} Max\_LE_{ijt}^{p}}{2*29}, \quad (1)$$

[12] Table A2 divides the field of production factors into investment/capital and labor.

$$RTA\_breadth_{ijt} = \frac{\sum_{p=1}^{23} Max\_LE_{ijt}^{p}}{2*23}, \quad (2)$$

where p indexes the policy areas and $Max\_LE_{ijt}^{p} \in \{0,1,2\}$ is the maximum point of the LE index of p in all RTAs to which countries i and j belong in year t. If the exporter and importer countries do not belong to any RTAs in force that provide at least one WTO+ or WTO-X area, the variable is zero. Given that the maximum point of the LE index for each policy area is 2, the denominator is the number of policy areas (29 for the depth and 23 for the breadth) multiplied by 2. Thus, the depth and breadth indexes take values between 0 and 1.[13]

In the above Equations (1) and (2), the individual policy areas are equally weighted. However, we can construct the indexes based on the policy areas that have clear economic contents, meanwhile excluding policy areas that do not (Laget et al. 2020). Thus, according to Falvey and Foster-McGregor (2022), Hofmann, Osnago, and Ruta (2017), Laget et al. (2020), and Mattoo, Mulabdic, and Ruta (2022), we construct the following alternative index on the depth of RTAs based on the policy areas that the literature identifies as more economically relevant (core provisions):

$$RTA\_core\_depth_{ijt} = \frac{\sum_{p=1}^{18} Max\_LE_{ijt}^{p}}{2*18}, \quad (3)$$

[13] Although Kohl, Brakman, and Garretsen (2016) and Mattoo, Mulabdic, and Ruta (2022) construct the depth indexes in a similar way, they do not separate depth from breadth.

The core provisions include all 14 WTO+ provisions and four WTO-X provisions (competition policy, investment, movement of capital and intellectual property rights), as shown in Table A2 in the Appendix.[14]

Considering that previous studies find the heterogeneous effects of RTAs including LAC countries by the type of agreements (i.e., FTAs versus CUs: Florensa, Márquez-Ramos, and Recalde 2015; Sanguinet, Alvim, and Atienza 2022), number of countries (i.e., bilateral versus plurilateral: Sánchez-Albornoz and Timini 2021), and characteristics of country-pairs (i.e., among LAC countries versus between LAC countries and non-LAC countries: Sánchez-Albornoz and Timini 2021), this study also constructs the three indexes based on the following disaggregated RTA categories, as presented in Table A1 in the Appendix. First, we disaggregate RTAs into CUs and FTAs. Next, we disaggregate the plurilateral CUs into those among Latin American countries (*CU_Latin America*) and those among Caribbean countries (*CU_Caribbean*). As for FTAs, we disaggregate them in two ways. First, we disaggregate FTAs into bilateral FTAs (*Bilateral_FTA*) and plurilateral FTAs. Furthermore, we disaggregate the plurilateral FTAs into those among three or more LAC countries (*Plurilateral_FTA_LAC*) and those between two or more LAC countries and at least one non-LAC countries (*Plurilateral_FTA_with outside*). For each of those disaggregated

[14] Similarly, Kohl, Brakman, and Garretsen (2016) identify 17 policy areas (13 WTO+ provisions and four WTO-X provisions). However, the 17 areas are slightly different from the 18 areas. As for WTO+ provisions, they exclude FTA industrial goods. As for WTO-X provisions, they exclude intellectual property right and investment, while including environmental laws and labor market regulations, both of which are not included in our core provisions.

RTA categories, this study constructs the indexes of the depth, breadth, and core depth as per Equations (1) to (3).

Tables A4 to A6 in the Appendix show the descriptive statistics of the indexes of the depth, breadth, and core depth of RTAs from 1989 to 2015 by country in the case where the country has RTAs in force that provide at least one WTO+ or WTO-X area. Additionally, Table A1 shows the three indexes by individual RTAs. In those tables, following Laget et al. (2020), we consider that CACM has same indexes before the revitalization (henceforth, the assumption on the revitalization (1), see footnote 2 for more detail). However, given that the assumption undoubtedly over-estimates the indexes before the revitalization, we also present estimation results in Sections 4 and 5 using the depth and core depth indexes under the alternative assumption that those indexes has given values since its revitalization in 1992 (henceforth the assumption on the revitalization (2), see footnote 2 for more detail). Moreover, given that the breadth index of CACM is equal to zero, we show the additional estimation results under the assumption (2) for the depth and core depth indexes only.

We find that the index of the depth is higher than that on the breadth, given the lower coverage and enforceability of labor and non-economic policies in the breadth index (see Tables A4 and A5 in the Appendix, and also see Table 1 of Mattoo, Mulabdic, and Ruta 2022, 1606 for all 279 RTAs). We find that three MERCOSUR member countries (Argentina, Brazil, and Paraguay) have the highest indexes on the depth (0.414) and core depth (0.944) (see Tables A4 and A6), given that MERCOSUR has relatively high values in those indexes (see Table A1). Indeed, MERCOSUR reports a maximum of 2 points of the LE index in 12 of 13 areas in the first three policy areas (import tariffs, non-tariff barriers, and behind-the-border policies) in the depth index

and 17 of 18 areas in the core depth index since its enforcement in 1991.[15] Additionally, we find that Mexico has the highest mean index on the breadth (0.251) (see Table A5), given that FTAs that Mexico executed (i.e., FTAs between Chile and Mexico, Colombia and Mexico, Mexico and Central America, Mexico and Uruguay, and Peru and Mexico has relatively high values in the breadth indexes (see Table A1).

Importantly, we confirm that the depth defined by the simple categorization by the type of agreements (i.e., FTAs versus CUs) does not necessarily coincide with the depth defined by the coverage and legal enforceability of WTO+ and WTO-X policy areas in the LAC region. The CUs except for MERCOSUR (i.e., CAN and CACM) are the shallowest agreements in the LAC region in terms of the coverage and legal enforceability of WTO+ and WTO-X policy areas, whereas the above mentioned FTAs that Mexico executed are deeper agreements. Therefore, the construction of the indexes based on the combination of the type of agreements and the coverage and legal enforceability, which this study employs, are more appropriate.

Finally, Tables 1 and 2 show the descriptive statistics and correlation matrix of all variables used in this study. The three indexes are highly correlated with each other, suggesting that they should be included separately in the gravity equation explained in Section 3. As expected, the parts and components trade is positively correlated with the three indexes. Furthermore, the variable is particularly positively correlated with the indexes of CUs among Latin American countries.

[15] Using the same database, Falvey and Foster-McGregor (2022) also report the number of the core provisions of MERCOSUR to be 17 out of 18 (see Table 9 on p. 222).

3 Empirical specifications

Following Laget et al. (2020) and Mattoo, Mulabdic, and Ruta (2022), who analyze the effects of depth of RTAs on trade, this study employs a structural gravity model. In the model, time-varying exporter and importer fixed effects are included to control for the changes in the multilateral resistance terms (Anderson and van Wincoop 2003; Baldwin and Taglioni 2007)[16] and time-varying exporter and importer-specific characteristics, such as their economic size and population or per capita income. Time-invariant country-pair fixed effects are also included to control for time-invariant unobserved bilateral heterogeneity that may be correlated with trade flows and the probability of forming RTAs (Baier and Bergstrand 2007) as well as time-invariant bilateral-pair specific characteristics, such as geographical distance, the use of a common language, and sharing common land borders. Furthermore, we apply a pseudo-Poisson maximum likelihood (PPML) estimator to the structural gravity model to addresses the issues related to heteroscedasticity and allows the inclusion of zero values of the dependent variable (Santos Silva and Tenreyro 2006). This issue is particularly relevant for this study because the dependent variable—parts and components trade—includes substantial parts with zero values, as noted in Section 2-1. Thus, the ordinary least squares (OLS) estimates of the log-linearized model, excluding zero values, can be biased and inefficient.[17] Consequently, the structural gravity model with the PPML

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[16] Anderson and van Wincoop (2003) refer to cross-country price variations in price as multilateral resistance terms.

[17] However, observations for which all values of the dependent variable for a given country-pair or exporter-year are zero are excluded in the PPML estimation with time-invariant country-pair fixed effects and time-varying exporter fixed effects. For this reason, the number of

estimator is the most accepted technique for identifying the determinants of international trade flows (Chang 2017; Larch et al. 2019; Yotov et al. 2016).

