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The Effects of Regional Trade Agreements on Trade Flows: A Structural Gravity Equation Analysis

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ABSTRACT

Regional trade agreements have markedly increased over the past few decades, and almost every country participates in one or more regional trade agreements. The depth and complexity of these signed agreements have also increased. Since the development of Viner's classic customs union theory in the 1950s, there has been considerable research on the effect of regional trade agreements on international trade volume. Still, the findings have been varied and mixed. This article analyzes the partial effect of regional trade agreements on trade volume, tracing the advancements in gravity and economic integration literature from Tinbergen's initial research to the present day. In this context, by using international and intranational trade data, this article uses the gravity equation with the PPML estimation method to reveal the effect of regional trade agreements on trade flows for the 1966–2020 period. According to the results, besides international trade flows, intranational trade flows and globalization are essential components when estimating the effects of regional trade agreements. Additionally, the findings show that the European Union, being one of the deepest and oldest economic integrations, considerably increases the bilateral trade compared to a standard regional trade agreement. Therefore, the policies implemented by the European Union in this context could serve as a guiding example for free trade agreements that other countries might sign.

Keywords: Regional trade agreements, Gravity equation, Economic integration

Bölgesel Ticaret Anlaşmalarının Ticaret Akımları Üzerindeki Etkisi: Yapısal Yerçekimi Denklemi Analizi

Süreç

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ÖZET

Bölgesel ticaret anlaşmaları, son kırk yılda hızlı bir şekilde artmıştır ve hemen hemen tüm ülkeler bir veya daha fazla bölgesel ticaret anlaşması imzalamışlardır. Bu anlaşmaların derinliği ve karmaşıklığı yıllar içinde giderek artmıştır. 1950'lerde Viner'in klasik gümrük birliği teorisinin geliştirilmesinden bu yana, bölgesel ticaret anlaşmalarının uluslararası ticaret hacmi üzerindeki etkisi üzerine çok sayıda çalışma yapılmıştır. Yine de bulgular çeşitli ve karışıktır. Bu makale, bölgesel ticaret anlaşmalarının dış ticaret hacmi üzerindeki kısmi etkisini Tinbergen ile başlayan ve günümüze kadar olan devam eden ekonomik entegrasyon ve yer çekimi denklemi literatüründeki gelişmeleri takip analiz etmektedir. Bu doğrultuda çalışma, uluslararası ve yurt içi ticaret verileri kullanarak PPML tahmin yöntemi ile 1966-2020 dönemi için bölgesel ticaret anlaşmalarının uluslararası ticaret hacmi üzerindeki etkisini ortaya koymak için yer çekimi modelini kullanmıştır. Elde edilen sonuçlara göre, uluslararası ticaret akımlarının yanı sıra yurtiçi satışlar ve küreselleşme bölgesel ticaret anlaşmalarının etkilerinin tahmin etmede temel bileşenlerdir. Ayrıca çalışmadan elde edilen bulgular en derin ve en eski ekonomik entegrasyonlardan biri olan Avrupa Birliği'nin standart bir bölgesel ticaret anlaşmasına kıyasla ikili ticareti önemli ölçüde artırdığını göstermektedir. Dolayısı ile Avrupa Birliği'nin bu bağlamda uyguladığı politikalar, diğer ülkelerin imzalayacağı serbest ticaret anlaşmaları için yol gösterici nitelikte olabilir.

Anahtar Kelimeler: Bölgesel ticaret anlaşmaları, Yerçekimi denklemi, Ekonomik entegrasyon

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Introduction

The General Agreement on Tariffs and Trade (GATT) was signed in 1947, following the end of the Second World War. Its primary objective was to promote global trade liberalization through multilateral means. In 1995, GATT was replaced by the World Trade Organization (WTO), which, unlike GATT, has a corporate structure. According to the most-favored-nation (MFN) principle of GATT/WTO, countries are generally prohibited from engaging in discriminatory practices against their trading partners. Certain exceptions are permissible; for instance, governments can establish a free trade agreement that exclusively pertains to products exchanged within the group, expressing discrimination against items from other countries (WTO, 2023). The slow progress and inconclusive GATT-WTO rounds have led countries toward bilateral agreements, and this fact has caused the regionalization of world trade. Krugman (1993) describes this process as shifting from globalism to localism because of slow multilateralism.

Furthermore**,** the founding members of GATT perceived regionalism as a form of "insurance policy" for smaller nations, as it helped to mitigate some of the imbalances between larger and smaller trading partners by allowing them to be part of numerous trading organizations. The flexible rule incentivized nations to seek alternative resolutions for trade issues outside the multilateral system (Barton et al., 2006). The result has been an explosion of both the number and context of these agreements, and according to the WTO, as of June 2016, all WTO members now have a regional trade agreement[1]. Bhagwati (1995) likens this increase in regional trade agreements and crisscrossing situation to a “spaghetti bowl." Consequently, regional trade agreements have emerged as a significant component of global trade. The aim of this paper is to analyze the partial effect[2] (henceforth only effect) of regional trade agreements on trade flows for the 1966–2020 period. In addition to regional trade agreements, globalization and the European Union (EU) variables are also included in the article to conduct a more comprehensive analysis. A long-term analysis is required to capture the effects of globalization and the European Union on trade flows. In this context, the 1966-2020 period was analyzed because the most comprehensive intranational trade data are available for this period, which allows for a long-term analysis perspective.

This article contributes to existing literature in several ways: Firstly, the European Union (EU) is differentiated from regional trade agreements and then added as a separate variable in the model. This distinction enables to make a fine-tuned analysis about the impact of integration depth on trade flows. Secondly, to reveal the effects of regional trade agreements on trade flows while considering intranational trade flows and globalization with a long-run treatment. To my knowledge, this article is one of the few studies in the literature that has used intranational data for such a long period of time. Thirdly, to ensure an unbiased and precise estimation, the article uses the gravity equation using Poisson Pseudo Maximum Likelihood (PPML) regression while incorporating developments and improvements from the related literature. The paper comprises five sections in this context, and the rest is organized as follows: Firstly, the prominent factors that caused the rise of regional trade agreements are presented, and then the literature is reviewed to highlight the paper’s contribution to existing literature. After these sections, there is a section that includes the motivation to estimate the effects of regional trade agreements on trade flows using the gravity equation, as the gravity equation is a widely accepted tool for evaluating the impacts of regional trade agreements. After all these sections, the method and research findings are revealed. Finally, there is a conclusion and offers suggestions for future research.

