DOCUMENTOS DE TRABAJO
ISSN 2174-4912

NOT ALL AGREEMENTS ARE EQUAL: HETEROGENEUS EFFECTS OF RTAS ON LATIN AMERICAN AGRI-FOOD EXPORTS, 1990-2019

Maria-Isabel Ayuda, Ignacio Belloc, and Vicente Pinilla[∝]

DT-AEHE N°2503
www.aehe.es

November 2025

asociación española de historia económica

DOCUMENTOS DE TRABAJO

ISSN 2174-4912

NO TODOS LOS ACUERDOS SON IGUALES: EFECTOS HETEROGÉNEOS DE LOS ACUERDOS REGIONALES DE COMERCIO EN LAS EXPORTACIONES AGROALIMENTARIAS DE AMÉRICA LATINA, 1990-2019

María-Isabel Ayuda[‡] Ignacio Belloc[§] y Vicente Pinilla[**]

Autor de correspondencia: María-Isabel Ayuda (mayuda@unizar.es)

DT-2503, Noviembre 2025

JEL: F13, F14, N56, N76, Q17

RESUMEN

Desde la última década del siglo XX, los países latinoamericanos han considerado cada vez más la firma de Acuerdos Comerciales Regionales como una estrategia prometedora para expandir sus exportaciones. En este contexto, el principal objetivo de este estudio es evaluar el impacto de ellos sobre las exportaciones agroalimentarias en América Latina durante el período 1990–2019, etapa en la que dichas exportaciones experimentaron un notable crecimiento. Para ello, el análisis comienza con un examen de los distintos acuerdos comerciales suscritos en la región y de los flujos de exportación que estos han ido canalizando progresivamente. En segundo lugar, se estiman los efectos de cada tipo de acuerdo sobre el comercio agroalimentario mediante modelos de gravedad y utilizando datos de exportaciones de diecinueve países latinoamericanos hacia sus principales socios comerciales (239 en total) entre 1990 y 2019. El principal hallazgo en relación con el efecto promedio de dichos acuerdos es que las estimaciones son robustas frente a los avances recientes en la modelización gravitatoria. Sin embargo, al estimar los efectos de cada tipo de acuerdo por separado, se observa una notable heterogeneidad, la cual depende no solo del tipo de acuerdo, sino también de la región de destino de las exportaciones y del período analizado.

Palabras clave: Exportaciones latinoamericanas, Acuerdos comerciales regionales, Comercio agroalimentario internacional, Modelos gravitacionales, Globalización

ABSTRACT

Since the final decade of the twentieth century, Latin American countries have increasingly regarded the signing of Regional Trade Agreements (RTAs) as a promising strategy for expanding their exports. Within this context, the main objective of this study is to assess the impact of RTAs on agri-food exports in Latin America over the period 1990–2019, during which such exports experienced significant growth. To this end, our analysis starts with an examination of the various trade agreements signed in the region and the export flows they have progressively channeled. Second, we estimate the effects of each type of agreement on agri-food trade using gravity models and export data from nineteen Latin American countries to their main trading partners (239 in total) between 1990 and 2019. Our main finding regarding the average effect of RTAs is that the estimates are robust to recent developments in gravity modeling. However, when we estimate the effects of each agreement type separately, we find considerable heterogeneity. This variation depends not only on the type of agreement, but also on the export destination region and the period under analysis.

[‡] Universidad de Zaragoza, Department of Economic Analysis and Institute of Employment, Digital Society and Sustainability (IEDIS), Gran Vía 2-4, 50005 Zaragoza, Spain; mayuda@unizar.es .

[§] Universidad de Zaragoza, Department of Economic Analysis and Institute of Employment, Digital Society and Sustainability (IEDIS), Gran Vía 2-4, 50005 Zaragoza, Spain; ibelloc@unizar.es

[**] Universidad de Zaragoza, Department of Applied Economics and Instituto Agroalimentario de Aragón (IA2), Gran Vía 2-4, 50005 Zaragoza, Spain; vpinilla@unizar.es

ISSN 2174-4912

Keywords: Latin American Exports, Regional Trade Agreements, Agri-food International Trade, Gravity Models, Globalization

Acknowledgments: The authors wish to thank participants at the 5th Agricliometrics Conference (Montevideo, 2023), for their comments on an earlier version of this paper. The usual disclaimer applies. We thank Kate Walters for her English language revision. This study has received financial support from the Ministry of Science and Innovation of Spain (projects PID2022-140010OB-I00 and PID2022-138886NB-I00) and from the Department of Science, Innovation and Universities of the Government of Aragon (projets S40_23R and S55_23R).

Not All Agreements Are Equal: Heterogeneous Effects of RTAs on Latin American Agri-Food Exports, 1990-2019

1. Introduction

Although the reorganization of the international economy after the Second World War sought to construct a multilateral framework, in the case of trade, the GATT agreements of 1947 introduced certain exceptions within this framework. Among these agreements were the notable customs unions, one of the most prominent being the European Common Market, established just a few years later, due to the significant trade flows it fostered among its member states. In general, regional trade agreements (RTAs) constituted accepted exceptions.

In the final decades of the twentieth century, the slowdown in multilateral liberalization within the framework of the WTO led to the signing of many RTAs, which became the preferred method for expanding international trade (Baldwin, 2016; Bhagwati, 1992). In the years that followed, these agreements have further strengthened their role in channeling global trade (Santeramo and Lamonaca, 2022; Döbeling et al., 2025). However, in more recent times, a range of developments—including military conflicts, economic sanctions, and shifts in U.S. trade policy—have rendered the global trade landscape increasingly complex, particularly for agri-food products (Lim and Suwanprasert, 2025). Against this backdrop of growing trade regionalization and an apparent crisis of multilateralism, assessing the effectiveness of regional trade agreements has become a matter of critical importance (Afesorgbor et al., 2025).

While the primary objective of RTAs is to encourage trade and investment among member countries, their effects on member and non-member countries can be quite varied. On the one hand, RTAs can create trade between members by substituting products with high production costs in the country of origin with lower-cost products from member countries. On the other hand, they can generate a trade diversion effect by importing products from a member country and replacing more efficient third-party countries. Therefore, one of the main criticisms of regional trade agreements is that they limit the liberalization of world trade.

Within this context, the main objective of this study is to analyze the effect of RTAs on agri-food exports in Latin America from 1990 to 2019, a period during which

such exports increased significantly (Ayuda et al., 2022). The Latin American economy did not achieve much in terms of economic integration between 1950 and 1990 (Bulmer-Thomas, 1994). However, since the final decade of the twentieth century, countries in the region have regarded the signing of regional trade agreements (RTAs) or free trade agreements as a promising way to expand their exports. Furthermore, there has been increasing integration within the region as well as with other parts of the world. In this respect, we first examine the different types of trade agreements existing in Latin America.

The choice of agri-food products for this study is based on the importance that they traditionally had before 1929 in the exports of the region and their renewed dynamism from the end of the twentieth century, which has led to talk about a reprimarization of the Latin American economies, also taking into account their mineral and fuel exports (Ayuda et al., 2024; Ocampo, 2017).

To rigorously meet the research objective, we estimate the specific effects of each category of agreement on agri-food trade. We analyze the robustness of these estimates with different types of models. That is, using only international trade or including also domestic trade as proposed by Yotov (2012), among others. We also attempt to consider possible biases in these types of estimations by not taking into account the effects of globalization, pointed out by Bergstrand et al. (2015), and include their adjustment proposal, which explicitly takes into account these effects. Observing Cheng and Wall's (2005) criticism of the use of consecutive annual data, we also use 5-year intervals. However, for most of the estimations, we use consecutive annual data as proposed by Egger et al. (2022), who argue that in gravity model estimations with 3-way fixed effects, as in our case, successive years should be used. In other words, we apply the suggestions that have been made in recent years in terms of new methods that can be used to estimate the effects of RTAs in structural gravity models, as highlighted by Larch and Yotov (2024a, 2024b).

Following the suggestions of Larch and Yotov (2024b) regarding the need for further research on the potential heterogeneity of the effects of RTAs, we attempt to show the effects of these agreements, distinguishing between intraregional trade and exchanges with countries outside of the region, as in Sanguinet et al. (2022). Due to the extended

period of the analysis, we further investigate the heterogeneity of agreement effects across different periods.

To analyze the impact of the RTAs, we have used gravity models and data referring to the exports from nineteen Latin American countries to their main trading partners (239) between 1990 and 2019, obtained from the UN COMTRADE database (2022). For information on trade agreements, we referred to the Regional Trade Agreements database developed by Mario Larch, based on the work of Egger and Larch (2008).