Therefore, this study estimates the following structural gravity equation:

$$X_{ijt} = \exp\left(\beta_0 + \beta_1 RTA_{ijt-1} + \lambda_{it} + \varphi_{jt} + \mu_{ij}\right) + \varepsilon_{ijt}, \quad (4)$$

where X_{ijt} is the nominal value of bilateral parts and components exports from exporter country *i* to importer country *j* in year *t,* expressed in millions of current US dollars; RTA_{ijt-1} is one of the three indexes defined in Section 2-2; λ_{it} is the time-varying exporter fixed effects; φ_{jt} is the time-varying importer fixed effects; μ_{ij} is the time-invariant country-pair fixed effects; and ε_{ijt} is the error term.[18] Note that, following Boffa, Jansen, and Solleder (2019), Falvey and Foster-McGregor (2022), Kohl, Brakman, and Garretsen (2016), and Orefice and Rocha (2014), we do not include RTA dummy (taking a value of 1 if both exporter and importer countries have an RTA in force) in Equation (4). Alternatively, it is possible to include the RTA dummy in addition to one of the three indexes of the depth of the RTA in the equation, as Jinji, Zhang, and Haruna (2019; 2022a), Laget et al. (2020), and Mattoo, Mulabdic, and Ruta (2022). However, the coefficients on the depth indexes only capture the additional

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observations in the full sample (24,806) in Tables 3 and 4 and Table A7 in the Appendix is smaller than the number of observations of the dependent variable (25,376) in Table 1.

[18] In Equation (4), we do not control for other country-pair time-varying variables such as bilateral applied tariffs, because the two policy areas (import tariffs and non-tariff barriers) included in our indexes deal with the tariff liberalization and elimination of non-tariff barriers on industrial and agricultural goods. Moreover, the missing data on the applied tariffs in the WITS database leads to the exclusion of substantial part of observations. Thus, we decide to keep our sample in the estimation without including applied tariffs.

effects of the RTA depth in this specification, which is different from what this study wants to estimate.

Finally, we consider the following specification where the effects of RTAs are allowed to vary at the disaggregated RTA categories explained in Section 2-2:

$$X_{ijt} = \exp\left(\beta_0 + \sum_k \beta_1^k RTA_{ij}^k + \lambda_{it} + \varphi_{jt} + \mu_{ij}\right) + \varepsilon_{ijt}\,, \qquad (5)$$

where superscript *k* indexes each of the five categories (*CU_Latin America*, *CU_Caribbean*, *Plurilateral_FTA_LAC*, *Plurilateral_FTA_with outside*, and *Bilateral_FTA*).

4 Baseline results

Table 3 reports the estimation results of Equation (4). We confirm that the PPML-estimated coefficients are remarkably similar using the whole sample and the sample with non-zero export values. Thus, we show only the estimation results using the whole sample henceforth.

The coefficients on the indexes of the depth, breadth and core depth are expectedly positive and significant. The estimated coefficient shows that if a country has an RTA in force with full coverage and enforceability for all policy areas in the given indexes, parts and components exports from the country to the partner country will increase by 72.9%, 63.4%, and 27.2% on average.[19] The magnitudes of the effects are comparable to those estimated by Orefice and Rocha (2014), who find that the

[19] As the indexes are normalized to take values between 0 and 1, as explained in Section 2-2, the percentage effect on the parts and components exports is provided by $100(\exp(\beta_1) - 1)$.

coefficients on the total number of WTO+ and WTO-X provisions is 0.008 for 200 countries from 1980 to 2007.[20]

Table 4 reports the estimation results of Equation (5) for disaggregated RTA categories. We find that the effects of the indexes are substantially heterogeneous across the RTA categories. We find that the three indexes of CUs among Latin American countries have positive and highly significant effects on the intra-regional parts and components exports. We confirm that the positive and significant effects of CUs among Latin American countries are robust to the use of the depth and core depth indexes based on the two different assumptions on the revitalization of CACM.

Among the CUs among Latin American countries, CACM came into force before the period under the analysis under the assumption on the revitalization (1), and CAN came into force under the assumptions on the revitalization (1) and (2).[21] Thus, the positive effects are likely to capture the enforcement of MERCOSUR in 1991. To find out the effects, following Baier, Yotov, and Zylkin (2019), Table A7 in the Appendix presents the estimation results of the specification where the effects of RTAs are allowed to vary at individual RTAs. We find that MERCOSUR has large positive effects on the intra-regional parts and components exports: the estimated coefficient in the first column shows that MERCOSUR increases intra-regional parts and components

[20] As Orefice and Rocha (2014) construct the depth index based on the number of provisions, the estimated coefficient in the case that the indexes are normalized can be $0.008 * 52 = 0.416$.

[21] Even under those assumptions, we can obtain the coefficients on the depth and core depth indexes of CAN, because Venezuela withdrew from CAN in 2006.

exports by 92.4%.[22] Thus, the results support the findings of Baier, Yotov, and Zylkin (2019), Martin-Mayoral, Carofilis, and Guijarro (2016), Sánchez-Albornoz and Timini (2021), who find that the enforcement of MERCOSUR has large positive and economically significant effects on bilateral trade. However, the novel contribution of this study is to show the significant effects of the depth of MERCOSUR rather than its enforcement itself on intra-regional parts and components trade instead of total trade flows.

Additionally, we find that the three indexes of CUs among the Caribbean countries (CARICOM) have positive and weakly significant effect, which support the finding of Baier, Bergstrand, and Vidal (2007). Note that given that CARICOM had already entered into force in 1973, the effects capture the accession of Suriname and Haiti to CARICOM in 1995 and 2002, respectively.[23]

By contrast, we find that the three indexes of plurilateral FTAs with countries outside the region have negative and highly significant effects on the intra-regional parts and components exports (see Table 4). The estimation results for individual RTAs reveal that the negative effects are primarily derived from CAFTA-DR and EU-Colombia and Peru FTA (see Table A7 in the Appendix). Thus, the finding suggests that growing production networks with the United States or EU courtiers induce an increase in the parts and components imports of partner countries from those developed

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[22] Given that the index on the depth of MERCOSUR is 0.4138 (see Table A1 in the Appendix), the effect is calculated by $(\exp(1.173) - 1) \times 0.4138$. As for this calculation, see Jinji, Zhang, and Haruna (2022b, 139), note 11 to 16.

[23] https://caricom.org/country_profiles/suriname/; https://caricom.org/country_profiles/haiti/, accessed on March 31, 2023.

countries, which results in decreasing intra-regional parts and components exports. The finding is not captured by Sánchez-Albornoz and Timini (2021), who find positive and significant effects of RTAs between LAC countries and EU (including EU-Colombia and Peru FTA), because they include LAC courtiers' major trading partners in their analysis. Indeed, we find that a regression of log of imports of CAFTA-DR's member countries in the LAC region (Costa Rica, Dominican Republic, El Salvador, Guatemala, Honduras, and Nicaragua) from the United States during 1990 to 2016 on the time trend, post CAFTA-DR dummy taking a value of 1 after 2006, interaction term between the time trend and post CAFTA-DR dummy, and importer-country fixed effects yields a positive and highly significant coefficient of 1.327 for the post CAFTA-DR dummy (the standard error is 0.252).[24] This finding is consistent with Sanguinet, Alvim, and Atienza (2022), who find that RTAs with European countries induce LAC countries to increase value-added imports.

Finally, the three indexes of plurilateral and bilateral FTAs in the LAC region do not have significant effects on intra-regional parts and components exports, unexpectedly. The estimation results for individual RTAs show that there is considerable heterogeneity across those RTAs, making it difficult to identify clear patterns among them. One possibility is that FTAs between geographically distant countries might not contribute to the formation of regional production networks because of bottlenecks such as high transportation costs owing to insufficient infrastructure in the region. Thus, inspired by Baier, Yotov, and Zylkin (2019) and Kohl (2014), who analyze the determinants of the effects of individual RTA, we regress the estimated effects of individual RTAs on the average of log distance between member countries for

[24] The detailed result is available upon request.

the 14 plurilateral and bilateral FTAs in the LAC. We source the data on the distance between most populated cities (*km*) of countries *i* and *j* from GeoDist of CEPII database.[25] We estimate the equation using weighted least squares, with the inverse of the robust clustered standard error of the effects of individual FTAs as the weight. However, the coefficients on the average of log distance are not significant at all for the three indexes.[26] Interestingly, the effects of three of five FTAs that Chile executed (FTAs between Chile and Central America, Chile and Mexico, and Chile and Peru) are positive and significant. Considering that Chile is one of most distant countries from other LAC countries, we conclude that geographical distance is *not* the main factor explaining the effects of FTAs among LAC countries on intra-regional parts and components exports.

5 Robustness checks

5-1. Use of mirror import data

To show that the baseline results in Section 4 are not affected by the missing observations explained in Section 2-1, we use imports of a country *j* from a country *i* to measure the exports of the country *i* to country *j* in this section. Following Falvey and Foster-McGregor (2022), Feenstra et al. (2005), and Linders and Groot (2006), when observations in the mirror imports are recorded as missing but the corresponding exports are reported as non-zero, we replace the missing import values with the non-

[25] http://www.cepii.fr/CEPII/en/bdd_modele/bdd_modele_item.asp?id=6, accessed on February 10, 2023.