The Rise of Regional Trade Agreements

The Regional Trade Agreements (henceforth, RTAs) aim to promote and facilitate international trade between participating countries by removing or reducing barriers to trade. In his influential book "The Customs Union Issue," Jacob Viner (1950) proposed that trade agreements had specific impacts, such as trade creation and diversion. In the framework of trade creation, the opening of preferential trade enables the substitution of domestic output with imports from more efficient enterprises in nations that receive preferential treatment. This substitution results in welfare advantages. Simultaneously, RTAs have the potential to decrease imports from non-member nations that are more efficient, resulting in a welfare loss known as trade diversion. The overall impact on welfare resulting from RTAs depends on the comparative magnitude of these opposing effects (WTO, 2011).

Figure 1 shows the evolution of RTAs between 1948 and 2025, and according to the WTO data, cumulative notifications of RTAs in force were only 2 in 1958; this number has increased rapidly since the beginning of the 2000s and increased to 617 in 2025.

[1]RTAs in the WTO are taken to mean any reciprocal trade agreement between two or more partners, not necessarily belonging to the same region (WTO,2024). In this paper, it is called RTA as an umbrella term and it covers Free Trade Agreements, Partial Scope Agreement, Regional Trade Agreements, Economic Integration Agreements, Custom Unions etc.

[2] The effect of a free trade agreement for a pair of countries in the ex-ante analysis is conducted by computable general equilibrium (CGE) analysis, and on the other hand, the ex-post analysis, which shows the partial effects of FTAs on trade flows, has mostly been conducted using gravity equations (Baier & Bergstrand, 2009).

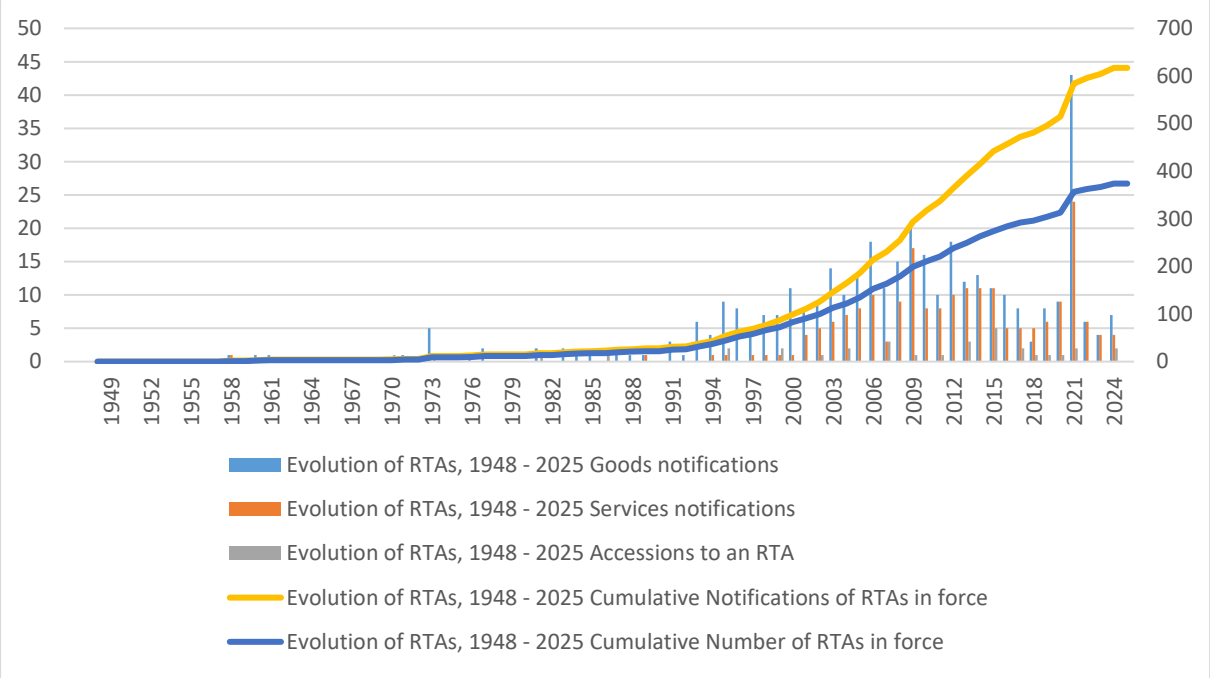

Figure 1. The Evolution of Regional Trade Agreements Between 1948-2025

Source: World Trade Organization RTA Database

This rapid increase in the number and scope of RTAs over the years has made determining to what extent they affect bilateral trade volume one of the analyzed topics. After the Second World War, tariffs fell rapidly, and the increase in RTAs accompanied this rapid decline in the world economy; tariffs were already low, so the factors that led to a rapid rise in RTAs may be factors outside the low tariffs. When looking at the course of RTAs periodically, before about 1980, trade agreements and global trade discussions conducted under the GATT were considered mutually reinforcing rather than alternative approaches. Subsequently, the two entities have diverged on their own paths. Regional trade blocs experienced remarkable and unforeseen success during the 1980s. (Krugman, 1991). In this context, the EU, AFTA, and NAFTA (USMCA) can be examples of old established trade blocs, and RCEP and AfCFTA can be examples of newly established trade blocs.

In recent decades, there has been a significant increase in the number of RTAs. These agreements involve many types of participants, such as bilateral, plurilateral, and cross-regional initiatives. Moreover, the countries involved in these agreements are at different levels of economic development, including agreements between developed and developing countries and between developed and developing countries. These agreements often address a wide range of issues outside the scope of the WTO, such as services, capital flows, standards, intellectual property rights, and commitments concerning labor and environmental issues. (WTO, 2011).

A frequently emphasized reason for the rise of the RTAs is the recognition of third-nation effects, or, in other words, RTA interdependence. This idea is formalized by Baldwin (1993) as the domino theory of regionalism. The domino theory of regionalism posits that signing or intensifying one RTA can encourage previously excluded nations to join other RTAs that they had formerly avoided. The main point is how trade diversion engenders novel political and economic dynamics in left-out countries. RTAs generate trade diversion, which may lead to the establishment of additional RTAs, making them 'contagious' (Baldwin & Jaimovich, 2012).