The estimation method employed is the Poisson Pseudo Maximum Likelihood (PPML) (Santos Silva and Tenreyro, 2006), including fixed effects of country pairs (exporter-importer), proposed by Baier and Bergstrand (2007), which helps address potential endogeneity issues in commercial policy variables. Additionally, we have incorporated time-varying fixed effects for both importers and exporters in the model specification, to account for factors such as multilateral resistances, following the guidance of Baldwin and Taglioni (2006) and Olivero and Yotov (2012). In other words, we have incorporated most of the practical recommendations proposed by Larch, Shikher, and Yotov (2025), both in the data preparation and in the estimation of the gravity models.

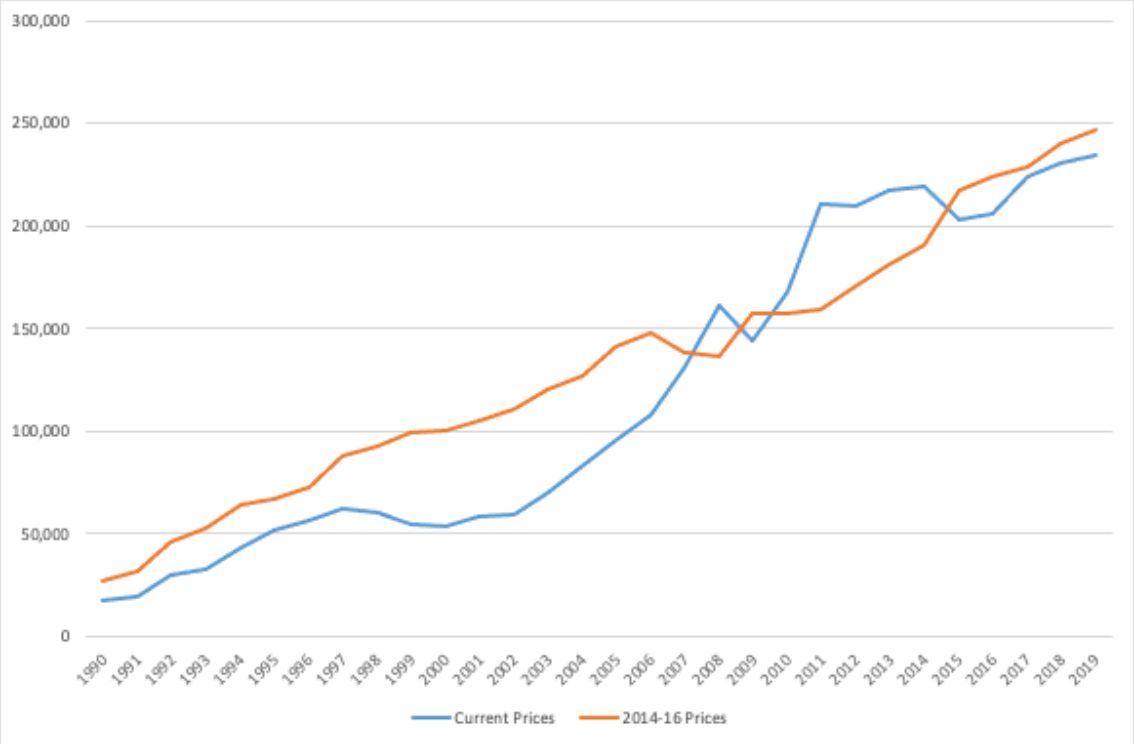
2. Stylized facts: The boom in Latin America's agri-food exports and the growing importance of the RTAs

After the Second World War, Latin America began to lose its relative share in the global exports of agri-food products, although in absolute terms it experienced significant growth (Serrano and Pinilla, 2011). While the exports of manufactured products from this region increased substantially, their dynamism was much lower than that of other regions, particularly with respect to the new industrial countries of East Asia (Gereffi and Wyman, 1990).

It has been estimated that the participation of the agri-food exports of Latin America and the Caribbean decreased from 16.5% of the global trade in these goods in 1961-63 to 11.2% in 1991-93. This lower dynamism of agri-food exports from the region has been explained by the disincentives for agri-food exports generated by Import Substitution Industrialization (ISI) strategies, the profound regionalization of agri-food trade, which occurred in an international context of acute multilateral protectionism in

these products (protected by the industrialized nations in the post-war years), the relative failure of Latin American attempts to liberalize trade in the region and the inability to shift from exporting basic products to other transformed products that were less affected by protectionism, and which had a higher value added and a growing demand (Serrano and Pinilla, 2016).

Figure 1. Evolution of Latin American Agri-Food Exports, 1990–2019 (Million USD, Current and Constant 2014–16 Prices)



Source: Own elaboration based on UN COMTRADE (2022) and FAO (2020).

Since the early 1990s, the region has exhibited an exceptionally high level of dynamism in its export performance. This occurred after a turnaround in economic policies from the beginning of this decade after the economic crisis of the 1980s, which generated serious structural problems and a stagnation of economic growth in what has been called the lost decade. A series of major structural reforms were implemented and there was a clear will for a reintegration into the international economy. The reforms led to an almost total elimination of the anti-export agricultural bias that existed, which facilitated the mobilization of resources in competitive export sectors, including agriculture (Martín-Retortillo et al., 2019).

Between 1990 and 2019, agri-food exports—measured at 2014–2016 constant prices—increased at an average annual rate of 7.9% (see Figure 1). While exports to all continents experienced growth, there was a marked decline in the relative importance of exports to Europe and a substantial increase in those directed to Asia, rising from 16.9% in 1994 to 39.7% in 2019. This robust export growth has been largely attributed to expanding external demand and the proliferation of regional trade agreements, particularly NAFTA, CACM, ALADI, MERCOSUR, and the TPP (Ayuda et al., 2024).

The regional trade agreements (RTAs) have been fundamental in Latin America's strategy of opening up to international trade. In particular, the failure of the third ministerial conference of the World Trade Organization (WTO) held in Seattle in 1999 and the stagnation of the multilateral negotiations of the Doha Round led to the signing of new RTAs to encourage the growth of its exports. The Latin American countries considered that, as these agreements involved a smaller number of countries, allowing the interests of all of them to be taken into account, a greater international integration could be reached more quickly.

In this way, the number of agreements signed by countries from this region grew to reach a total of 98 in 2024. There are several types of agreements according to the classification of the WTO:

- Customs Unions (CU). A CU involves the substitution of a single customs territory for two or more customs territories.
- Free Trade Agreements (FTA). An FTA exists when in a group of two or more customs territories, the duties and other restrictive regulations of commerce are eliminated on practically all the trade between the constituent territories in products originating in these territories.
- Partial Scope Agreements (PSA). A PSA is an agreement that covers only certain products.
- Economic Integration Agreement (EIA). An EIA is an agreement between nations to reduce or eliminate trade barriers and concur on fiscal policies.

There were also two possible combinations: Customs Unions and Economic Integration Agreements (CUEIA) and Free Trade Agreements and Economic Integration Agreements (FTAEIA).

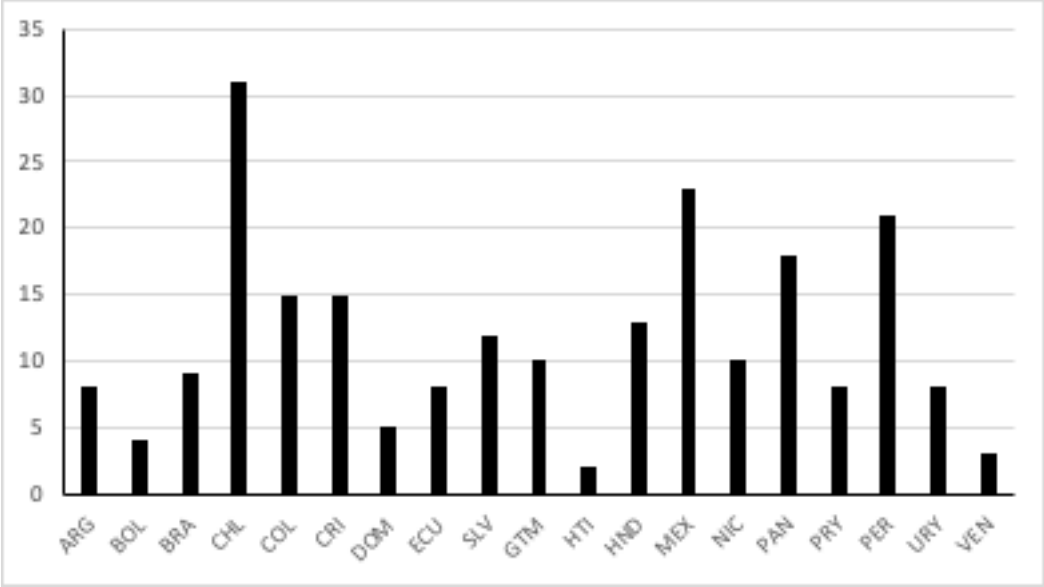
Table 1. Number of RTAs by type (2024)