[26] The detailed result is available upon request.

zero export values. After this replacement, we replace the remaining missing observations with zero, because all countries under the analysis period report some import data in the database. Consequently, the mirror import data have no missing observations and only 6853 zero values, which are substantially smaller than the export data in Section 4.[27]

Tables 5 and 6 show the estimation results of the use of the mirror import data. Except for the insignificant effects of the aggregate breadth index in Table 5, the estimation results obtained using the mirror data are remarkably similar to the results obtained using the export data in Section 4. The three indexes of the CUs among Latin American countries have significantly positive effects, while the three indexes of the plurilateral FTAs with developed countries outside the region have significantly negative effects. The three indexes of the plurilateral and bilateral FTAs in the LAC region do not have significant effects. Therefore, we conclude that our main findings in Section 4 are robust to the use of mirror import data with full observations and are not affected by the missing observations in the export data.

5-2. Use of data at three-year intervals

Trefler (2004) argues that the adjustment of trade flows after the enforcement of RTAs is not instantaneous and thus criticizes the use of consecutive-year data. Moreover, RTAs often have a 5-to-10-year phase-in period until the full enforcement of the

[27] However, 54 observations for which all vales of the dependent variable for a given country-pair are zero are excluded in the PPML estimation of the structural gravity equation. For this reason, the number of observations (28,458) in Tables 5 and 6 is smaller than the number of the full observations (28,512) in Table 1.

provisions, with different times at different provisions (Baier and Bergstrand 2007; Falvey and Foster-McGregor 2022; Kohl 2014). Thus, we check whether the results are robust to the specification that allows more time for the dependent variable to adjust to changes in the depth of RTAs. Given that we exclude PSAs, which usually have longer phase-in period, from our analysis, we consider that the use of data with wider intervals (e.g., more than five year) is unnecessary. Consequently, following Laget et al. (2020) and Mattoo, Mulabdic, and Ruta (2022), we use the panel data at three-year intervals from 1992 to 2016.

Tables 7 and 8 show the estimation results of the use of the data with three-year intervals from 1992 to 2016. We find that the coefficients on the breadth and core depth indexes are smaller and less significant than the coefficients obtained using the consecutive data. However, for the disaggregated RTA categories, the estimation results are remarkably similar to the results obtained using the consecutive-year data in Section 4. The depth and core depth indexes of the CUs among Latin American countries have significantly positive effects, while the three indexes of the plurilateral FTAs with developed countries outside the region have significantly negative effects. The three indexes of the plurilateral and bilateral FTAs in the LAC region do not have significant effects. Therefore, we conclude that our main findings are robust to the use of data at three-year intervals.

5-3. Control for reverse causality

Our final concern is that the estimation results in Section 4 might be biased owing to reverse causality (i.e., trade causes future RTAs). In general, reverse causality arises because countries that have been already significant trade partners (i.e., natural trading partners) are more likely to sign deeper agreements, given that the inclusion of specific

provisions depends on the trade potentials (Mattoo, Mulabdic, and Ruta 2022; Piermartini and Yotov 2016). Particularly, countries participating in production networks often tend to sign deeper agreements to complement the development of value chains through *de jure* integration (Kuwayama 2019). This decision may be affected by lobbying activities by firms that are involved in production networks trade and need to secure the supply of intermediate goods from partner countries (Laget et al. 2020; Sanguinet, Alvim, and Atienza 2022).

To control for the possible reverse causality, following Laget et al. (2020), Mattoo, Mulabdic, and Ruta (2022), we add future values (leads) of the depth indexes, in addition to the lags that capture the adjustment of trade over time explained in Section 5-2. Specifically, we include two leads and three lags of the depth indexes. In the absence of reverse causality (i.e., in the assumption of strict exogeneity), the coefficients of the leads should not be statistically different from zero (Kohl 2014; Piermartini and Yotov 2016; Sánchez-Albornoz and Timini 2021; Yotov et al 2016). In this specification, we estimate Equation (4) using consecutive-year data from 1987 to 2013, because we need to include the periods before and after the enforcement of the RTA of particular interest (i.e., the enforcement of MERCOSUR in 1991).[28] In this period of analysis, the depth and core depth indexes of CAN have same indexes before the revitalization under the assumption on revitalization (1), whereas they have given values since its revitalization in 1988 under the assumption on revitalization (2) (see footnote 2 for more detail), as in the case of CAN.

Tables 9 and 10 show the estimation results. For the aggregated effects, we find that the third lag remains positive and significant, except for the breadth index.

[28] The second lead of the three indexes of MERCOSUR include the values since 1989.

Unfortunately, the first lead is also statistically significant. However, as the significant effects are limited to the first lead, they may be explained by the time gap between signature and entry into force of RTAs, as suggested by Laget et al. (2020).

For the disaggregated effects, the third lag of the depth and core depth indexes of the CUs among Latin American countries remains positive and significant although the second lead is also statistically significant. Unfortunately, the second lead of the indexes of plurilateral FTAs with countries outside the region is negative and significant, whereas the lags are statistically insignificant. However, considering that the RTA that have main negative effects (CAFTA-DR, see Table A7 in the Appendix) entered into force two years after the signature, the significant negative effects also may be explained by the time gap between the signature and entry into force.[29] Consequently, although we cannot entirely rule out the concern for the reverse causality, we show that the long-run positive effects of the CUs among Latin American countries are robust to the inclusion of the future values.

6 Concluding remarks

Although the promotion of regional production networks in the LAC region is expected to contribute to the region's export diversification and structural changes, the region has been characterized by a low degree of regional production networks. Although prior studies analyze the effects of RTAs in the LAC region, they do not analyze the effects of depth of RTAs, measured by the coverage and legal enforceability of WTO+ and

[29] CAFTA-DR was signed on August 5, 2004 and entered into force on March 1, 2006 (http://www.sice.oas.org/Trade/CAFTA/CAFTADR_e/CAFTADRin_e.asp, accessed on May 31, 2023).

WTO-X policy areas, on the production networks trade in the region. Thus, focusing on the role of the depth of RTAs in the LAC region, this study analyzed the determinants of the formation of intra-regional production networks. For this purpose, this study constructed dataset on the indexes of the depth, breadth, and core depth of RTAs, measured by the coverage and legal enforceability of WTO+ and WTO-X policy areas, for all RTAs in force that include at least two LAC countries. Using this unique dataset, this study directly analyzed the causal effects of the depth of RTAs on the intra-regional parts and components exports in all the 33 LAC countries from 1990 to 2016.

We found that both depth and breadth of RTAs had positive effects on the intra-regional parts and components exports in the LAC region. However, the effects were substantially heterogeneous by the type of agreements and characteristics of country-pairs. The depth of CUs among Latin American countries, mainly MERCOSUR, had positive effects on the intra-regional parts and components exports. By contrast, the depth and breadth of plurilateral FTAs with developed countries outside the region (the United States or European countries) had negative effects on the intra-regional parts and components exports. Additionally, the depth and breadth of plurilateral and bilateral FTAs in LAC region did not have statistically significant effects. Finally, our main findings were robust to the alternative assumption on the revitalization of the temporarily moribund CUs, the use of mirror import data with full observations, the use of panel data at three-year intervals that allows more time for the adjustment, and the inclusion of the future values that controls for the reverse causality.

A notable policy implication emerges from the findings. As shown in Table A3, the major parts and components exporters in the LAC region include Brazil, Argentina, Mexico, Chile, and Colombia. After the period under the analysis of this study, the Pacific Alliance, plurilateral FTAs comprising Chile, Colombia, Mexico, and Peru,

entered into force in 2016. However, until very recently, any RTAs between MERCOSUR and the Pacific Alliance countries had not existed, except for economic complementation agreements (ECAs).[30] Thus, the findings indicate that the absence of deep RTAs between the major parts and component exporters in the LAC region, in terms of both contents and type of agreements, is likely to pose significant impediments to promote intra-regional production networks. The full enforcement of deep integration covering all those countries may contribute to export diversification and structural changes in the LAC region.

[30] Recently, FTAs between Chile-Uruguay, Argentina-Chile, Brazil-Chile entered into force on December 13, 2018, May 2, 2019, and January, 25, 2022, respectively. (http://www.sice.oas.org/ctyindex/CHL/CHLagreements_e.asp, accessed on March 31, 2023).

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Appendix

Table A1. List of regional trade agreements (RTAs) in force that include at least two Latin American and Caribbean (LAC) countries included in Deep Trade Agreements Database 1.0 and the mean of the indexes of the depth, breadth, and core depth of RTAs since their enforcement.