Another opinion regarding the increase in the number of RTAs is that there is an "authoritative gap" regarding GATT/WTO, according to Barton et al. (2006). The present state of affairs demonstrates the regime's incapacity to adapt its regulations and standards of conduct to align with its members' evolving interests and influence. Despite undergoing significant reinstitutionalization in 1995, the organization's "contract" frequently fails to align with the interests of its members and the changing dynamics of international trade. As international trade shifted from the exchange of manufactured goods to services and commercial transactions, including foreign direct investment, the members' interests started to diverge based on geographical divisions between the northern and southern regions. The focus on emerging trade concerns, such as safeguarding intellectual property rights, intensified this division as developing countries were frequently compelled to modify their domestic regulations and institutions. (Barton et al., 2006)

Bhagwati (2008) analyzed the evolution of RTAs from a historical perspective and identified two distinct periods of increase of RTAs and regionalism in world trade. The First Regionalism of the 1960s is different from the Second Regionalism, and the first one was hugely unsuccessful, in contrast to the second one, which turned out to be excessively successful and resulted in the current pandemic of RTAs. The first wave of regionalism in the 1960s was shaped by the early developments of the European Union, albeit driven by a distinct primary impetus. The pursuit of industrialization became a prominent objective in developing countries, mainly through implementing import substitution policies in the aftermath of World War II. These countries (like East African and Latin American countries) aimed to allocate import-substituting activities through bureaucratic decision-making, thereby strengthening intra-RTA specialization through managed trade instead of pursuing trade liberalization and relying on market forces to determine the allocation of activities. Considering the approach followed by developed countries in this period, the United States remained committed to multilateralism and non-discrimination in trade liberalization through the Kennedy Round. During the Second Regionalism (the beginning of the 1990s), the United States changed its mind and abandoned its policy of exclusively embracing multilateralism in trade (Bhagwati 2008).

Baldwin (2014) also made an evaluation by comparing periodically and emphasized that there is a fundamental distinction exists between regionalism in the 20th and 21st centuries; in other words, the nature of RTAs varies significantly across these two time periods. In the 20th century, trade mostly revolved around exchanging goods produced in one location and sold in another. In the global context, international trade refers to the movement of commodities across national boundaries. Consequently, during the 20th century, RTAs primarily focused on addressing trade barriers at borders, particularly those linked to tariff preferences and associated regulations such as rules of origin and cumulation. In the 21st century, trade mainly revolves around goods manufactured globally and distributed and sold in various markets. So, there is a transition from "made-here-sold-there" to "made-everywhere-sold-there." International trade in the 21st century encompasses trading practices from the 20th century and intricate cross-border movements associated with global production networks. The scope comprises exchanging intermediate goods, services, ideas, know-how, capital, and persons. 21st-century free trade agreements, sometimes called "deep" RTAs, prioritize tariff advantages rather than focusing mainly on preferential market access. Instead, they concentrate on the fundamental disciplines supporting multinational supply networks.

Anderson & Yotov (2016) evaluated the increase in RTAs from another perspective. They highlighted that the substantial estimated impacts of RTAs are primarily due to reductions in non-tariff costs, as these reductions go beyond what can be reasonably attributed to changes in tariffs. These significant fluctuations in volume, which cannot be solely explained by changes in tariffs, are likely due to the unobservable activities prompted by RTAs that effectively lower trade costs. Regulatory policy barriers often exist between partners in an RTA; however, the increased security of bilateral trading encourages partners to make specialized investments in trade (Anderson &Yotov, 2016).

Literature Review

The gravity equation has been used as a workhorse for empirical analysis to study the effects of regional trade agreements on the pattern of trade (Eichengreen & Irwin, 1998; Baier & Bergstrand, 2007; Head & Mayer, 2013; Larch & Yotov, 2023). Jan Tinbergen, a Nobel laureate in 1963, was the first to apply Newton's Law of Universal Gravitation to estimate international trade flows. He used the gravity model, which suggests that the amount of trade between two countries can be predicted by considering their sizes and the trade barriers (represented as distance) between them. So, the gravity equation states that trade is inversely proportional to the square of the trade frictions, or distance, between two countries and directly proportional to their GDPs '(Yotov et al., 2016).

Tinbergen emphasized that apart from purely economic variables (the exporting country's GNP, the importing country's GNP, and the distance between the two countries), some other variables, like political or semi-economic factors, play a part in determining the volume of trade between countries. The existence of free trade agreements is an example of the most outstanding of the additional factors (Tinbergen, 1963: 266).

Yotov et al., (2016) highlighted that although the gravity model is widely used and empirical gravity research has made significant advancements, many gravity estimations in the current literature still exhibit biases and inconsistencies. Baier & Bergstrand (2007) asserted that findings have been inconclusive, at most, since that time. A massive body of literature has emerged attempting to analyze the effects of RTAs using the gravity equation. Some of these studies are Aitken (1973) examined the European trade relations over the period 1951-67 and found that both the European Economic Community (EEC) and the European Free Trade Association (EFTA) have increased the trade between members, with gross trade creation of the EEC being substantially greater than gross trade creation of the EFTA.

Frankel et al., (1995) estimated the gravity equation for 63 nations from 1965 to 1990 and assessed whether global trade is increasingly being regionalized due to preferential agreements, and according to the results, Mercosur and the Andean Pact have significant and positive results for certain years, and for the EC, the effect is significant in 1985; the other years' results are not significant, and EFTA's results are not significant.

Using five-year intervals, Baier & Bergstrand (2007) assessed the impact of free trade agreements (FTA) on the goods and services trade between 96 countries from 1960 to 2000. On average, it has been observed that an FTA leads to a

roughly 100% rise in bilateral trade between member nations compared to non-members within a decade of its establishment. The possibility of volume changes, which cannot be fully explained by tariff adjustments alone, is reasonable since FTAs can lead to hidden actions that effectively decrease the costs associated with trade. Regulatory policy barriers often exist between partners in an FTA, but the increased security of bilateral trade encourages countries to make specialized investments in trading with each other.