TYPE	NAME (examples)	COVERAGE	Nº.
Total RTAs		Goods	98
CU	CAN, CACM	Goods	2
FTA		Goods	9
PSA	ALADI, PTN, …	Goods	13
CUEIA	MERCOSUR, CARICOM	Goods and Services	2
FTAEIA	NAFTA, TPP, …	Goods and Services	72

Source: Own elaboration based on the "Regional Trade Agreements Database": http://rtais.wto.org/UI/PublicAllRTAList.aspx

Although many Latin American countries have followed this liberalization trend through the signing of regional agreements, Chile, Mexico, and Peru have participated in the highest number. The two largest exporters of the Southern Cone, Argentina and Brazil, however, are among those that have signed the least number of agreements, probably due to the fact that their principal markets are in Asia and that China does not implement this type of trade liberalization strategy. On the other hand, the Central American and Andean countries, which have a much lower weight in exports to Asia, are those that most apply this strategy.

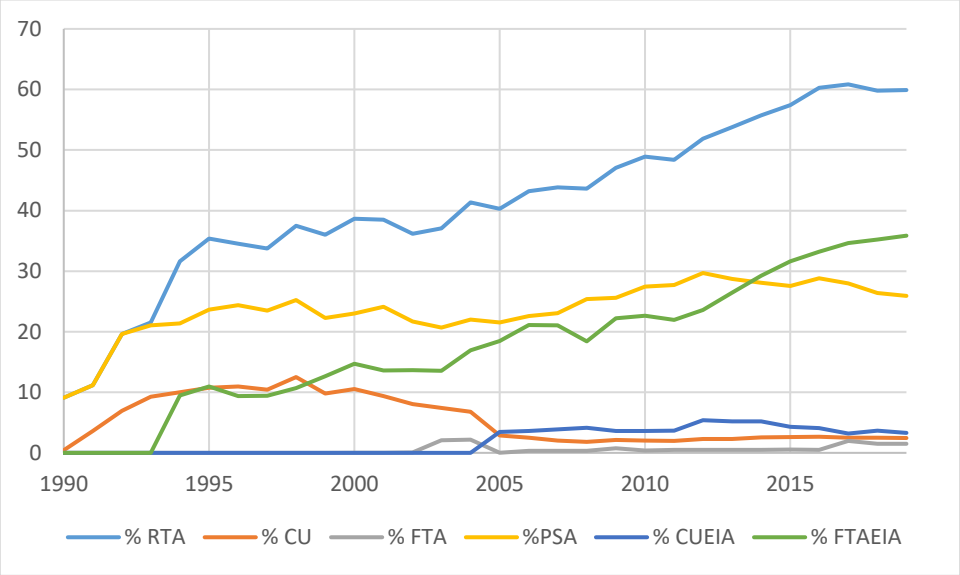
Figure 2. Number of Regional Trade Agreements (RTAs) by Country in Latin America (2024)



Source: Own elaboration based on the "Regional Trade Agreements Database": http://rtais.wto.org/UI/publicPreDefRepByCountry.aspx

As a result, the agri-food trade of Latin America has been increasingly channeled through these types of agreements (Figure 3). In 1990, less than 10% of agri-food trade was conducted through these agreements; subsequently, it experienced spectacular growth and currently represents 60%. In this expansion, the two most relevant types of agreement are the PSAs and FTAEIAs, with a similar relative weight, but representing around 50% of agri-food exports of the region. The importance of the rest of the types of agreements is fairly low.

Figure 3: Percentage of Latin American agri-food exports by RTAs and years



Source: own elaboration based on COMTRADE

Table 3 shows the average percentages of LA agri-food exports by country in the period 1990-2019. We can see that the countries with the highest percentage of their agricultural product exports through RTAs are Mexico (92.6%), Chile (78.4%), Bolivia (76.4%), and Nicaragua (76.3%). The majority of agricultural exports from Mexico, Chile, and Nicaragua are through FTAEIAs, while those from Bolivia are through PSAs.

Table 3: Average percentage of LA agri-food exports by country, period 1990-2019

	RTA	CU	FTA	PSA	CUEIA	FTAEIA
ARG	48.9	4.0	0.8	48.6	8.5	0.0
BOL	76.4	55.6	0.0	76.4	0.0	0.0
BRA	25.9	0.8	0.6	25.9	2.3	0.0
CHL	78.4	0.0	2.4	24.0	0.0	62.0
COL	44.5	7.2	0.0	17.3	0.0	30.2
CRI	55.3	15.1	0.8	0.0	0.0	50.0
DOM	62.2	0.0	0.0	0.3	0.0	61.8
ECU	24.5	5.7	0.0	19.3	0.0	5.2

	RTA	CU	FTA	PSA	CUEIA	FTAEIA
GTM	58.2	17.1	0.0	0.0	0.0	54.3
HND	56.5	12.7	0.0	0.0	0.0	53.9
HTI	0.0	0.0	0.0	0.0	0.0	0.0
MEX	92.6	0.0	0.0	4.8	0.0	89.0
NIC	76.3	25.0	0.0	14.8	0.0	60.5
PAN	19.8	1.9	0.0	10.0	0.0	10.6
PER	62.7	5.5	0.3	17.5	0.0	49.9
PRY	54.7	7.8	2.0	54.7	21.1	0.0
SLV	62.5	39.1	0.0	0.0	0.0	53.1
URY	38.7	7.0	1.7	38.7	15.7	1.8
VEN	35.4	29.3	0.0	35.4	0.0	0.0
Total	49.0	3.8	0.7	25.9	3.2	23.9

Source: own elaboration based on COMTRADE

To analyze whether trade agreements have contributed more to trade between Latin American countries or have favored trade with countries outside the region, we present Table 4, which indicates the average percentages exported each year to other Latin American countries or abroad, and what portion of this trade is carried out between countries with RTAs.

Table 4: Average percentage of LA agri-food exports to LA (LA-LA) and to the Rest of the World (LA-RoW), and percentage through RTAs

	TOTAL AGRI-FOOD EXPORTS		AGRI-FOOD EXP. through RTAs	
Year	**LA-LA**	**LA-RoW**	**LA-LA**	**LA-RoW**
1990	6.7	93.3	91.5	3.1
1991	7.5	92.5	94.2	4.5
1992	13.0	87.0	95.9	8.2
1993	15.8	84.2	94.8	7.8
1994	16.5	83.5	93.7	19.4
1995	17.1	82.9	94.1	23.3
1996	17.9	82.1	93.4	21.7
1997	17.1	82.9	92.8	21.6
1998	20.1	79.9	92.6	23.6
1999	16.9	83.1	91.2	24.7
2000	17.9	82.1	92.2	27.0
2001	17.3	82.7	92.8	27.1
2002	15.2	84.8	92.1	26.2
2003	14.0	86.0	92.6	28.0
2004	14.1	85.9	92.1	33.0
2005	13.4	86.6	92.4	32.2
2006	13.7	86.3	91.9	35.5
2007	15.3	84.7	92.5	35.0

	TOTAL AGRI-FOOD EXPORTS		AGRI-FOOD EXP. through RTAs	
Year	LA-LA	LA-RoW	LA-LA	LA-RoW
2008	16.9	83.1	94.2	33.3
2009	15.6	84.4	94.2	38.3
2010	16.0	84.0	94.3	40.3
2011	16.1	83.9	93.8	39.7
2012	17.2	82.8	94.8	43.0
2013	16.1	83.9	94.8	45.9
2014	15.5	84.5	95.1	48.4
2015	14.2	85.8	95.1	51.0
2016	13.7	86.3	95.6	54.5
2017	13.3	86.7	95.5	55.0
2018	13.7	86.3	96.4	53.9
2019	13.2	86.8	95.4	55.1
Year's average	**15.2**	**84.8**	**94.2**	**40.9**

Source: own elaboration based on COMTRADE

From the results in Table 4, we can draw two clear conclusions. First, throughout the period analyzed, the average percentage of agricultural exports from Latin America to the rest of the world (84.4%) is higher than intra-regional exports (15.2%). However, over time, the percentage of agri-food exports to other Latin American countries has increased (from 6.7% to 13.2%) and decreased to the rest of the world (from 93.3% to 86.8%). Second, the percentage of intra-regional agricultural exports through RTAs has increased from 91.5% in 1990 to 95.4% in 2019, while the percentage of exports to the rest of the world through RTAs has grown significantly more (from 3.1% to 55.1%).