Type	Agreement	Date entered into force	Depth	Breadth	Core depth
CU_Latin America	Andean Community (CAN)	10/16/1969 05/25/1988[a]	0.2069	0.0000	0.2222
	Central American Common Market (CACM)	06/04/1961 07/23/1992[b]	0.1379	0.0000	0.2222
	Southern Common Market (MERCOSUR)	11/29/1991	0.4138	0.2174	0.9444
CU_Caribbean	Caribbean Community and Common Market (CARICOM)	08/01/1973	0.3448	0.0870	0.5556
Plurilateral_FTA_LAC	Chile-Central America (Chile-Costa Rica)	02/15/2002	0.3448	0.1087	0.6667
	Chile-Central America (Chile-El Salvador)	06/01/2002	0.3448	0.1522	0.6667
	Chile-Central America (Chile-Guatemala)	03/23/2010	0.3793	0.1087	0.6667
	Chile-Central America (Chile-Honduras)	07/19/2008	0.3793	0.1087	0.6667

	Chile-Central America (Chile-Nicaragua)	10/19/2012	0.4138	0.1087	0.7222
	Colombia-Northern Triangle	11/12/2009	0.3448	0.1957	0.7778
	Dominican Republic-Central America	10/04/2001	0.3103	0.2391	0.7778
	Mexico-Central America	09/01/2012	0.2759	0.2391	0.6667
	Panama-Central America (Panama-Costa Rica)	11/23/2008	0.3966	0.2391	0.8611
	Panama-Central America (Panama-El Salvador)	04/11/2003	0.3276	0.2391	0.7500
	Panama-Central America (Panama-Guatemala)	06/20/2009	0.3276	0.2391	0.7500
	Panama-Central America (Panama-Honduras)	01/09/2009	0.3276	0.2391	0.7500
	Panama-Central America (Panama-Nicaragua)	11/21/2009	0.3621	0.2391	0.7500
Plurilateral_FTA_with outside	Dominican Republic-Central America-United States Free Trade Agreement (CAFTA-DR)	03/01/2006	0.3621	0.3478	0.8611
	El Salvador-Honduras-Chinese Taipei	03/01/2008	0.4138	0.2826	0.7778
	European Free Trade Association (EFTA)-Central America (Costa Rica and Panama)	08/19/2014	0.3621	0.2609	0.8611
	EU-Colombia and Peru	03/01/2013	0.3966	0.2609	0.7778
Bilateral_FTA	Chile-Colombia	05/08/2009	0.2414	0.1957	0.6111

Chile-Mexico	08/01/1999	0.3276	0.2826	0.8611
Colombia-Mexico	01/01/1995	0.4483	0.2391	0.8333
Costa Rica-Peru	06/01/2013	0.3621	0.2826	0.9167
Mexico-Uruguay	07/15/2004	0.3448	0.2391	0.8333
Panama-Chile	03/07/2008	0.2069	0.0870	0.4444
Panama-Peru	05/01/2012	0.3276	0.2391	0.8056
Peru-Chile	03/01/2009	0.3103	0.1957	0.6667
Peru-Mexico	02/01/2012	0.4138	0.2826	0.8333

Source: Author's calculations from the Deep Trade Agreements Database 1.0. and Regional Trade Agreements Database.

Note: CU_Latin America, custom unions (CUs) among Latin American countries; CU_Caribbean, CUs among Caribbean countries; Bilateral_FTA, bilateral free trade agreements (FTAs) among LAC countries; Plurilateral_FTA_LAC, plurilateral FTAs among three or more LAC countries; Plurilateral_FTA_with outside, plurilateral FTAs between two or more LAC countries and at least one non-LAC countries. [a]: Revitalization of the Andean Pact. [b]: Revitalization of CACM.

Table A2. List of policy areas of the depth and breadth of regional trade agreements.

Depth		Breadth	
Field	Policy Area	Field	Policy Area
(a) Import Tariffs	Free Trade Agreement (FTA) Industrial Goods (+) FTA Agricultural Goods (+)	(a) Services	General Agreement on Trade in Services (+)
(b) Non-tariff barriers	Customs Administration (+) Export Taxes (+) Sanitary and Phytosanitary (+) Technical Barriers to Trade (+) Anti-dumping (+) Countervailing Measures (+)	(b) Technology	Trade-related Aspects of Intellectual Property Rights (+) Intellectual Property Right (X)* Innovation Policies (X) Economic Policy Dialogue (X) Information Society (X) Research and Technology (X)
(c) Behind the Border Policies	State Trading Enterprises (+) State Aid (+) Public Procurement (+) Anti-corruption (X)	(c) Investment/Capital	Trade-related Investment Measures (+) Investment (X)* Movement of Capital (X)*

	Competition Policy (X)*		
(d) Other Policies	Consumer Protection (X)	(d) Labor	Labor Market Regulation (X)
	Data Protection (X)		Illegal Immigration (X)
	Agriculture (X)		Social Matters (X)
	Approximation of Legislation (X)		Visa and Asylum (X)
	Civil Protection (X)	(e) Non-economic Policies	Environmental Laws (X)
	Education and Training (X)		Audio Visual (X)
	Energy (X)		Cultural Cooperation (X)
	Financial Assistance (X)		Health (X)
	Industrial Cooperation (X)		Human Rights (X)
	Mining (X)		Illicit Drugs (X)
	Nuclear Safety (X)		Money Laundering (X)
	Public Administration (X)		Political Dialogue (X)
	Regional Cooperation (X)		Terrorism (X)
	Small and Medium Enterprises (X)		
	Statistics (X)		

	Taxation (X)		

Source: Hofmann, Osnago, and Ruta (2017: 12) Table 2, Jinji, Zhang, and Haruna (2022a: 26) Table 2.2, and Limão (2016) Table A1.

Note: (+), (X), and * indicate that WTO-plus policy areas, WTO-extra (WTO-X) policy areas, and core provisions in the WTO-X policy areas, respectively.

Table A3. Descriptive statistics of parts and components exports (million dollars) from 1990 to 2016 by country.

Country	Observations	Mean	Standard Deviation	Min	Max
Antigua and Barbuda	384	0.03	0.11	0.00	1.08
Argentina	864	149.33	478.85	0.00	4333.61
Bahamas	672	0.09	0.51	0.00	5.00
Barbados	864	1.25	2.21	0.00	19.72
Belize	800	0.10	0.61	0.00	11.90
Bolivia	864	10.45	35.14	0.00	326.94
Brazil	864	340.59	952.48	0.00	10092.00
Chile	864	102.31	292.08	0.00	2832.06
Colombia	864	66.22	159.47	0.00	2086.60
Costa Rica	864	20.54	45.66	0.00	324.23
Cuba	256	4.74	12.13	0.00	102.58
Dominica	576	0.09	0.24	0.00	2.10
Dominican Republic	704	11.21	60.76	0.00	741.94
Ecuador	864	10.81	37.04	0.00	373.39
El Salvador	864	14.33	43.99	0.00	304.50
Grenada	800	0.06	0.18	0.00	1.32
Guatemala	864	20.91	56.90	0.00	352.96
Guyana	640	0.59	1.99	0.00	36.00
Haiti	256	0.01	0.04	0.00	0.42
Honduras	800	5.13	13.84	0.00	105.93
Jamaica	864	0.87	2.10	0.00	24.78
Mexico	864	121.29	238.83	0.00	2246.26

Nicaragua	864	4.47	36.72	0.00	528.01
Panama	864	9.68	32.82	0.00	393.04
Paraguay	864	10.28	33.39	0.00	309.58
Peru	864	44.97	110.10	0.00	740.81
Saint Kitts and Nevis	736	0.01	0.04	0.00	0.74
Saint Lucia	864	0.15	0.48	0.00	3.67
Saint Vincent and the Grenadines	768	0.17	0.35	0.00	2.29
Suriname	832	0.30	2.46	0.00	37.94
Trinidad and Tobago	864	15.79	35.14	0.00	481.40
Uruguay	864	17.04	59.94	0.00	584.35
Venezuela	736	37.89	100.13	0.00	812.12
Total	25376	34.39	224.74	0.00	10092.00

Source: Author's calculations from World Integrated Trade Solution (WITS) database.

Note: Counties with fewer than 864 ($32 \text{ partners} \times 27 \text{ years} = 864$) observations have missing data on parts and components exports in the analysis period. The missing years by country are listed in footnote 10.

Table A4. Descriptive statistics of the depth index from 1989 to 2015 by country in the case where the country has RTAs in force that provide at least one WTO-plus or WTO-extra area.