In their paper, Sun & Reed (2010) assessed the impact of specific FTAs on agricultural trade with three-year intervals, explicitly focusing on the ASEAN-China preferential trade agreement, EU-15, EU-25, Southern African Development Community (SADC) agreements, and the Common Market for Eastern and Southern Africa. The paper analyzed data from 1993 to 2007, encompassing eighty-one countries. The findings indicate that the ASEAN-China preferential trade agreements and the agreements between the EU-15, EU-25, and SADC have led to substantial growth in agricultural trade among the countries involved. There was a notable shift in export and import patterns away from the EU-15, although the formation of the SADC led to a rise in agricultural exports to nations outside the EU.

Dür & Elsig (2014) examined the structure of 536 Preferential Trade Agreements (PTAs) that were established between 1945 and 2009. They found that PTAs had a positive effect on trade flows, with the greatest influence coming from comprehensive agreements. Furthermore, based on the findings, reducing tariffs and implementing trade-related provisions are essential tools for enhancing trade. Specifically, provisions that address regulations within a country's borders also impact the trade of goods and services.

Weidner & Zylkin (2021) used the FE-PPML estimator to determine the average impact of an FTA on trade in manufacturing industries across 167 countries and between 1995 and 2015 with five-year periods. Their estimation results indicate that the average partial effect of an FTA on trade is 8.5%.

Although many studies have estimated the gravity equation only with international trade flows, Yotov (2022) emphasized that including intranational trade flows provides significant benefits, such as the inclusion of intranational trade flows, which strengthens the connection between theory and empirical analysis; therefore, the estimation will be unbiased. Dai et al. (2014) emphasized that identifying trade-diversion effects is impossible when gravity is solely evaluated using international trade flows. Because estimates incorporating international trade do not consider the trade-diversion effects caused by intranational trade, which can lead to a downward bias in these estimations.

Accordingly, some recent studies added the intranational trade flows to their models. One of these papers is Yotov (2012), and Yotov (2012) used intranational trade flows besides international trade flows and analyzed 93 countries for the period 1965–2005 and emphasized that relative trade costs must be identified to capture the effect of globalization adequately so that it is possible to show steadily falling distance effects on international trade. According to the estimation results, the distance puzzle[3] disappears when the effect of the international distance is measured in relation tof the internal one.

Using the structural gravity model, Dai et al. (2014) studied manufacturing trade and FTAs for 64 countries from 1990 to 2002 to see how FTAs affect trade diversion and creation, and the results show that FTAs greatly affect how domestic trade shifts to international trade. In simpler terms, FTAs cause a bigger drop in local sales within member countries, and this shift in internal trade gets stronger as a country joins more FTAs. In other words, FTAs lead to a still larger decrease in internal trade (domestic sales) within member countries, and the diversion of internal trade intensifies with the number of FTAs a given country joins.

Bergstrand et al. (2015) examined the impact of bilateral distance, international borders, and economic integration agreements (EIA) on trade for eight manufacturing sectors in 40 nations and the rest of the world between 1990 and 2002. The findings indicate that the partial effect of an EIA is 157 percent. Still, the impact of a typical EIA is reduced by half and drops to 66% when a dummy for international vs. intranational bilateral trade is added. Furthermore, the article states that costs associated with international borders compared to domestic trade decreased by around 2.4 percent annually between 1990 and 2002. Another important emphasis made in this paper is that failing to consider the impact of international borders when assessing EIA effects leads to overestimating these effects.

Spornberger (2022) analyzed the integration of EU trade in the manufacturing sector, and the findings indicate that trade between the old EU-15 countries had already grown by 70% by 1995. Since then, trade shares among the new members of central and eastern EU countries have doubled, but trade integration for the EU-15 has not deepened. Further enhancing the Single Market has the potential to generate an additional 50% growth in trade and around a 3% improvement in real income.

Egger et al. (2022) analyzed to determine the impact that FTAs had on the overall bilateral trade of manufactured goods between 69 countries between the years 1986 and 2006. Based on the estimation results, the influence of these factors changes non-linearly over time. The effects of FTAs start to manifest approximately three years before their implementation, potentially when they are announced or signed. This initial phase, the Pre-FTA and Anticipation Phase, is characterized by moderately positive and significant FTA estimates. However, the overall cumulative impact leading

[3] Disdier & Head (2008) found that distance has a negative effect on international trade and their analysis reveals a consistently high negative impact of distance on trade, which has increased since the mid-20th century and has remained continuously high ever since. Their estimate relies on a meta-study examining the impact of distance on bilateral trade, which determined that the mean effect is 0.9. This inconsistency is referred to as the distance puzzle or the missing globalization puzzle.

up to the agreement's implementation remains relatively small. The second phase, the growth phase, encompasses the years after implementing an FTA. During this phase, there are notable and statistically significant benefits. Most of the positive effects of FTAs are observed 3 to 6 years after their adoption, following a gradual process of early adjustment. The Maturity Phase, which occurs approximately eight years after implementing an FTA, signifies the final stage. During this phase, no further trade effects are observed, indicating that the FTA has attained its maximum impact. Mattoo et al. (2022) analysed the impact of deep agreements on 95 nations spanning all major economies between 2002 and 2014. They highlight that Vinerian logic may not fully capture the effects of deep agreements, as the deep provisions do not always function as preferential tariffs. Based on the estimation results, signing a deep agreement between two countries leads to a 34% increase in trade. Deep provisions within these agreements promote more trade creation than shallow PTAs. Furthermore, when these agreements are designed or implemented non-discriminately, they can have a positive spillover effect on trade with countries outside the agreement (Mattoo et al., 2022).

Diaz-Mora et al. (2023) examined the potential impacts of various PTAs on trade by using international and intranational trade flows for 189 nations from 1980 to 2015. The results indicate that while PTAs and the GATT/WTO both increase trade, regional PTAs significantly affect bilateral trade more than interregional PTAs. South-South PTAs have the most significant impact, followed by North-South PTAs, and then, to a lesser degree, North-North PTAs.

Larch & Yotov (2023) analyzed the average effect of RTAs on the goods and services trade between 1980 and 2016 for 89 countries. The findings indicate that RTAs had an average effect of around 22% on bilateral trade flows. They also analyzed how the effects of RTAs varied over different periods. During the 1980s, the limited number of RTAs significantly influenced trade. However, in the 1990s, which marked the beginning of a surge in RTAs, the average effect on trade was weaker. In the 2000s and the last period studied (2010-2016), there was a notable increase in the magnitude of the RTA effects, suggesting a growing impact of these agreements on bilateral trade flows over time.