3. Material and methods

In this section, we will explain how to estimate the effects of RTAs on bilateral agri-food trade in Latin America. The gravity model has been the main econometric approach for estimating the partial effects of different types of economic integration agreements on bilateral trade. In this paper, for the empirical analysis, we also use gravity models to explain the effect of different kinds of regional trade agreements on bilateral agri-food export flows from 19 Latin America countries to all of the countries in the world, during the period 1990-2019. The data are organized according to the Standard International Trade Classification (SITC) Revision 3 at the four-digit level, although with

respect to the estimates, the trade flows are aggregated according to the exporter, importer, type of trade flow and year.[1]

The gravity equation has been estimated, first, for the total agri-food exports, and second, including the intra-national agri-food flows, to account for possible trade diversion effects, following Yotov (2022), who emphasizes the advantages of including domestic trade flows in the estimations of these gravity equations. These domestic agri-food flows have been estimated by subtracting agri-food exports from agri-food production, as proposed in Dai et al (2014)[2].

In order to assess the effect of RTAs on Latin American agri-food exports, our baseline econometric specification is the same as in Baier and Bergstrand (2007) and Dai et al. (2014):

$$X_{ijt} = \exp(\beta_1 RTA_{ijt} + \theta_{it} + \phi_{jt} + \mu_{ij}) + \varepsilon_{ijt} \quad (1)$$

The dependent variable in the gravity model corresponds to the nominal bilateral agri-food exports from country *i* to country *j* at year *t* expressed in current US dollars, and sourced from UN-COMTRADE (2022). When we include the domestic agri-food trade, the only difference is that the dependent variable includes internal trade, X_{iit}. We denote "*i*" to the Latin American exporting country ($i = 1, 2, \ldots 19$), "*j*" to the importing country ($j = 1, 2, \ldots 239$) and "*t*" ($t = 1990, \ldots, 2019$) is the time horizon analysed. β_1 is the RTA parameter and RTA_{ijt} is a dummy variable taking the value of 1 if countries *i* and *j* shared at least one trade agreement in the year *t* and zero otherwise. Following the highly influential work of Anderson and van Wincoop (2003), we use time-exporter (θ_{it}) and time-importer (ϕ_{jt}) fixed effects in order to control for multilateral resistance terms (MRTs) and time-invariant country-pair (μ_{ij}) fixed effects to control for endogeneity in trade policies and to control for all time-invariant bilateral trade costs that can bias the estimates of the model. So, due to these multiple fixed effects, all standard country-specific time-varying variables and time-invariant country-pair-specific variables have

[1] The commodity groups included, with a disaggregation of 2, 3 and 4 digits, are: 00, 01, 02, 03, 04, 05, 06, 07, 08, 09, 11, 12, 21, 22, 231, 2322, 24, 261, 263, 264, 265, 268, 2721, 2919, 292, 41, 42 and 43. We take into account a total of 231 products.

[2] Agricultural production data from FAOSTAT (2023), https://www.fao.org/faostat/es/#data/QV.

been dropped in the gravity model. The error term (ε_{ijt}) captures all those variables that influence trade, and which are not explicitly specified.

In a second specification, as proposed in Larch and Yotov (2024a), we control for GATT/WTO membership to control for other trade liberalization policy variables, as their omission may lead to biases in the estimates of RTA effects:

$$X_{ijt} = \exp(\beta_1 RTA_{ijt} + \beta_2 GATT/WTO_{ijt} + \theta_{it} + \phi_{jt} + \mu_{ij}) + \varepsilon_{ijt} \qquad (2)$$

where β_2 is the WTO parameter and $GATT/WTO_{ijt}$ is a dummy variable taking the value of 1 if countries *i* and *j* belong to the GATT/WTO in the year *t*, and zero otherwise. We also implement the approach taken by Bergstrand et al. (2015), Baier et al. (2019), Larch and Yotov (2024a), and Timini (2023), introducing in the model a new variable $BORDER_{ijt}$ that is the interaction of a dummy $BORDER_{ij}$ that takes value 1 if $i \neq j$ and 0 otherwise, and year dummies:

$$X_{ijt} = \exp(\beta_1 RTA_{ijt} + \beta_2 GATT/WTO_{ijt} + \rho_t BORDER_{ijt} + \theta_{it} + \phi_{jt} + \mu_{ij}) + \varepsilon_{ijt} \qquad (3)$$

The evolution of the coefficient ρ_t over time shows how easy it is to trade internationally as opposed to trading domestically, as an indicator of globalization. This makes it possible to separate the impact of a trade agreement from other factors that influence international and domestic trade in different ways.

Finally, we have also estimated the impact of RTAs both on agri-food trade flows between Latin American countries (LA-LA) and on agri-food exports from Latin America to the rest of the world (LA-RoW).

One of the weaknesses of the estimation of the average effect of RTAs is that this effect can vary considerably depending on the type of agreement in question. To analyze the effect of different kinds of RTAs, we have also disaggregated them in terms of the type of RTAs signed by some LA countries, according to the WTO classification: CU, FTA, PSA, CUEIA and FTAEIA.

In all the estimations, we have used the Poisson Pseudo Maximum Likelihood (PPML) estimator, recommended by Santos Silva and Teneyro (2006, 2011 and 2022) and Larch and Yotov (2024a) with panel data to control for heteroscedasticity and for zero-trade flows. We have used the *ppmlhdfe* command of Stata that estimates the Poisson pseudo-maximum likelihood regressions (PPML) with multi-way fixed effects, as

described by Correia, et al. (2020), because we use three types of fixed effects as in Esteve-Perez et al. (2020), Sanguinet et al. (2022), Matto et al. (2022), and also recommended in Larch and Yotov (2024a, 2024b). Given the structure of trade data, which includes importers, exporters, and years, model errors may exhibit correlation across multiple dimensions. As a result, various clustering approaches have been proposed in the literature to adjust the standard errors accordingly. In these models, the standard errors have been calculated by clustering on exporter, importer and time levels, following Larch and Yotov (2024a), but similar results are obtained when clustering by country pair.

4. Results and discussion

4.1. Main results

As in Sanguinet et al. (2022) we have estimated five models for each of the previously proposed specifications. One that includes all RTAs, so that we can measure the impact of trade agreements in general, without distinguishing by type of agreement, and one for each type of regional trade agreement. Table 4 summarizes the effects of them on the agri-food trade of Latin America to all countries in the sample for the period 1990-2019**.** In the first column, the types of RTAs are listed. The second column (Exports) presents the estimated effects of the different RTAs on agri-food exports in (1). The third column (X+Domestic trade) contains the estimated effects of the different types of agreements, taking domestic trade into account. In the fourth column (X+DT+GATT/WTO), the estimations of these effects in expression (2) are shown when domestic trade and the dummy variable WTO are included. The fifth column (X+DT+GATT/WTO+BORDER) shows the estimates of these effects obtained in model (3) where the variable defined previously as BORDER is added, in order to measure the impact of globalization. Finally, the last column contains the estimated effects of the agreement, as in the fourth column, but using 5-year intervals, instead of consecutive years.