Country	Observations	Mean	Standard Deviation	Min	Max
Antigua and Barbuda	305	0.345	0.000	0.345	0.345
Argentina	79	0.414	0.000	0.414	0.414
Bahamas	305	0.345	0.000	0.345	0.345
Belize	305	0.345	0.000	0.345	0.345
Bolivia	99	0.207	0.000	0.207	0.207
Brazil	79	0.414	0.000	0.414	0.414
Chile	85	0.326	0.054	0.207	0.414
Colombia	148	0.268	0.094	0.207	0.466
Costa Rica	152	0.264	0.118	0.138	0.431
Dominica	305	0.345	0.000	0.345	0.345
Dominican Republic	75	0.310	0.000	0.310	0.310
Ecuador	99	0.207	0.000	0.207	0.207
El Salvador	161	0.271	0.123	0.138	0.517
Grenada	305	0.345	0.000	0.345	0.345
Guatemala	147	0.260	0.118	0.138	0.414
Guyana	305	0.345	0.000	0.345	0.345
Haiti	168	0.345	0.000	0.345	0.345
Honduras	149	0.267	0.127	0.138	0.517
Jamaica	305	0.345	0.000	0.345	0.345
Mexico	74	0.355	0.068	0.276	0.448
Nicaragua	138	0.255	0.120	0.138	0.414

Panama	54	0.326	0.057	0.207	0.431
Paraguay	79	0.414	0.000	0.414	0.414
Peru	117	0.235	0.065	0.207	0.466
Saint Kitts and Nevis	305	0.345	0.000	0.345	0.345
Saint Lucia	305	0.345	0.000	0.345	0.345
Saint Vincent and the Grenadines	305	0.345	0.000	0.345	0.345
Suriname	245	0.345	0.000	0.345	0.345
Trinidad and Tobago	305	0.345	0.000	0.345	0.345
Uruguay	91	0.405	0.023	0.345	0.414
Venezuela	88	0.245	0.080	0.207	0.414
Total	5682	0.327	0.067	0.138	0.517

Source: Author's calculations from the Deep Trade Agreements Database 1.0.

Table A5. Descriptive statistics of the breadth index from 1989 to 2015 by country in the case where the country has RTAs in force that provide at least one WTO-plus or WTO-extra area.

Country	Observations	Mean	Standard Deviation	Min	Max
Antigua and Barbuda	305	0.087	0.000	0.087	0.087
Argentina	79	0.217	0.000	0.217	0.217
Bahamas	305	0.087	0.000	0.087	0.087
Belize	305	0.087	0.000	0.087	0.087
Bolivia	99	0.000	0.000	0.000	0.000
Brazil	79	0.217	0.000	0.217	0.217
Chile	85	0.163	0.069	0.087	0.283
Colombia	148	0.076	0.105	0.000	0.261
Costa Rica	152	0.151	0.151	0.000	0.348
Dominica	305	0.087	0.000	0.087	0.087
Dominican Republic	75	0.239	0.000	0.239	0.239
Ecuador	99	0.000	0.000	0.000	0.000
El Salvador	161	0.160	0.151	0.000	0.413
Grenada	305	0.087	0.000	0.087	0.087
Guatemala	147	0.153	0.154	0.000	0.370
Guyana	305	0.087	0.000	0.087	0.087
Haiti	168	0.087	0.000	0.087	0.087
Honduras	149	0.155	0.157	0.000	0.413
Jamaica	305	0.087	0.000	0.087	0.087
Mexico	74	0.251	0.020	0.239	0.283
Nicaragua	138	0.149	0.155	0.000	0.348

Panama	54	0.220	0.058	0.087	0.326
Paraguay	79	0.217	0.000	0.217	0.217
Peru	117	0.043	0.095	0.000	0.283
Saint Kitts and Nevis	305	0.087	0.000	0.087	0.087
Saint Lucia	305	0.087	0.000	0.087	0.087
Saint Vincent and the Grenadines	305	0.087	0.000	0.087	0.087
Suriname	245	0.087	0.000	0.087	0.087
Trinidad and Tobago	305	0.087	0.000	0.087	0.087
Uruguay	91	0.220	0.007	0.217	0.239
Venezuela	88	0.040	0.084	0.000	0.217
Total	5682	0.105	0.079	0.000	0.413

Source: Author's calculations from the Deep Trade Agreements Database 1.0.

Table A6. Descriptive statistics of the core depth index from 1989 to 2015 by country in the case where the country has RTAs in force that provide at least one WTO-plus or WTO-extra area.

Country	Observations	Mean	Standard Deviation	Min	Max
Antigua and Barbuda	305	0.556	0.000	0.556	0.556
Argentina	79	0.944	0.000	0.944	0.944
Bahamas	305	0.556	0.000	0.556	0.556
Belize	305	0.556	0.000	0.556	0.556
Bolivia	99	0.222	0.000	0.222	0.222
Brazil	79	0.944	0.000	0.944	0.944
Chile	85	0.683	0.112	0.444	0.861
Colombia	148	0.418	0.270	0.222	0.833
Costa Rica	152	0.561	0.315	0.222	0.972
Dominica	305	0.556	0.000	0.556	0.556
Dominican Republic	75	0.778	0.000	0.778	0.778
Ecuador	99	0.222	0.000	0.222	0.222
El Salvador	161	0.568	0.309	0.222	1.000
Grenada	305	0.556	0.000	0.556	0.556
Guatemala	147	0.552	0.316	0.222	0.944
Guyana	305	0.556	0.000	0.556	0.556
Haiti	168	0.556	0.000	0.556	0.556
Honduras	149	0.557	0.318	0.222	1.000
Jamaica	305	0.556	0.000	0.556	0.556
Mexico	74	0.795	0.079	0.667	0.861
Nicaragua	138	0.538	0.318	0.222	0.917

Panama	54	0.729	0.131	0.444	0.972
Paraguay	79	0.944	0.000	0.944	0.944
Peru	117	0.322	0.218	0.222	0.917
Saint Kitts and Nevis	305	0.556	0.000	0.556	0.556
Saint Lucia	305	0.556	0.000	0.556	0.556
Saint Vincent and the Grenadines	305	0.556	0.000	0.556	0.556
Suriname	245	0.556	0.000	0.556	0.556
Trinidad and Tobago	305	0.556	0.000	0.556	0.556
Uruguay	91	0.930	0.038	0.833	0.944
Venezuela	88	0.354	0.280	0.222	0.944
Total	5682	0.564	0.184	0.222	1.000

Source: Author's calculations from the Deep Trade Agreements Database 1.0.

Table A7. Estimation results for individual regional trade agreements (RTAs).

Assumption on the revitalization	(1)			(2)	
	RTA_depth	RTA_breadth	RTA_core_depth	RTA_depth	RTA_core_depth
CU_Latin America					
CAN	0.6041		0.5631	0.6043	0.5633
	(0.9085)		(0.8459)	(0.9085)	(0.8458)
CACM				-2.7790*	-1.7227*
				(1.5296)	(0.9491)
MERCOSUR	1.1732***	2.3815***	0.5140***	1.1717***	0.5133***
	(0.4394)	(0.8075)	(0.1925)	(0.4391)	(0.1924)
CU_Caribbean					
CARICOM	5.2530*	20.7943*	3.2603*	5.2677*	3.2695*
	(3.0373)	(12.0464)	(1.8853)	(3.0407)	(1.8874)
Plurilateral_FTA_LAC					
Chile-Central America	1.1382***	3.5449***	0.6104***	1.1344***	0.6082***

	(0.2413)	(0.8334)	(0.1374)	(0.2428)	(0.1383)
Colombia-Northern Triangle	0.5986	1.0299	0.2611	0.5982	0.2609
	(0.5817)	(1.0251)	(0.2579)	(0.5819)	(0.2580)
Dominican Republic-Central America	0.4761	0.6005	0.1905	0.4562	0.1825
	(0.7817)	(1.0156)	(0.3127)	(0.7800)	(0.3120)
Mexico-Central America	2.0865**	2.3850**	0.8625**	2.0867**	0.8626**
	(0.8223)	(0.9470)	(0.3403)	(0.8224)	(0.3404)
Panama-Central America	-2.0112***	-3.1374***	-0.9097***	-2.0216***	-0.9144***
	(0.7214)	(1.1814)	(0.3294)	(0.7191)	(0.3284)
Plurilateral_FTA_with outside					
CAFTA-DR	-1.3279**	-1.3896**	-0.5581**	-1.2683**	-0.5331**
	(0.5294)	(0.5467)	(0.2224)	(0.5278)	(0.2217)
El Salvador-Honduras-Chinese Taipei	0.6251**	0.9062**	0.3322**	0.6235**	0.3313**
	(0.2918)	(0.4301)	(0.1555)	(0.2902)	(0.1546)
EFTA-Central America	-0.1486	-0.3074	-0.0699	-0.1479	-0.0696
	(0.2339)	(0.3473)	(0.0997)	(0.2339)	(0.0996)