It is realized that in the related literature, some papers (e.g., Aitken (1973), Frankel et al. (1995)) preferred ordinary least squares (OLS) as the estimation method. However, as emphasized by Baier & Bergstrand (2007), using OLS may yield biased and inconsistent coefficient estimates. Furthermore, some papers (e.g., Dai et al., 2014; Weidner & Zylkin, 2021) did not differentiate between economic integration types, and this situation may yield to obtain general results; however, there are substantial differences between economic integration types. Lastly, some papers (e.g., Frankel et al., (1995), Baier & Bergstrand (2007)) made their analyses with only international trade flows and did not include intranational trade flows. However, as emphasized above by Dai et al., (2014) and Yotov (2022), intranational trade flows should be included in the analysis to obtain trade-diversion effects of RTAs and make unbiased estimations. Considering all these determinations and the points emphasized above, this paper aims to contribute to existing literature by analyzing the effects of regional trade agreements on trade flows precisely and without bias with a long-term perspective. To this end, firstly a distinction is made between regional trade agreements and the European Union (EU), and the EU is included as a separate variable in the model. This differentiation enables us to analyze how integration depth influences trade flows. Furthermore, to identify potential trade diversion away from domestic markets due to regional trade agreements, besides international trade flows, intranational trade flows are included in the analysis. Moreover, to ensure a comprehensive approach, globalization, which is one of the main determinants of the trade, is also included. In this context, by incorporating the EU and globalization variables, the article goes beyond a purely bilateral analysis. Lastly, by considering all recommendations and improvements from the structural gravity equation literature, the PPML method is used in the article.

The Motivation of Estimation of Free Trade Agreements with Gravity Equation

The gravity equation is accepted as one of the great success stories of economics, and the success of the model comes from its explanatory power. In Tinbergen's seminal work, the gravity equation is written as follows:

$$E_{ij} = \alpha_0 Y_i^{\alpha_1} Y_j^{\alpha_2} D_{ij}^{\alpha_3} \quad (1)$$

E_{ij} shows exports of country i to country j, and Y_i shows the Gross National Product (GNP) of country i and Y_j shows GNP of country j and D_{ij} is the distance between countries i and j (Tinbergen, 1963). Equation (1) termed as the "naïve" gravity equation (Head & Mayer, 2013, Wölwer et al., 2018, Yotov, 2024).

Despite its success in empirical models, it is acknowledged that the empirical gravity equation lacks a theoretical basis. According to Anderson (2011), the gravity equation is considered an intellectual orphan that lacks connections to the extensive body of economic theory. Anderson (1979) provided the initial theoretical explanation for the gravity model in response to the lack of a recognized link to economic theory (Yotov et al., 2016). The gravity equation is derived from the expenditure system through a three-stage process.[4]

Anderson & Van Wincoop (2003) contributed significantly to a theoretically grounded gravity equation and criticized the existing gravity theory because it includes an atheoretical "remoteness" variable related to distance to all bilateral partners. This remoteness index does not capture any of the other trade barriers that are the focus of the

[4] In addition to Anderson (1979)'s model, there are different models with different assumptions and market structures like Eaton & Kortum (2002)'s and Anderson and van Wincoop (2003)'s model to derive gravity model. The theoretical development and foundations for the gravity model are surveyed in papers given in Anderson & Wincoop (2003), Head & Mayer (2013), Yotov et al. (2016), Yotov (2022).

analysis. They developed a methodology based on existing gravity theory and defined multilateral resistance (MR) as an average trade barrier. The naive gravity equation does not control for MRs, so the estimation results are biased due to omitted variables, incorrect comparative statics analysis[5], and a lack of understanding of what drives the results (Anderson & Wincoop, 2003). With this contribution of Anderson & Wincoop (2003), the gravity equation began to be called structural gravity with a theoretical basis. When analyzing the effects of free trade agreements on trade flows, the structural gravity equation should include intra-national and international trade flows data. Firstly, it aligns with gravity theory, allowing consumers to select and consume both domestic and foreign options. Secondly, it leads to the theoretically consistent identification of the effects of trade diversion of bilateral trade policies (Yotov et al., 2016). In this context, by including intranational trade flows, it is possible to put forward the trade diversion effects of regional trade agreements not only away from non-member countries but also from intranational trade within member states. In more detail, the inclusion of intranational trade flows can help identify three trade diversion effects: (i) exports moving from non-member FTA countries to FTA members; (ii) imports moving from non-member FTA countries to FTA members; and (iii) domestic sales moving to foreign markets through FTA members. Moreover, the diversion of internal trade intensifies with the number of RTAs a given country joins (Dia et al., 2014). Thirdly, to capture the effects of globalization, the effects of distance on international trade costs in structural gravity models should be measured relative to domestic trade costs (Yotov, 2022). Because it is widely acknowledged that new communication and transportation technologies drove the globalization process, and in this process, countries may have many different alternative trade partners to make trade, and this situation steals the role of regional trade agreements. Consequently, to capture the effect of globalization, Yotov (2012) proposes that the theoretical gravity model, which is developed by Anderson & Wincoop (2003), should estimate the gravity equation with intranational, in addition to international, trade flows, because this impact is identified relative to other international trade costs.

In the literature as an estimation method, many papers used the ordinary least squares (OLS) to estimate the gravity equation; however, when OLS is used, the analysis does not include any form of multilateral resistance. The MR terms accurately convey that trade between two nations is influenced not only by their respective sizes and bilateral trade costs but also by how isolated these nations are from the rest of the globe economically and geographically (Anderson & Wincoop, 2003). Additionally, when the gravity equation is estimated with OLS, trade data is transformed into a logarithmic form, and zero trade flows are dropped from the sample so OLS will not regard the information from this data (Santos Silva & Tenreyro, 2006, and Yotov et al., 2016). So, to include zero-value observations and consider the heteroskedasticity of trade data, Santos Silva & Tenreyro (2006) recommended estimating the gravity equation in levels using the proposed PPML estimator.