Table 5: Effects of RTAs on total LA agri-food exports, 1990-2019

VARIABLES	Exports (X)	X+ Domestic Trade (DT)	X+ DT+ GATT/WTO	X+ DT+ GATT+ BORDER	5-Year interval
RTA	0.118**	0.118**	0.118**	0.118	0.152**
	(0.057)	(0.057)	(0.057)	(0.075)	(0.070)
CU	0.638***	0.634***	0.634***	0.653***	0.807**
	(0.185)	(0.184)	(0.184)	(0.293)	(0.344)
FTA	-0.173***	-0.172***	-0.172***	-0.172	-0.230*
	(0.027)	(0.027)	(0.051)	(0.111)	(0.124)
PSA	0.393	0.387	0.388	0.388*	0.597
	(0.381)	(0.379)	(0.381)	(0.414)	(0.365)
CUEIA	0.132	0.110	0.109	0.113	0.116
	(0.344)	(0.329)	(0.329)	(0.415)	(0.352)
FTAEIA	0.109**	0.112**	0.111**	0.111*	0.122*
	(0.055)	(0.054)	(0.054)	(0.066)	(0.064)
Observations	84,349	89,750	89,110	89,103	17,130
Import-Year FE	YES	YES	YES	YES	YES
Export-Year FE	YES	YES	YES	YES	YES
Pair FE	YES	YES	YES	YES	YES

PPML regressions estimated using the *ppmlhdfe* of Coreira et al. (2021). Robust standard errors in parentheses are clustered at the exporter, importer and time level.
*** p< 0.01,** p <0.05, * p < 0.1

Before discussing the results of Table 5, we wish to make two clarifications. First, Table 4 does not include the estimates for the constant, the various fixed effects, or the parameters for the GATT/WTO and BORDER variables, due to space constraints. However, it should be noted that the effect of GATT/WTO membership is negative in all models and statistically not significant at the 5% level. Second, in the models estimated with the BORDER variable (3), which attempts to measure the effect of globalization, given that the model has a constant and a set of fixed effects, it is impossible to estimate the coefficients of all border variables, and we must drop one of them. Therefore, we have selected the border variable for the last year in our sample, 2019.

All estimates have been made using annual data, as proposed in Edger et al (2022), except those in the last column, which have been estimated using 5-year intervals, following the approach taken by Baier and Bergstrand (2007) and Oliver and Yotov (2012). In these 5-year interval estimations, all the models include the dummy GATT/WTO, and the effect of this variable in all the models is also negative and not significant. Although the estimates of trade elasticities with respect to the different RTAs

change, compared to those obtained when using data for consecutive years, the conclusions remain similar.

Following the recommendations of Edger et al (2022), we use three-way fixed effects, and we rely on data for consecutive years in the rest of our estimations.

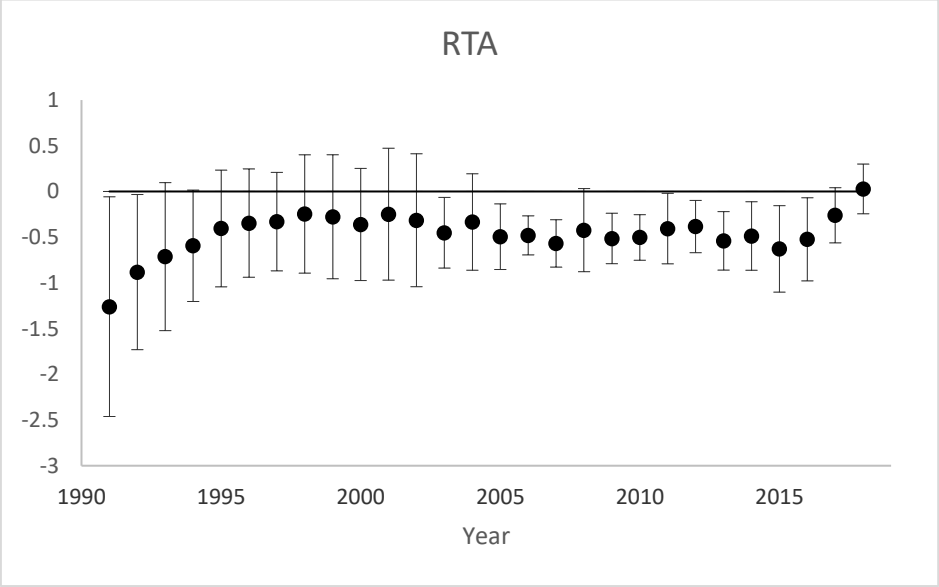
The main conclusions based on the results in Table 5 are that the estimates of the effects across different models for the same type of RTA, as well as their standard errors, are very robust, changing very little when introducing domestic trade or the GATT/WTO and BORDER variables. However, the heterogeneity between different types of agreements is larger.

When we use the dummy variable RTA, without distinguishing by type of agreement, we can see that the estimated coefficient for regional trade agreements is the same in all the models and is positive and statistically significant at conventional levels (except in the model with BORDER, which it is not significant but positive), implying that the Latin American agri-food exports between country pairs that sign an agreement increase by around 12.5% [100*(exp(0.118)-1)]. However, there are significant differences depending on the type of trade agreement. The estimated coefficient of the customs unions (CU) is always positive and statistically significant, meaning that this type of agreement has expanded the LA agri-food exports by 88-89% [100*(exp(0.634)-1); 100*(exp(0.638)-1)], while the elasticity of free trade agreements (FTAs) is negative and significant (except in (3), with BORDER). The elasticity of partial scope agreements (PSA), also always positive but not significant (except in the model with GATT/WTO, which is significant at 10%), is around 48% [100*(exp(0.39)-1)], and for free trade agreements and economic integration agreements (FTAEIA) it is around 11.5%. It is important to note that the two most important types of agreement for trade, the PSA and the FTAEIA, have the expected sign, and the latter is significant. Although the greatest effect is generated by the CUs, it should be remembered that there are only two agreements of this type, and they channel only a small part of the agri-food exports of the region.

We can also observe that the estimated effects of different agreements are larger when using time-interval data, specifically 5-year intervals. However, Egger et al. (2022) emphasize that time-interval data can lead to biased estimates of the magnitude of trade policy effects.

The estimation of the BORDER coefficients in (3) is presented in Figure 4, which plots the evolution of the estimated effects of international borders in the period 1990-2019 in the model with the global dummy RTA. We can observe the declining effect of international borders on trade. The estimated parameter for 1991 is -1.260, indicating that at the beginning of the sample period, it was more difficult to trade internationally compared to the end of the sample, 2019. In 1991, borders reduced international trade with respect to domestic trade by 72% [100*(exp(-1.26)-1)] more than in 2019.

Figure 4: Evolution of the effect of international borders, 1990-2019



The figure shows the estimation of the BORDER coefficients in (3) with the global dummy RTA (1990–2019). The bars represent the 95% confidence interval around the point estimates.

The decrease in the estimated effects over time indicates the effect of globalization, understood as the decrease in the costs of international trade compared to those of domestic trade, as in Timini (2023). It is worth noting that this impact was particularly significant during the 1990s, whereas it has been considerably more limited in subsequent decades.

4.2. Further empirical results

In order to make our results more solid, we have repeated our analysis, disaggregating the exports by destination region. To do this, we have divided the exports according to

whether they correspond to intraregional Latin American trade (LA-LA) or exports to the rest of the world (LA-RoW).

Historically, intraregional trade in Latin America has remained relatively limited (Carreras et al., 2013). This was also the case for agri-food trade, as between 1960 and 1990 it represented only a small fraction of total Latin American agri-food exports, fluctuating around 8% of the total (Serrano and Pinilla, 2015). From this late date, it initially grew very fast to around 15%. Table 5 shows the estimations of the effect of RTAs by type of agreements on the agri-food trade within Latin America (LA-LA) and with the rest of the world (LA-RoW), and some important differences in the estimates are worth noting. In the case of intraregional trade (LA-LA), in the same way as for the total agri-food trade in Table 4, we have used different specifications. In the case of trade between Latin America and the rest of the world (LA-RoW), the results are only presented in the last column of Table 5. This is because there is no difference in the estimated effects of the various RTAs on exports to the rest of the world (in this case, we cannot take into account the domestic trade), and these estimates do not change when the GATT/WTO dummy variable is included. Besides, it makes no sense to introduce the variable BORDER, because only in the case of Mexico with the USA, the dummy takes value 1. As a result, there is collinearity when we estimate the model with the BORDER variable.

For intra-regional trade, the main conclusion is that the estimations of the effects of the trade agreements and their standard errors are robust to the different specifications. When we use the dummy variable RTA, without distinguishing by type of agreement, we can see that the estimated coefficient for the regional trade agreements variable is the same in all the models, implying that the intraregional Latin American agri-food trade between Latin American country pairs that sign an agreement increases by around 32% [100*(exp (0.28)-1)], but only by around 12% [100*(exp (0.11)-1)] for the exports of LA to the rest of the world.

There are significant differences depending on the type of trade agreement. Only the CUs have fostered growth in intra-regional exports, having a considerably high impact (increasing it by around 95%). As there are two CUs (Central America and the Andean region), we can consider that, although their effect has been important, this trade has been geographically restricted to these regions. On the other hand, it is interesting to note that the most important CUEIA of the region, which is MERCOSUR, has not stimulated agri-

food exchanges between the member countries. This result is not surprising, as their production specializations in these types of goods are relatively similar.