EU-Colombia and Peru	-0.9012***	-1.3479***	-0.4595***	-0.9008***	-0.4593***
	(0.2709)	(0.4090)	(0.1381)	(0.2709)	(0.1381)
Bilateral_FTA					
Chile-Colombia	-0.4108	-0.4707	-0.1627	-0.4102	-0.1624
	(0.3818)	(0.4807)	(0.1508)	(0.3818)	(0.1508)
Chile-Mexico	0.5871***	0.6590***	0.2235***	0.5916***	0.2252***
	(0.1789)	(0.2071)	(0.0681)	(0.1789)	(0.0681)
Colombia-Mexico	0.2286	0.4601	0.1229	0.2381	0.1280
	(0.2534)	(0.4722)	(0.1363)	(0.2539)	(0.1366)
Costa Rica-Peru	0.6027	0.7777	0.2386	0.6024	0.2385
	(0.4259)	(0.5444)	(0.1681)	(0.4261)	(0.1682)
Mexico-Uruguay	-0.3779*	-0.5560*	-0.1563*	-0.3756*	-0.1554*
	(0.2261)	(0.3271)	(0.0936)	(0.2260)	(0.0935)
Panama-Chile	0.7329	1.6607	0.3431	0.7301	0.3418
	(1.1309)	(2.7605)	(0.5263)	(1.1313)	(0.5265)
Panama-Peru	0.7017	0.9467	0.2854	0.7025	0.2857

	(0.6130)	(0.8543)	(0.2496)	(0.6132)	(0.2496)
Peru-Chile	0.5528**	0.8843**	0.2572**	0.5529**	0.2573**
	(0.2593)	(0.4152)	(0.1207)	(0.2593)	(0.1207)
Peru-Mexico	-0.1057	-0.1579	-0.0524	-0.1054	-0.0523
	(0.2362)	(0.3440)	(0.1173)	(0.2362)	(0.1173)
Exporter-year fixed effects	Yes	Yes	Yes	Yes	Yes
Importer-year fixed effects	Yes	Yes	Yes	Yes	Yes
Country-pair fixed effects	Yes	Yes	Yes	Yes	Yes
Observations	24,806	24,806	24,806	24,806	24,806

Note: CU_Latin America, custom unions (CUs) among Latin American countries; CU_Caribbean, CUs among Caribbean countries; Bilateral_FTA, bilateral free trade agreements (FTAs) among Latin American and Caribbean (LAC) countries; Plurilateral_FTA_LAC, plurilateral FTAs among three or more LAC countries; Plurilateral_FTA_with outside, plurilateral FTAs between two or more LAC countries and at least one non-LAC countries. Estimations were implemented using the Stata command *ppmlhdfe*. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively. Numbers in parentheses represent robust standard errors clustered by country-pairs. The constant term is included. The reason why the number of observations (24,806) is smaller than the number of observations of the dependent variable (25,376) in Table 1 is presented in footnote 17.

Table 1. Descriptive statistics of all variables.

Variable	Observations	Mean	Standard Deviation	Min	Max
Parts and components trade (millions dollars)	25,376	34.389	224.744	0.000	10092.000
RTA_depth	28,512	0.065	0.134	0.000	0.517
RTA_breadth	28,512	0.021	0.055	0.000	0.413
RTA_core_depth	28,512	0.112	0.240	0.000	1.000
RTA_depth disaggregated					
CU_Latin America	28,512	0.011	0.054	0.000	0.414
CU_Caribbean	28,512	0.046	0.117	0.000	0.345
Plurilateral_FTA_LAC	28,512	0.005	0.041	0.000	0.414
Plurilateral_FTA_with outside	28,512	0.003	0.032	0.000	0.483
Bilateral_FTA	28,512	0.002	0.027	0.000	0.448
RTA_breadth disaggregated					
CU_Latin America	28,512	0.003	0.023	0.000	0.217
CU_Caribbean	28,512	0.011	0.029	0.000	0.087
Plurilateral_FTA_LAC	28,512	0.003	0.026	0.000	0.239
Plurilateral_FTA_with outside	28,512	0.003	0.030	0.000	0.413
Bilateral_FTA	28,512	0.001	0.018	0.000	0.283
RTA_core_depth disaggregated					
CU_Latin America	28,512	0.019	0.109	0.000	0.944
CU_Caribbean	28,512	0.073	0.188	0.000	0.556
Plurilateral_FTA_LAC	28,512	0.012	0.093	0.000	0.861
Plurilateral_FTA_with outside	28,512	0.006	0.074	0.000	0.944
Bilateral_FTA	28,512	0.004	0.059	0.000	0.917

Source: Author's calculations from the World Integrated Trade Solution (WITS) database and the Deep Trade Agreements Database 1.0.

Note: CU_Latin America, custom unions (CUs) among Latin American countries; CU_Caribbean, CUs among Caribbean countries; Bilateral_FTA, bilateral free trade agreements (FTAs) among Latin American and Caribbean (LAC) countries; Plurilateral_FTA_LAC, plurilateral FTAs among three or more LAC countries; Plurilateral_FTA_with outside, plurilateral FTAs between two or more LAC countries and at least one non-LAC countries.

Table 2. Correlation matrix of all variables.

	Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
1	Parts and components trade	1.000																		
2	RTA_depth	0.133	1.000																	
3	RTA_breadth	0.196	0.835	1.000																
4	RTA_core_depth	0.174	0.979	0.920	1.000															
	RTA_depth disaggregated																			
5	CU_Latin America	0.342	0.385	0.400	0.432	1.000														
6	CU_Caribbean	-0.054	0.792	0.438	0.690	-0.078	1.000													
7	Plurilateral_FTA_LAC	0.020	0.281	0.477	0.361	0.003	-0.049	1.000												
8	Plurilateral_FTA_with outside	0.042	0.236	0.529	0.303	0.198	-0.033	0.155	1.000											
9	Bilateral_FTA	0.104	0.179	0.305	0.225	-0.017	-0.030	-0.011	-0.007	1.000										
	RTA_breadth disaggregated																			
10	CU_Latin America	0.369	0.299	0.395	0.393	0.803	-0.042	-0.015	-0.010	-0.009	1.000									
11	CU_Caribbean	-0.054	0.792	0.438	0.690	-0.078	1.000	-0.049	-0.033	-0.030	-0.042	1.000								
12	Plurilateral_FTA_LAC	0.022	0.267	0.494	0.356	0.000	-0.048	0.958	0.137	-0.010	-0.015	-0.048	1.000							
13	Plurilateral_FTA_with outside	0.040	0.235	0.530	0.304	0.198	-0.033	0.149	0.997	-0.007	-0.010	-0.033	0.132	1.000						
14	Bilateral_FTA	0.106	0.175	0.312	0.227	-0.017	-0.029	-0.011	-0.007	0.980	-0.009	-0.029	-0.010	-0.007	1.000					
	RTA_core_depth disaggregated																			
15	CU_Latin America	0.368	0.373	0.437	0.447	0.965	-0.068	0.000	0.156	-0.015	0.924	-0.068	-0.002	0.157	-0.014	1.000				

16	CU_Caribbean	-0.054	0.792	0.438	0.690	-0.078	1.000	-0.049	-0.033	-0.030	-0.042	1.000	-0.048	-0.033	-0.029	-0.068	1.000			
17	Plurilateral_FTA_LAC	0.021	0.279	0.489	0.363	0.003	-0.050	0.994	0.155	-0.011	-0.015	-0.050	0.982	0.149	-0.011	0.000	-0.050	1.000		
18	Plurilateral_FTA_with outside	0.041	0.235	0.530	0.304	0.198	-0.033	0.149	0.998	-0.007	-0.010	-0.033	0.132	0.999	-0.007	0.156	-0.033	0.149	1.000	
19	Bilateral_FTA	0.104	0.176	0.310	0.227	-0.017	-0.030	-0.011	-0.007	0.990	-0.009	-0.030	-0.010	-0.007	0.996	-0.015	-0.030	-0.011	-0.007	1.000

Source: Author's calculations from the World Integrated Trade Solution (WITS) database and the Deep Trade Agreements Database 1.0.

Note: CU_Latin America, custom unions (CUs) among Latin American countries; CU_Caribbean, CUs among Caribbean countries; Bilateral_FTA, bilateral free trade agreements (FTAs) among Latin American and Caribbean (LAC) countries; Plurilateral_FTA_LAC, plurilateral FTAs among three or more LAC countries; Plurilateral_FTA_with outside, plurilateral FTAs between two or more LAC countries and at least one non-LAC countries.

Table 3. Estimation results of Equation (4).