Moreover, Baier & Bergstrand (2007) point out that the estimations made about the gravity equation state that treating FTAs as exogenous may give results that are over- or underestimated; in other words, they may be biased and inconsistent. They assert that, in reality, FTA dummies are not exogenous random variables; countries likely select endogenously into FTAs, and the source of endogeneity bias in the gravity equation is unobserved time-invariant bilateral variables, and they are best controlled for using bilateral fixed effects. In short, considering all these facts, a "three-way" fixed effects Poisson Pseudo-Maximum Likelihood ("FE-PPML") estimator with time-varying exporter and importer fixed effects to account for network dependence and time-invariant exporter-importer ("pair") fixed effects to address endogeneity has recently emerged as a logical workhorse method for empirical trade policy analysis (Weidner & Zylkin 2021).

Method and Research Findings

Research Method

In this article, two different datasets are used to estimate the effect of RTAs on trade flows with two estimations. For the estimation with international trade flows, the CEPR II Gravity database is used, and export data and the RTA variables and EU are taken from this dataset. This dataset includes the 1948-2020 period. The export data is trade flows as reported by the exporter country, and the RTA shows there is a regional trade agreement between country pairs.
The second dataset that I used is the Trade and Production (TradeProd) database, and from this dataset the trade flows variable is taken, which includes both international and intranational (domestic) trade flows,[6] and this dataset includes the 1966-2020 period. The TradeProd database matches well together with the CEPR II Gravity database, so for the second estimation these two datasets are merged, and it is possible to get a long period of many countries for estimating the effects of RTAs on bilateral trade flows, which is suitable for panel estimation. Accordingly, to maintain consistency

[5] Baldwin & Taglioni (2006) stated that the inaccurate estimation of gravity was caused by the omission of MRs' gold medal error.
[6] TradeProd dataset consists of nine industrial sectors, which is equally nearly the whole manufacturing sector on international and intranational trade flows. These nine sectors are summed up, so estimated results total pf all included sectors. The nine 2-digit ISIC Rev. 3 manufacturing sectors: Food (ISIC rev.3 15t16), Textiles (17t19), Wood- Paper (20t22), Chemicals (23t25), Minerals (26), Metals (27t28), Machines (29t33), Vehicles (34t35), Other (36). For details about the database see: Mayer et al. (2023).

between estimation equations and compare their results, the gravity equation is estimated for 162 countries and the 1966-2020 time period.

To put forward the effects of RTAs on bilateral trade, the estimations are done in a panel setting with fixed effects because the aim is to estimate without bias. As emphasized by Baier & Bergstrand (2007), trade policy is not an exogenous variable; in other words, FTA variables are not exogenous random variables; rather, countries likely select endogenously into FTAs. Therefore, the source of endogeneity bias in the gravity equation is unobserved time-invariant heterogeneity, when it is said in economic terms that there are unobserved time-invariant bilateral variables influencing simultaneously the presence of an FTA and the volume of trade. So, the potential bias and inconsistent coefficient estimates can be treated using panel data with fixed effects.
Cheng & Wall (2005) underlined the criticism that fixed-effects estimates may not be suitable for analysing data aggregated over consecutive years since the dependent and independent variables may not adapt fully within a single year. Considering this criticism, the equations are estimated for both consecutive years and three-year intervals.

Findings

As emphasized in the research method section, two estimations are made. In the first estimation the dependent variable includes only international goods flows and the CEPR II Gravity dataset is used in this estimation. Firstly, the effect of RTAs is estimated, and EU variable is added to the estimation equation and in this step EU and its enlargements are excluded from RTA variable.

Considering the criticisms and developments in the gravity literature mentioned above, OLS is not used, and to account for zero exports and heteroscedasticity problems, Equation (2) is estimated using the Poisson pseudo maximum likelihood (PPML) estimator as suggested by Santos Silva &Tenreyro (2006) and Santos Silva & Tenreyro (2022).

$$X_{ij,t} = \beta_1 RTA_{ij,t} + \phi_{i,t} + \psi_{j,t} + \mu_{ij} + \epsilon_{ij,t} \quad (2)$$

Here, $X_{ij,t}$ shows the nominal bilateral international trade flows from exporter I to importer j at time t. Moreover, following most of the gravity literature, bilateral trade is measured at the yearly level. $RTA_{ij,t}$ shows the presence of an RTA between countries i and j at time t, so it takes a value of one if countries i and j are partners in an RTA at time t and zero otherwise. The estimated (β_1) coefficient of $RTAij_{,t}$ variable, shows how much trade would increase on average between i and j countries that sign an RTA. Following the related literature (Larch et al., 2019 and Larch & Yotov, 2023), the exporter-time and importer-time fixed effects (ϕi,t, and ψj,t, respectively) are applied to Equation (2). These fixed effects will absorb not only the multilateral resistances but also the size control variables and will control for all conceivable observable and unobservable factors peculiar to each country that influence trade. In addition, country pair fixed effects, μ_{ij}, control for all time-invariant gravity variables to avoid endogeneity bias about FTAs, as Baier & Bergstrand (2007) proposed.
In Equation (3), both the effects of RTAs and EU are estimated. In this context $EU_{ij,t}$ dummy shows i and j are both members of the EU at time t, indicating bilateral trade flows between the EU countries and changes over time due to entry new members. Since the EU variable is one of the deepest integrations and considering that the number of RTAs was relatively low until the 1990s, the EU variable could have dominated the result. the EU avoid this, EU is excluded from the RTA variable and estimated as a new variable. So, it is possible to isolate the effects of the EU from RTAs.