Table 5: Effects of RTAs on intraregional LA agri-food trade (LA-LA) and extra-regional trade (LA-RoW), 1990-2019

	LA-LA				LA-WORLD
VARIABLES	**Exports (X)**	**X + Domestic Trade (DT)**	**X+DT+ GATT/WTO (G/W)**	**X+DT+ G/W+ +BORDER**	**Exports+G/W**
RTA	0.269***	0.283***	0.268***	0.282***	0.112***
	(0.080)	(0.082)	(0.080)	(0.109)	(0.040)
GATT/WTO$_{RTA}$			1.099***	1.051***	-0.295**
			(0.213)	(0.231)	(0.140)
CU	0.659***	0.659***	0.659***	0.686***	
	(0.168)	(0.150)	(0.168)	(0.199)	
GATT/WTO$_{CU}$			1.091***	1.060***	-0302**
			(0.129)	(0.161)	(0.144)
FTA					-0.176***
					(0.061)
GATT/WTO$_{FTA}$				1.062***	-0.302**
				(0.227)	(0.144)
PSA	0.231	0.226	0.234	0.226	0.135
	(0.350)	(0.344)	(0.350)	(0.347)	(0.182)
GATT/WTO$_{PSA}$			1.119***	1.071***	-0.302***
			(0.254)	(0.285)	(0.145)
CUEIA	0.106	0.080	0.105	0.080	
	(0.333)	(0.307)	(0.334)	(0.372)	
GATT/WTO$_{CUEIA}$			1.091***	1.051***	-0.302**
			(0.198)	(0.224)	(0.145)
FTAEIA	0.025	0.049	0.025	0.046	0.117***
	(0.110)	(0.114)	(0.111)	(0.155)	(0.033)
GATT/WTO$_{FTAEIA}$				1.059***	
				(0.230)	
Observations	8,876	9,961	8,848	9,954	75,501
Import-Year FE	YES	YES	YES	YES	YES
Export-Year FE	YES	YES	YES	YES	YES
Pair FE	YES	YES	YES	YES	YES

PPML regressions estimated using the ppmlhdfe of Coreira et al. (2021). Robust standard errors in parentheses are clustered at the exporter, importer and time level.
*** p< 0.01,** p <0.05, * p < 0.1

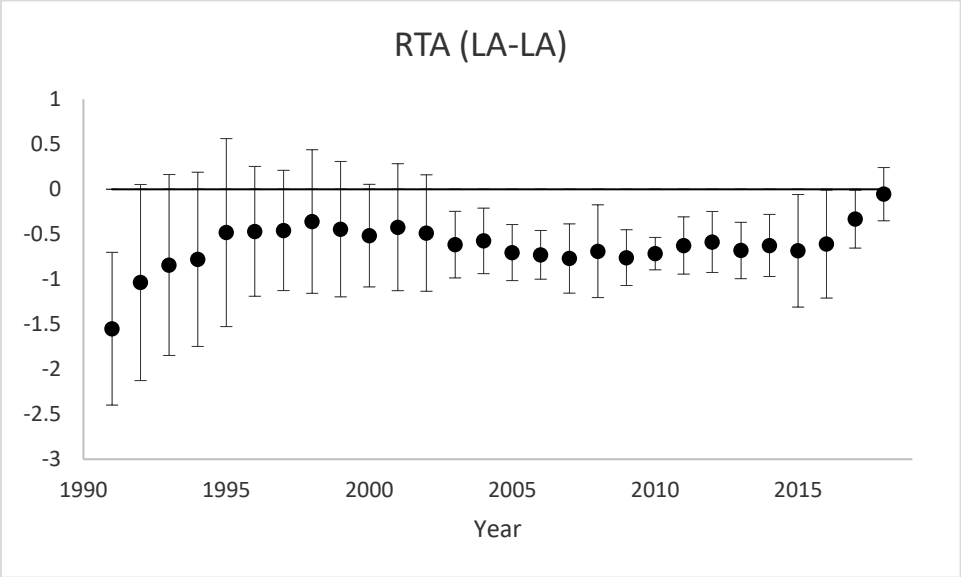
In the case of extra-regional trade, the effects of the RTAs are smaller than those for intra-regional trade, and only the FTAEIAs have driven its growth. Here, it is interesting to point out that a very large part of Latin American exports is channeled through these types of agreements, and some, as relevant as NAFTA or TPP have stimulated trade,

which seems logical, given that the complementarities between the specialization of the countries of the region and the demands of their partners have been exploited.

It should be noted that the GATT/WTO membership variable is highly significant (even at 1%) and the estimation of its parameter is positive (around 1.1, for all types of agreements) in the case of intra-regional trade (LA-LA), with an elasticity of around 175% [100*(exp (1.1)-1)]. However, this estimation is negative (-0.3) for trade with the rest of the world (LA-RoW), with a negative elasticity of around -26% [100*(exp (-0.3)-1)]. In other words, membership in GATT or WTO has benefited intra-regional trade but has hindered Latin America's agricultural trade with the rest of the world.

Figure 5 plots the evolution of the estimated effects of international borders in the period 1990-2019 in the model with the global dummy RTA, for intra-regional trade.

Figure 5: Evolution of the effect of international borders in the intra-regional trade, 1990-2019, LA-LA



The figure shows the estimation of the BORDER coefficients in (3) with the global dummy RTA (1990–2019) for intraregional trade. The bars represent the 95% confidence interval around the point estimates.

We can appreciate the declining effect of international borders on LA-LA trade. The estimated parameter for 1991, for intra-regional trade, is -1.549, indicating that at the beginning of the sample period, it was more difficult to trade internationally compared to the end of the sample, 2019. In 1991, borders reduced international trade with respect to

domestic trade by 79% [100*(exp(-1.549)-1)] more than in 2019. As with total trade, intraregional trade also experienced its strongest liberalizing momentum during the first half of the 1990s, in line with the new development strategy aimed at mobilizing resources in competitive sectors (Martín-Retortillo et al., 2018).

We also examine how the effects of RTAs evolved over time. In Table 6, we present estimates that allow for decade-specific RTA effects, based on specification (3), which includes the GATT/WTO dummy and BORDER variable. We distinguish three subperiods: 1990–1999, 2000–2009, and 2010–2019.

Table 6: Effects of RTAs on LA agri-food trade, by subperiods

VARIABLES	**1990-1999**	**2000-2009**	**2010-2019**
RTA	-0.241***	0.047*	0.040
	(0.112)	(0.024	(0.064)
CU	0.285	0.462***	0.133
	(0.200)	(0.078	(0.208)
FTA		-0.010	-0.246
		(0.041)	(0.169)
PSA	-0.106	0.168	0.102
	(0.138)	(0.228)	(0.378)
CUEIA		-0.309**	0.347
		(0.131)	(0.236)
FTAEIA	-0.182	0.043**	0.031
	(0.177)	(0.017)	(0.060)
Observations	20,105	27,472	28,070
Import-Year FE	YES	YES	YES
Export-Year FE	YES	YES	YES
Pair FE	YES	YES	YES

PPML regresions estimated using the ppmlhdfe of Coreira et al. (2021). Robust standard errors in parentheses are clustered at the exporter, importer and time level.
*** p< 0.01,** p <0.05, * p < 0

We found some differences between the subperiods. In the period 1990–1999, the average effect of RTAs on bilateral agri-food trade is negative. In the period 2000–2009, the average effect becomes positive and significant, and in the last subperiod 2010–2019, it remains positive but is not statistically significant.

When these results are considered alongside those obtained from the estimation of the border effect (Figure 3), it can be argued that during the final decade of the 20th century, multilateral liberalization—within the broader context of what has been termed hyper globalization played a key role in driving the region's agri-food exports. This phase was shaped by major shifts in trade policy among developing countries, including those in

Latin America, as well as by the integration of former Soviet bloc countries and China into global markets (Anderson et al., 2013; Anderson, 2023). As a result, agri-food exports grew at an exceptionally high average annual rate of 13.9% during this period. In contrast, in the first decade of the 21st century, the effects of regional trade agreements (RTAs) became the main driver of trade expansion. During this period, the growth of agri-food exports consolidated, with an average annual growth rate of 4.6%, and the combined impact of all trade agreements was both positive and statistically significant. However, in the second decade of the 21st century, despite a similar export growth rate (5.1% annually), the overall effect of trade agreements is no longer statistically significant.