Assumption on the revitalization	(1)						(2)	
	X_{ijt}	$X_{ijt} > 0$	X_{ijt}	$X_{ijt} > 0$	X_{ijt}	$X_{ijt} > 0$	X_{ijt}	X_{ijt}
RTA_depth	0.5477***	0.5604***					0.5393***	
	(0.1847)	(0.1843)					(0.1837)	
RTA_breadth			0.4914**	0.5105**				
			(0.2375)	(0.2371)				
RTA_core_depth					0.2402***	0.2458***		0.2373***
					(0.0806)	(0.0804)		(0.0802)
Exporter-year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Importer-year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country-pair fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	24,806	16,774	24,806	16,774	24,806	16,774	24,806	24,806

Note: Estimations were implemented using the Stata command *ppmlhdfe*. ∗∗∗ and ∗∗ indicate statistical significance at the 1% and 5% levels, respectively. Numbers in parentheses represent robust standard errors clustered by country-pairs. The constant term is included. The reason why the number of observations in the full sample (24,806) is smaller than the number of observations of the dependent variable (25,376) in Table 1 is presented in footnote 17.

Table 4. Estimation results of Equation (5).

Assumption on the revitalization	(1)			(2)	
	RTA_depth	RTA_breadth	RTA_core_depth	RTA_depth	RTA_core_depth
CU_Latin America	1.1680***	3.3883***	0.6789***	1.1462***	0.6702***
	(0.3415)	(0.4061)	(0.1077)	(0.3458)	(0.1092)
CU_Caribbean	5.0405**	19.8241**	3.1140**	5.0382**	3.1127**
	(2.4284)	(9.5670)	(1.5004)	(2.4288)	(1.5005)
Plurilateral_FTA_LAC	0.6758	0.9343	0.2899	0.6790	0.2911
	(0.4801)	(0.6727)	(0.2093)	(0.4800)	(0.2093)
Plurilateral_FTA_with outside	-0.9349***	-1.1727***	-0.4440***	-0.9458***	-0.4492***
	(0.2344)	(0.2794)	(0.1088)	(0.2353)	(0.1091)
Bilateral_FTA	0.1642	0.1914	0.0686	0.1628	0.0681
	(0.1856)	(0.2419)	(0.0780)	(0.1857)	(0.0780)
Exporter-year fixed effects	Yes	Yes	Yes	Yes	Yes
Importer-year fixed effects	Yes	Yes	Yes	Yes	Yes

Country-pair fixed effects	Yes	Yes	Yes	Yes	Yes
Observations	24,806	24,806	24,806	24,806	24,806

Note: CU_Latin America, custom unions (CUs) among Latin American countries; CU_Caribbean, CUs among Caribbean countries; Bilateral_FTA, bilateral free trade agreements (FTAs) among Latin American and Caribbean (LAC) countries; Plurilateral_FTA_LAC, plurilateral FTAs among three or more LAC countries; Plurilateral_FTA_with outside, plurilateral FTAs between two or more LAC countries and at least one non-LAC countries. Estimations were implemented using the Stata command *ppmlhdfe*. *** and ** indicate statistical significance at the 1% and 5% levels, respectively. Numbers in parentheses represent robust standard errors clustered by country-pairs. The constant term is included. The reason why the number of observations (24,806) is smaller than the number of observations of the dependent variable (25,376) in Table 1 is presented in footnote 17.

Table 5. Estimation results of Equation (4) using mirror import data.

Assumption on the revitalization	(1)			(2)	
RTA_depth	0.4656*			0.4551*	
	(0.2434)			(0.2443)	
RTA_breadth		0.4198			
		(0.2983)			
RTA_core_depth			0.2183**		0.2146**
			(0.1022)		(0.1025)
Exporter-year fixed effects	Yes	Yes	Yes	Yes	Yes
Importer-year fixed effects	Yes	Yes	Yes	Yes	Yes
Country-pair fixed effects	Yes	Yes	Yes	Yes	Yes
Observations	28,458	28,458	28,458	28,458	28,458

Note: Estimations were implemented using the Stata command *ppmlhdfe*. ** and * indicate statistical significance at the 5% and 10% levels, respectively. Numbers in parentheses represent robust standard errors clustered by country-pairs. The constant term is included. The reason why the number of observations (28,458) is smaller than the number of full observations of (28, 512) in Table 1 is presented in footnote 27.

Table 6. Estimation results of Equation (5) using mirror import data.

Assumption on the revitalization	(1)			(2)	
	RTA_depth	RTA_breadth	RTA_core_depth	RTA_depth	RTA_core_depth
CU_Latin America	1.0803***	3.4627***	0.6592***	1.0574***	0.6499***
	(0.3772)	(0.5230)	(0.1215)	(0.3819)	(0.1230)
CU_Caribbean	3.8783**	15.1995**	2.3927**	3.8765**	2.3916**
	(1.8629)	(7.3067)	(1.1485)	(1.8630)	(1.1485)
Plurilateral_FTA_LAC	0.4630	0.5939	0.1931	0.4656	0.1942
	(0.4327)	(0.5901)	(0.1868)	(0.4327)	(0.1868)
Plurilateral_FTA_with outside	-0.8899***	-1.1244***	-0.4220***	-0.9001***	-0.4271***
	(0.2340)	(0.2754)	(0.1077)	(0.2349)	(0.1080)
Bilateral_FTA	0.1810	0.1808	0.0723	0.1800	0.0718
	(0.2148)	(0.2811)	(0.0916)	(0.2149)	(0.0916)
Exporter-year fixed effects	Yes	Yes	Yes	Yes	Yes
Importer-year fixed effects	Yes	Yes	Yes	Yes	Yes

Country-pair fixed effects	Yes	Yes	Yes	Yes	Yes
Observations	28,458	28,458	28,458	28,458	28,458

Note: CU_Latin America, custom unions (CUs) among Latin American countries; CU_Caribbean, CUs among Caribbean countries; Bilateral_FTA, bilateral free trade agreements (FTAs) among Latin American and Caribbean (LAC) countries; Plurilateral_FTA_LAC, plurilateral FTAs among three or more LAC countries; Plurilateral_FTA_with outside, plurilateral FTAs between two or more LAC countries and at least one non-LAC countries. Estimations were implemented using the Stata command *ppmlhdfe*. *** and ** indicate statistical significance at the 1% and 5% levels, respectively. Numbers in parentheses represent robust standard errors clustered by country-pairs. The constant term is included. The reason why the number of observations (28,458) is smaller than the number of full observations of (28, 512) in Table 1 is presented in footnote 27.

Table 7. Estimation results of Equation (4) using panel data at three-year intervals, 1992-2016.

Assumption on the revitalization	(1)			(2)	
RTA_depth	0.4746**			0.4609**	
	(0.2091)			(0.2088)	
RTA_breadth		0.0615			
		(0.2426)			
RTA_core_depth			0.1477*		0.1433
			(0.0881)		(0.0879)
Exporter-year fixed effects	Yes	Yes	Yes	Yes	Yes
Importer-year fixed effects	Yes	Yes	Yes	Yes	Yes
Country-pair fixed effects	Yes	Yes	Yes	Yes	Yes
Observations	7,973	7,973	7,973	7,973	7,973

Note: Estimations were implemented using the Stata command *ppmlhdfe*. ** and * indicate statistical significance at the 5% and 10% levels, respectively. Numbers in parentheses represent robust standard errors clustered by country-pairs. The constant term is included.

Table 8. Estimation results of Equation (5) using panel data with three-year intervals, 1992-2016.

Assumption on the revitalization	(1)			(2)	
	RTA_depth	RTA_breadth	RTA_core_depth	RTA_depth	RTA_core_depth
CU_Latin America	1.4030***	1.7658	0.5862**	1.3690***	0.5735**
	(0.4739)	(1.2225)	(0.2453)	(0.4748)	(0.2452)
CU_Caribbean	4.2637	16.9406	2.6447	4.2611	2.6439
	(3.4408)	(13.7761)	(2.1406)	(3.4410)	(2.1408)
Plurilateral_FTA_LAC	0.7642	1.2972	0.3445	0.7688	0.3458
	(0.6199)	(0.8379)	(0.2693)	(0.6201)	(0.2693)
Plurilateral_FTA_with outside	-1.2017***	-1.4484***	-0.5783***	-1.2166***	-0.5832***
	(0.4351)	(0.5264)	(0.2034)	(0.4381)	(0.2041)
Bilateral_FTA	0.0221	0.0200	0.0010	0.0212	0.0010
	(0.2745)	(0.3640)	(0.1195)	(0.2747)	(0.1196)
Exporter-year fixed effects	Yes	Yes	Yes	Yes	Yes
Importer-year fixed effects	Yes	Yes	Yes	Yes	Yes

Country-pair fixed effects	Yes	Yes	Yes	Yes	Yes
Observations	7,973	7,973	7,973	7,973	7,973

Note: CU_Latin America, custom unions (CUs) among Latin American countries; CU_Caribbean, CUs among Caribbean countries; Bilateral_FTA, bilateral free trade agreements (FTAs) among Latin American and Caribbean (LAC) countries; Plurilateral_FTA_LAC, plurilateral FTAs among three or more LAC countries; Plurilateral_FTA_with outside, plurilateral FTAs between two or more LAC countries and at least one non-LAC countries. Estimations were implemented using the Stata command *ppmlhdfe*. *** and ** indicate statistical significance at the 1% and 5% levels, respectively. Numbers in parentheses represent robust standard errors clustered by country-pairs. The constant term is included.