Table 1: The Estimation Results of RTA on International Trade Flows

Part A: Consecutive Years	**1**	**2**
RTA	0.082***(0.0316)	0.070**(.0314)
EU	-	0.321***(0.037)
N	818,428	818,428
Pseudo R^2	0.9902	0.9902
Part B: 3 Years Interval	**3**	**4**
RTA	0.090*** (0.0314)	0.079**(0.0314)

EU	-	0.297*** (0.036)
N	277,509	277,509
Pseudo R^2	0.9902	0.9902

***, **, and * indicate, respectively, the 1, 5, and 10 % levels of statistical significance. Robust standard errors are in parentheses.

$$X_{ij,t} = \beta_1 RTA_{ij,t} + \beta_2 EU_{ij,t} + \phi_{i,t} + \psi_{j,t} + \mu_{ij} + \epsilon_{ij,t} \quad (3)$$

Table 1 shows the results of the PPML estimation of the Equation 2 and 3 for consecutive and three-year intervals[7]. The dependent variable includes only international trade flows. In Part A, column (1) shows the estimation results of Equation (2), the coefficient of the RTA variable is positive and significant, 0.082 (std. err. 0.0316), which implies that all else equal, the presence of an RTA between countries increases trade by 8.5 %[8]. This result is consistent with the trade creation effect of the regional trade agreements. Moreover, this empirical finding is consistent with the results of Weider & Zylkin's (2021) and Larch & Yotov's (2023) empirical findings. Weider & Zylkin (2021) found that the effect of an RTA on trade flows is 8.5%, and Larch & Yotov (2023) found that the effect of an RTA on trade flows is 14%.
When EU dummy variable added and estimated as Equation (3) there is a slight decrease in RTA' s coefficient and it increases bilateral trade 7.2%; meanwhile, the EU increases bilateral trade 37.8%, as shown in column (2). This is an expected result because, as mentioned before, the EU is one of the deepest integration types, so its effect is stronger than an RTA. This empirical finding is also consistent with literature; for example, Mayer et al. (2018) found that the EU provides for deep trade integration over and above tariff cuts and a (partial) trade impact of the Single Market that is more than three times larger than the regional FTA. Head & Mayer (2021) also obtained similar results, and according to their results, intra-EU trade tripled between 1960 and 2018. Franco-Bedoya & Frohm (2022) found that deeper FTAs increase trade more than an average FTA, and the EU's trade more than doubles compared to an average FTA.
When the estimation is done with 3-year interval the coefficients of variables are nearly the same, as seen from columns 3 and 4.
In the second estimation following Yotov (2012), Bergstrand et al. (2015), and Baier et al. (2019), the dependent variable includes international and intranational (domestic) trade flows. The point is that RTAs may be diverting trade from domestic to international sales, and, therefore, the estimates of the variable RTA that are based on international trade only may be biased downward (Yotov et al. 2016). Accordingly, to eliminate the biased concern and consistent with the gravity theory $X_{ij,t}$ includes both the value of international and intranational (domestic) trade flows.

$$X_{ij,t} = \beta_1 RTA_{ij,t} + EU_{ij,t} + \phi_{i,t} + \psi_{j,t} + \mu_{ij} + \epsilon_{ij,t} \quad (4)$$

Additionally, the paper analyzes a period of nearly half a century (1966-2020), and in this period, especially with the acceleration of globalization after the 1980s, world trade increased rapidly and decreased after the 2008 crisis and then increased until the COVID-19 pandemic. Thus, to reveal the effect of this process, the globalization variable is added to Equation (4). Bergstrand et al. (2015) stated that when analyzing whether free trade agreements increase trade between countries, the effects of globalization should be considered; otherwise, the answer may have been premature. Moreover, an empirical model allowing for a decrease in international trade costs relative to internal trade costs is more likely to capture the effects of globalization than a model analyzing the impact of trade costs relative to a reference group that has been affected similarly equally by globalization (Yotov et al., 2016). In this context, as emphasized by Baier & Standaert (2024), when the declining bilateral fixed and variable export costs were ignored, the partial effects of the FTAs were biased upward. So, to make an unbiased estimation following Bergstrand et al. (2015) and Baier et al. (2019) to control for the effects of globalization, a set of globalization dummies is added to Equation (4). The equation that the globalization dummies added will be as follows:

$$X_{ij,t} = \beta_1 RTA_{ij,t} + \beta_2 EU_{ij,t} + \sum_t b_t + \phi_{i,t} + \psi_{j,t} + \mu_{ij} + \epsilon_{ij,t} \quad (5)$$

The globalization dummies consist of a group of dummies that, at each time t, equal 1 for observations of international trade (as opposed to internal trade) and illustrate the pattern of how to interpret this indicator of trade globalization in comparison to 1966 (the first year in the sample).
The coefficients of these time-varying border dummies reflect the process of globalization over time as countries take part in greater international trade and decrease trading in their own markets.

[7] Instead of 5-year interval, 3-year interval is chosen to avoid losing too many observations.
[8] Obtained as $(\exp(\beta_1) - 1) \times 100 = (\exp(0.0820) - 1) \times 100$, where standard errors are obtained with the Delta method.

Table 2: The Estimation Results of RTA on Trade Flows

Part A: Consecutive Years	1	2	3	4
RTA	0. 347*** (0.059)	0.334*** (0.060)	0.103** (0.037)	0.094** (0 .037)
EU	-	0.696*** (0.077)	-	0.440*** (0.058)
Globalization	No	No	Yes	Yes
N	775,887	775,887	775,887	775,887
Pseudo R^2	0.9973	0.9973	0.9977	0.9977
Part B: 3 Years Interval	5	6	7	8
RTA	0.342*** (0.0619)	0.329*** (0.0625)	0.0982** (0.0402)	0.0885** (0.0401)
EU	-	0.313*** (0.0563)	-	0.390*** (0.0567)
Globalization	No	No	Yes	Yes
N	253,124	253,124	253,124	253,124
Pseudo R^2	0.9977	0.9977	0.9977	0.9977

***, **, and * indicate, respectively, the 1, 5, and 10 % levels of statistical significance. Robust standard errors are in parentheses.

Table 2 shows the results of the PPML estimation of the Equation 4 and 5 for consecutive and three-year intervals. The dependent variable includes both international and intranational trade flows. In Part A, column (1) shows the estimation results of Equation (4), the coefficient of the RTA variable is positive and significant, 0.347 (std. err. 0.059), which implies that all else equal, the presence of an RTA between countries increases trade by 41.4 %. So, this finding shows that RTAs increase the trade between members at the expense of intranational trade, in other words RTAs diverse trade from national markets to international markets. This result is consistent with the findings of Dai et al., (2014) and Larch & Yotov (2023), in both papers when intranational trade flows included to the analyses, the coefficient of RTAs increases dramatically. According to the results of Egger et al. (2022), when estimation is done only international trade flows, it is found that the effect of RTA is positive but insignificant. On the other hand, when the estimation is done both intranational and international trade flows, FTA increases the bilateral trade between the FTA members 43.6% relative to non-members.