If we distinguish between the effects of different types of RTAs, following the WTO classification, Customs Unions (CUs) already had a positive but not statistically significant impact in the 1990s, but it is significant in the following decade. Since there were only two CUs in the region, this result can largely be attributed to the case of the Andean Community (CAN), where the free movement of goods among member countries was definitively implemented starting in 1993. However, this impact appears to diminish in later years, a trend likely influenced by Venezuela's withdrawal from the agreement in 2006. In the case of Central America, intraregional trade received a notable boost with the launch of the Central American Integration System (SICA) in 1991 and the subsequent efforts to promote the free circulation of goods.

The positive impact of Free Trade Areas and Economic Integration Agreements (FTAEIAs) appears to be closely linked to the results of NAFTA, signed in 1994, which began to yield substantial effects particularly from the late 1990s onward. This is largely due to the gradual nature of tariff reductions following the agreement's entry into force, which led to a surge in Mexican exports to the United States. The initially limited effect of NAFTA has also been noted in previous studies (Krueger, 2000; Lederman et al., 2004). In the second decade of the 21st century, although our results continue to indicate a positive effect, it is no longer statistically significant.

7. Discussion and Conclusions

This paper has analyzed the impact of various regional trade agreements (RTAs) on Latin American agri-food trade, using bilateral trade data from 19 Latin American countries over the period 1990–2019. To conduct this analysis, we estimated a gravity model using the Poisson pseudo-maximum likelihood (PPML) estimator, which addresses issues of heteroskedasticity and zero trade flows. Our empirical strategy incorporates a rich set of fixed effects to control for endogeneity and multilateral resistance terms, and we apply three-way clustered standard errors to account for potential autocorrelation in the error terms. Importantly, the analysis includes both international and domestic trade flows, aligning our specifications with the most recent methodological advances in the literature on the effects of RTAs.

To ensure the robustness of our results, we carried out a comprehensive sensitivity analysis, testing alternative model specifications and using data at different frequencies, including annual observations and five-year averages. We further explored potential heterogeneity in the trade effects of RTAs, distinguishing between types of agreements, the destination regions of exports, and different subperiods.

The first and arguably most significant conclusion of our study is that the strategy adopted by Latin American countries to expand trade through the signing of RTAs has played a crucial role in boosting agri-food exports. While previous studies (Florensa et al., 2015; Hannan, 2017; Márquez-Ramos et al., 2015; Sánchez-Albornoz and Timini, 2021) have found positive effects of RTAs on total exports, none have focused exclusively on agri-food products, which are central to the region's export profile.

Our results show that not all RTAs have had the same impact. Custom Unions (CUs) and Free Trade Agreements and Economic Integration Agreements (FTAEIAs) have generated the strongest positive effects on agri-food exports. Customs Unions (CUs), while associated with the highest trade impacts, remain rare in the region. This suggests that deeper and broader trade integration could have generated even more substantial benefits for Latin American agri-food exports. The FTAEIAs findings highlight the pivotal role that NAFTA played for Mexico over the period studied, along with the significance of other agreements—such as the TPP—for the region's partner countries.

These findings are in line with a growing body of evidence that highlights the importance of the quality of trade agreements—such as product coverage and the depth of liberalization—over their quantity (Gómez-Mera and Varela, 2021). In this regard, our results reinforce those of Sánchez-Albornoz and Timini (2021), who found that only about half of the trade agreements signed by Latin American countries produced significant export gains. We similarly observe substantial heterogeneity across agreements, with particularly strong positive effects from initiatives such as NAFTA, TPP, CAN, and CACM. Conversely, the impact of MERCOSUR remains ambiguous, and our findings do not suggest a statistically significant effect throughout the entire period. —echoing the mixed results reported in the literature (Sánchez-Albornoz and Timini, 2021).

Export destination also matters. RTAs have had a more pronounced impact on intraregional trade than on exports to countries outside the region, mirroring the findings of Sánchez-Albornoz and Timini (2021) for total trade. Likewise, studies by the Inter-American Development Bank (IADB, 2018) and Mesquita Moreira (2018) also report stronger effects of RTAs on intra-Latin American trade than on extra-regional flows.

The impact of the different RTAs has also been different depending on the period analyzed. In the last decade of the 20th century, the expansion of Latin America's agri-food exports was driven more by a combination of liberalizing policies implemented by countries in the region—which reoriented their economies toward external trade—the strong demand surge from Asia, particularly China, and the broader phenomenon of hyperglobalization, than by regional trade agreements (RTAs) themselves. However, since the early 21st century, these agreements have gained prominence, especially considering the subsequent slowdown in international economic integration.

Finally, our results carry important policy implications in the context of rising global trade tensions and uncertainty regarding the future of the multilateral trading system. In the face of stalled multilateral liberalization efforts, RTAs have played a key role in sustaining and expanding Latin America's agri-food exports. This is especially true for trade with countries outside the region, which accounts for more than 80% of the region's agri-food exports. The potential dismantling of existing agreements—such as NAFTA in the case of Mexico—could have severe economic consequences, while the

implementation of new accords, such as the EU–MERCOSUR agreement, could yield substantial benefits for agri-food exporters, particularly in the Southern Cone. In general, it can be argued that meaningful progress in the integration of Latin American economies would provide a significant boost to intraregional trade, which still represents only a small share of total exports.

8. References

Afesorgbor, S.K., Santeramo, F. and Steinbach, S. (2025). Global governance, economic sanctions and agricultural trade in a fragmenting world economy. *The World Economy*. https://doi.org/10.1111/twec.13730

Anderson, J.E. and Van Wincoop, E. (2003). Gravity with gravitas: A solution to the border puzzle. *American Economic Review*, **93**(1), pp. 170–192. https://doi.org/10.1257/000282803321455214

Anderson, K. (2023). Agriculture's globalization: Endowments, technologies, tastes and policies. *Journal of Economic Surveys*, **37**(4), pp. 1314–1352. https://doi.org/10.1111/joes.12529

Anderson, K., Rausser, G. and Swinnen, J. (2013). Political economy of public policies: Insights from distortions to agricultural and food markets. *Journal of Economic Literature*, **51**(2), pp. 423–477. http://dx.doi.org/10.1257/jel.51.2.423

Ayuda, M.I., Belloc, I. and Pinilla, V. (2022). Latin America agri-food exports, 1994–2019: A gravity model approach. *Mathematics*, **10**(3), 333. https://doi.org/10.3390/math10030333

Ayuda, M.I., Belloc, I. and Pinilla, V. (2024). Export boom and reprimarisation: Determining factors of a new export era in Latin American economic history. *Revista de Historia Económica / Journal of Iberian and Latin American Economic History*, **42**(3), pp. 301–330. https://doi.org/10.1017/S021261092400020X

Baier, S.L., Yotov, Y.V. and Zylkin, T. (2019). On the widely differing effects of free trade agreements: Lessons from twenty years of trade integration. *Journal of International Economics*, **116**, pp. 206–226. https://doi.org/10.1016/j.jinteco.2018.06.001

Baier, S.L. and Bergstrand, J.H. (2007). Do free trade agreements actually increase members' international trade? *Journal of International Economics*, **71**(1), pp. 72–95. https://doi.org/10.1016/j.jinteco.2006.02.005

Baier, S. and Standaert, S. (2024). Gravity, globalization and time-varying heterogeneity. *European Economic Review*, **163**, 104679. https://doi.org/10.1016/j.euroecorev.2023.104679

Baldwin, R. (2016). The World Trade Organization and the future of multilateralism. *Journal of Economic Perspectives*, **30**(1), pp. 95–116. http://dx.doi.org/10.1257/jep.30.1.95

Baldwin, R.E. and Taglioni, D. (2006). Gravity for dummies and dummies for gravity equations (NBER Working Paper No. 12516). Cambridge, MA: National Bureau of Economic Research. https://doi.org/10.3386/w12516

Balogh, J.M. and Aguiar, G.M.B. (2022). Determinants of Latin American and the Caribbean agricultural trade: A gravity model approach. *Agricultural Economics*, **68**(4), pp. 127–136. https://doi.org/10.1111/agec.12682

Bergstrand, J.H., Larch, M. and Yotov, Y.V. (2015). Economic integration agreements, border effects, and distance elasticities in the gravity equation. *European Economic Review*, **78**, pp. 307–327. https://doi.org/10.1016/j.euroecorev.2015.07.001

Bhagwati, J. (1992). Regionalism versus multilateralism. *The World Economy*, **15**(5), pp. 535–556. https://doi.org/10.1111/j.1467-9701.1992.tb00536.x

Bulmer-Thomas, V. (1994). *The economic history of Latin America since independence*. Cambridge: Cambridge University Press.