Table 9. Estimation results of Equation (4) including 2 leads and 3 lags, 1987-2013.

Assumption on the revitalization	(1)			(2)	
	RTA_depth	RTA_breadth	RTA_core_depth	RTA_depth	RTA_core_depth
t	0.2235	0.4607	0.1335	0.2193	0.1333
	(0.2172)	(0.3441)	(0.1011)	(0.2158)	(0.1010)
t-1	-0.0623	0.2847	0.0155	-0.0775	0.0114
	(0.1861)	(0.3048)	(0.0837)	(0.1841)	(0.0834)
t-2	-0.1926	-0.6903	-0.1287	-0.1952	-0.1298
	(0.2481)	(0.4581)	(0.1193)	(0.2459)	(0.1190)
t-3	0.4542**	0.3194	0.1534**	0.4802**	0.1579**
	(0.1852)	(0.2212)	(0.0757)	(0.1871)	(0.0761)
t+1	0.2518***	0.2636**	0.1000***	0.2474***	0.0991***
	(0.0865)	(0.1114)	(0.0381)	(0.0865)	(0.0380)
t+2	0.2060	0.1290	0.1075	0.2132	0.1085
	(0.2201)	(0.3388)	(0.1038)	(0.2201)	(0.1037)

Exporter-year fixed effects	Yes	Yes	Yes	Yes	Yes
Importer-year fixed effects	Yes	Yes	Yes	Yes	Yes
Country-pair fixed effects	Yes	Yes	Yes	Yes	Yes
Observations	24,247	24,247	24,247	24,247	24,247

Note: Estimations were implemented using the Stata command *ppmlhdfe*. *** and ** indicate statistical significance at the 1% and 5% levels, respectively. Numbers in parentheses represent robust standard errors clustered by country-pairs. The constant term is included.

Table 10. Estimation results of Equation (5) including 2 leads and 3 lags, 1987-2013.

Assumption on the revitalization	(1)			(2)	
	RTA_depth	RTA_breadth	RTA_core_depth	RTA_depth	RTA_core_depth
CU_Latin America					
t	-0.3043	0.0371	-0.0626	-0.3167	-0.0645
	(0.4942)	(1.0205)	(0.2275)	(0.4832)	(0.2262)
t-1	-0.0251	0.8103	0.0917	-0.0638	0.0786
	(0.4376)	(0.9217)	(0.1958)	(0.4266)	(0.1941)
t-2	0.5128	1.7731*	0.3638	0.4506	0.3351
	(0.5366)	(0.9457)	(0.2217)	(0.5012)	(0.2157)
t-3	1.0871***	0.4832	0.2936*	1.1343***	0.3249**
	(0.4137)	(0.7145)	(0.1692)	(0.3783)	(0.1637)
t+1	0.3415	0.3852	0.1247	0.3404	0.1236
	(0.4940)	(1.0411)	(0.2307)	(0.4863)	(0.2296)
t+2	0.6223*	2.1071***	0.3886**	0.6667**	0.3964**

	(0.3264)	(0.7349)	(0.1590)	(0.3252)	(0.1587)
CU_Caribbean					
t	1.0035	3.9838	0.6230	0.9911	0.6200
	(4.2379)	(16.7901)	(2.6298)	(4.2360)	(2.6301)
t-1	3.2793	13.0042	2.0353	3.2807	2.0364
	(2.9560)	(11.7061)	(1.8339)	(2.9582)	(1.8353)
t-2	1.1365	4.5198	0.7046	1.1368	0.7049
	(1.5270)	(6.0277)	(0.9461)	(1.5306)	(0.9474)
t-3	-0.4160	-1.7546	-0.2643	-0.4135	-0.2633
	(1.1713)	(4.6188)	(0.7253)	(1.1745)	(0.7263)
t+1	-3.5682	-13.9820	-2.1982	-3.5585	-2.1987
	(3.6155)	(14.2531)	(2.2381)	(3.6139)	(2.2389)
t+2	2.9541	11.4364	1.7996	2.9274	1.7912
	(2.0296)	(7.9238)	(1.2487)	(2.0333)	(1.2500)
Plurilateral_FTA_LAC					
t	0.8401	1.2746	0.3776	0.8412	0.3778

	(0.6054)	(0.9047)	(0.2712)	(0.6052)	(0.2712)
t-1	0.1833	0.2481	0.0808	0.1846	0.0813
	(0.8536)	(1.2960)	(0.3833)	(0.8535)	(0.3832)
t-2	-1.0973*	-1.7674*	-0.4903*	-1.0932*	-0.4888*
	(0.6125)	(0.9815)	(0.2781)	(0.6126)	(0.2782)
t-3	0.0070	-0.1224	0.0104	0.0095	0.0115
	(0.3608)	(0.6571)	(0.1665)	(0.3610)	(0.1665)
t+1	0.1357	0.2475	0.0624	0.1359	0.0624
	(0.3517)	(0.5094)	(0.1560)	(0.3523)	(0.1562)
t+2	0.1128	-0.0048	0.0185	0.1189	0.0206
	(0.2625)	(0.3827)	(0.1161)	(0.2635)	(0.1163)
Plurilateral_FTA_with outside					
t	-0.5752	-0.8414	-0.2923	-0.5805	-0.2951
	(0.5487)	(0.6874)	(0.2586)	(0.5523)	(0.2596)
t-1	0.6114	0.9579*	0.3156	0.5424	0.2952
	(0.4611)	(0.5280)	(0.2075)	(0.4629)	(0.2080)

t-2	-0.1884	-0.2253	-0.0917	-0.1885	-0.0917
	(0.6337)	(0.6637)	(0.2738)	(0.6338)	(0.2738)
t-3	-0.0159	0.0699	-0.0124	-0.0134	-0.0115
	(0.6264)	(0.6391)	(0.2697)	(0.6265)	(0.2697)
t+1	-0.0428	-0.1460	-0.0355	-0.0438	-0.0362
	(0.6122)	(0.8010)	(0.2946)	(0.6142)	(0.2953)
t+2	-0.9340**	-1.0980*	-0.4294**	-0.9660**	-0.4412**
	(0.4448)	(0.5866)	(0.2136)	(0.4462)	(0.2140)
Bilateral_FTA					
t	0.5421	0.6928	0.2523	0.5399	0.2518
	(0.4863)	(0.7106)	(0.2306)	(0.4864)	(0.2306)
t-1	-0.6374	-0.7995	-0.2876	-0.6369	-0.2875
	(0.4851)	(0.7165)	(0.2326)	(0.4849)	(0.2325)
t-2	-0.0536	0.0183	-0.0110	-0.0547	-0.0120
	(0.4824)	(0.7200)	(0.2215)	(0.4822)	(0.2214)
t-3	0.3770	0.3430	0.1319	0.3813	0.1328

	(0.3890)	(0.5788)	(0.1766)	(0.3888)	(0.1765)
t+1	0.2335	0.3571	0.1068	0.2310	0.1057
	(0.3984)	(0.5791)	(0.1821)	(0.3985)	(0.1820)
t+2	-0.2040	-0.1832	-0.0656	-0.1873	-0.0632
	(0.2902)	(0.4162)	(0.1312)	(0.2900)	(0.1311)
Exporter-year fixed effects	Yes	Yes	Yes	Yes	Yes
Importer-year fixed effects	Yes	Yes	Yes	Yes	Yes
Country-pair fixed effects	Yes	Yes	Yes	Yes	Yes
Observations	24,247	24,247	24,247	24,247	24,247

Note: CU_Latin America, custom unions (CUs) among Latin American countries; CU_Caribbean, CUs among Caribbean countries; Bilateral_FTA, bilateral free trade agreements (FTAs) among Latin American and Caribbean (LAC) countries; Plurilateral_FTA_LAC, plurilateral FTAs among three or more LAC countries; Plurilateral_FTA_with outside, plurilateral FTAs between two or more LAC countries and at least one non-LAC countries. Estimations were implemented using the Stata command *ppmlhdfe*. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively. Numbers in parentheses represent robust standard errors clustered by country-pairs. The constant term is included.