Cheng, I.H. and Wall, H.J. (2005). Controlling for heterogeneity in gravity models of trade and integration. *Federal Reserve Bank of St. Louis Review*, **87**(1), pp. 49–63. https://doi.org/10.20955/r.87.49-64

Correia, S., Guimarães, P. and Zylkin, T. (2020). Fast Poisson estimation with high-dimensional fixed effects. *Stata Journal*, **20**, pp. 90–115. https://doi.org/10.1177/1536867X20909670

Dai, M., Yotov, Y.V. and Zylkin, T. (2014). On the trade-diversion effects of free trade agreements. *Economics Letters*, **122**, pp. 321–325. https://doi.org/10.1016/j.econlet.2014.01.036

Döbeling, T., Ikeme, S. and Countryman, A.M. (2025). Tariff troubles: Repercussions of protectionist policies on US agriculture and the trade deficit. *The World Economy*. https://doi.org/10.1111/twec.13731

Egger, P.H. and Larch, M. (2008). Interdependent preferential trade agreement memberships: An empirical analysis. *Journal of International Economics*, **76**(2), pp. 384–399. https://doi.org/10.1016/j.jinteco.2008.05.001

Egger, P.H. and Larch, M. (2011). An assessment of the Europe Agreements' effects on bilateral trade, GDP, and welfare. *European Economic Review*, **55**(2), pp. 263–279. https://doi.org/10.1016/j.euroecorev.2010.09.001

Egger, P.H., Larch, M. and Yotov, Y.V. (2022). Gravity estimation with interval data: Revisiting the impact of free trade agreements. *Economica*, **89**, pp. 44–61. https://doi.org/10.1111/ecca.12454

Esteve-Pérez, S., Gil-Pareja, S. and Llorca-Vivero, R. (2020). Does the GATT/WTO promote trade? After all, Rose was right. *Review of World Economics*, **156**, pp. 377–407. https://doi.org/10.1007/s10290-019-00378-8

FAO. (2020). *Food Outlook – Biannual Report on Global Food Markets: June 2020*. *Food Outlook*, **1**. Rome: FAO https://doi.org/10.4060/ca9509e

FAOSTAT (2023). *Production*. https://www.fao.org/faostat/en/#data/QV

Florensa, L.M., Márquez-Ramos, L. and Recalde, M.L. (2015). The effect of economic integration and institutional quality of trade agreements on trade margins: Evidence for Latin America. *Review of World Economics*, **151**(2), pp. 329–351. https://doi.org/10.1007/s10290-015-0209-x

Gómez-Mera, L. and Varela, G. (2021). Deep trade agreements and domestic institutions in the Americas. *Latin American Research Review*, **56**(3), pp. 607–624. https://doi.org/10.25222/larr.679

Hannan, S.A. (2017). *The impact of trade agreements in Latin America using the synthetic control method* (IMF Working Paper No. WP/17/45). Washington, DC: International Monetary Fund.

Inter American Development Bank. (2018). *Connecting the dots: A road map for better integration in Latin America and the Caribbean*. Washington, DC: IADB Publishing.

Krueger, A.O. (2000). NAFTA's effects: A preliminary assessment. *The World Economy*, **23**(6), pp. 761–775. https://doi.org/10.1111/1467-9701.00302

Larch, M. and Yotov, Y.V. (2024a). Estimating the effects of trade agreements: Lessons from 60 years of methods and data. *The World Economy*, **47**(5), pp. 1771–1799. https://doi.org/10.1111/twec.13569

Larch, M. and Yotov, Y.V. (2024b). Regional trade agreements: What do we know and what do we miss? *FIW Policy Brief*, **64**. FIW. https://www.fiw.ac.at/wp-content/uploads/2024/10/64_FIW_PB_LarchYotov.pdf

Larch, M., Shihher, S. and Yotov, Y.V. (2025). Estimating gravity equations: Theory implications, econometric developments, and practical recommendations. *Review of International Economics*, **0**, pp. 1–25. https://doi.org/10.11111/roie.12789

Lederman, D., Maloney, W.F. and Serven, L. (2004). *Lessons from NAFTA for Latin America and the Caribbean Countries: A Summary of Research Findings*. Stanford, CA: Stanford University Press and The World Bank.

Lim, S. and Suwanprasert, W. (2025). Post-coup sanctions and Thailand's agricultural trade. *The World Economy*. https://doi.org/10.1111/twec.13733

Márquez Ramos, L., Florensa, L.M. and Recalde, M.L. (2015). Economic integration effects on trade margins: Sectoral evidence from Latin America. *Journal of Economic Integration*, **30**, pp. 269–299. https://doi.org/10.11130/jei.2015.30.2.269

Martín Retortillo, M., Pinilla, V., Velazco Portocarrero, J. and Willebald, H. (2019). The dynamics of Latin American agricultural production growth, 1950–2008. *Journal of Latin American Studies*, **51**(3), pp. 573–605.

Mattoo, A., Mulabdic, A. and Ruta, M. (2022). Trade creation and trade diversion in deep agreements. *Canadian Journal of Economics*, **55**(3), pp. 1598–1637. https://doi.org/10.1111/caje.12611

Ocampo, J.A. (2017). Commodity-led development in Latin America. *International Development Policy Series*, **9**, pp. 51–76. https://doi.org/10.1163/9789004351677_005

Olivero, M.P. and Yotov, Y.V. (2012). Dynamic gravity: Endogenous country size and asset accumulation. *Canadian Journal of Economics*, **45**(1), pp. 64–92.

Sánchez-Albornoz, A.E. and Timini, J. (2021). Trade agreements and Latin American trade (creation and diversion) and welfare. *The World Economy*, **44**(7), pp. 2004–2040. https://doi.org/10.1111/twec.13126

Sanguinet, E.R., Alvim, A.M. and Atienza, M. (2022). Trade agreements and participation in global value chains: Empirical evidence from Latin America. *The World Economy*, **45**(3), pp. 702–738. https://doi.org/10.1111/twec.13185

Santeramo, F.G. and Lamonaca, E. (2022). Standards and regulatory cooperation in regional trade agreements: What the effects on trade? *Applied Economic Perspectives and Policy*, **44**(4), pp. 1682–1701. https://doi.org/10.1002/aepp.13276

Santos Silva, J.M.C. and Tenreyro, S. (2006). The log of gravity. *The Review of Economics and Statistics*, **88**(4), pp. 641–658. https://doi.org/10.1162/rest.88.4.641

Santos Silva, J.M.C. and Tenreyro, S. (2011). Further simulation evidence on the performance of the Poisson pseudo maximum likelihood estimator. *Economics Letters*, **112**(2), pp. 220–222. https://doi.org/10.1016/j.econlet.2011.05.008

Santos Silva, J.M.C. and Tenreyro, S. (2022). The log of gravity at 15. *Portuguese Economic Journal*, **21**, pp. 423–437. https://doi.org/10.1007/s10258-021-00203-w

Serrano, R. and Pinilla, V. (2011). The evolution and changing geographical structure of world agri-food trade, 1951–2000. *Revista de Historia Industrial*, **46**, pp. 97–125.

Serrano, R. and Pinilla, V. (2016). The declining role of Latin America in global agricultural trade, 1963–2000. *Journal of Latin American Studies*, **48**(1), pp. 115–146.

Timini, J. (2023). Revisiting the "Cobden Chevalier network" trade and welfare effects. *Explorations in Economic History*, **89**, 101480. https://doi.org/10.1016/j.eeh.2022.101480

United Nations (UN) Comtrade. (2021). *Commodity Trade Statistics Database*. https://comtrade.un.org/db/

Wise, C. (2016). Playing both sides of the Pacific: Latin America's free trade agreements (FTAs) with China. *Pacific Affairs*, **89**(1), pp. 75–101. https://doi.org/10.5509/201689175

Yotov, Y.V. (2012). A simple solution to the distance puzzle in international trade. *Economics Letters*, **117**(3), pp. 794–798. https://doi.org/10.1016/j.econlet.2012.08.032

Yotov, Y.V. (2022). *Gravity at sixty: The workhorse model of trade* (CESifo Working Paper No. 9584). Munich: CESifo. https://doi.org/10.2139/ssrn.4037001