Column (2) shows the results for both RTA and EU and according to the results, RTA's coefficient is significant and positive, yet the magnitude of the coefficient decreases slightly. The coefficients imply that all else equal, the presence of an RTA between countries increases trade by 39.6 % and the EU increases the bilateral trade by 100%. As mentioned before, the result about the EU's coefficient is broadly in line with other papers in the related literature.

However, the picture changes, and the coefficients decrease dramatically when the globalization trend is included and estimated in Equation (4). When the globalization trend is not included in the analysis, the RTA variable encompasses the effects of globalization, which causes the estimation result to be biased upward. About globalization trend it can be emphasized that some developments other than trade policy also affect international trade, like the decrease in transportation and information costs, increased fragmentation, and containerization, which can be labelled as unobservable trade costs. These developments promote trade between countries, and their effect can be observed throughout the course of globalization. This course of globalization is obtained from Equation (5) estimation for the consecutive years and given as Table 3 in the appendix[9]. In 1967 the coefficient of the globalization is negative; for 1968-69 the coefficients are insignificant, and then the coefficients are positive and increasing, especially after 1975. This finding can be explained by the closing of the Suez Canal between 1967 and 1975, and the course of globalization has been accelerating since the late 1980s. In addition, there was a decrease during the 2008 financial crisis, and the recovery trend that occurred afterward was remarkable[10].

Columns (3) and (4) show the results with globalization dummies. When the globalization dummies are added, there is a considerable decrease in coefficients of RTA and EU. To put a finer point on it, with the inclusion of

[9] For brevity I did not report globalization dummy variables in Table 2. Instead, I gave as Table 3 in the appendix. The results for globalization dummy variables for Equation (4) and (5) are available upon request.

[10] Feyrer (2021) provides an analysis about the effect of the closing of the Suez Canal from 1967 to 1975. Kataryniuk et al. (2021) and Campos et al. (2023) provide detailed discussions and evolution about globalization.

globalization trend, RTAs increase trade by 10.8% as shown in column (3). Moreover, the results show that when EU and globalization are added; RTAs increase trade by 9.8% and EU increases %55 as shown in column (4).

In this context, two main findings regarding estimating globalization are in Equation (5). First, the estimates of globalization dummies are increasing over time, so it can be concluded that globalization has a steady and substantial effect on trade; in other words, unobserved trade costs decreased and made trade less frictionless between countries. Second, the estimated coefficients of RTA and EU remain positive and significant, but there is a decrease in their magnitude which means that RTAs may capture the globalization trend.

Bergstrand et al. (2015), Larch & Yotov (2023) and Franco-Bedoya & Frohm (2020) included globalization trend to their analysis and the results that they estimated are consistent with the result obtained in this article. According to Bergstrand et al. (2015) findings the cost of an international border has declined on average by 25.3 % from 1990 to 2002 and which means the impact of a typical RTA is halved. Larch & Yotov (2023) also found nearly similar results when globalization trend is added the effects of RTAs decreased from 75% to 27% between 1980-2016. Franco-Bedoya & Frohm (2020) found that globalization have been the prime driver of the increase in international trade in manufacturing goods between 1970-2009.

In Table 2 Part B shows the estimation is done with 3-year interval the findings are quite similar to the estimation of consecutive years as seen from columns 5,6,7 and 8.

Conclusion

Viner (1950) introduced the trade creating and trade-diversion effects of RTAs in the Customs Union. Theory. Many countries sign trade agreements with the expectation of benefiting from the trade-creating effect of RTAs. Nowadays, RTAs, which are increasing in number and have become deeper and more comprehensive than in previous periods, are also no longer primarily within continents. On the contrary, they are between continents and countries with different development levels. To put it another way, RTAs' format and design have evolved. Furthermore, globalization has become a significant variable determining trade between countries, and advancements in communication and transportation technologies have both accelerated and facilitated foreign trade. In this context, globalization has brought to the forefront not only the trade-creating but also the trade-diversionary effects of RTAs. Because of the fragmentation of production and global value chains, RTAs may lead to trade diversion, not only away from non-member countries but also from intra-national trade within member states.

In line with these determinations, this paper analyzed the partial effects of RTAs on trade for 1966-2020 using both international and intranational trade data. Moreover, the paper delved into the effect of both regional trade agreements and the EU. Since the aim here is to prevent the effects of the variables from masking each other and reveal the effect of RTA and EU. Just as the structure of RTAs has changed, the gravity equation model, which is frequently used for estimating international trade for nearly 60 years, has also undergone a dramatic change and transformation. In this context, the atheoretical, naive gravity equation which is predicted by Tinbergen (1963) has been replaced by a theory-based structural gravity equation. This development made possible to demonstrate the trade-diversification effect of the RTA variable, in addition to its trade-creation effect and to reveal the effects of declining international borders due to globalization.

In this regard in this paper, the most recent developments and contributions in the gravity equation literature are followed to get precise and unbiased estimation; in this context, besides international trade flows and intranational trade flows, the globalization trend is included in the analysis. The results obtained from estimation with international trade data indicate that the RTAs between nations led to a 8.5 % rise in trade, which is the general result of the estimation. On the other hand, when a more detailed analysis is conducted, EU has a greater coefficient than RTA and EU increases the bilateral trade between members 37.8%. These results indicate trade creation effects of the RTAs and are consistent with related literature and. Moreover, the substantially larger trade-creating effect of the EU compared to RTAs underscores the notion that as economic integration deepens and becomes more institutionally developed, its trade creation ability increases.

The results obtained from the estimation with intranational trade data shows that RTAs increase the bilateral trade by 41.4 % and when EU is included to estimation RTAs increase the bilateral trade by 39.6 % and the EU increase the bilateral trade 100%. However, when the impact of globalization is considered, there is a significant decrease in both coefficients. So, this result indicates that economic integration variables capture the effects of globalization, and their coefficients are upwardly biased when they are not estimated with the globalization trend. When globalization is considered, the EU has the higher coefficient, resulting in a 55% rise in bilateral trade, while the RTAs lead to a 10% increase in bilateral trade. Many studies in the literature that in the dependent variable besides to international trade flows included intranational data and these have obtained similar results. This result actually points to two different points. First, countries are trading more with each other than with their domestic markets because globalization has made this possible. Second, tariff rates are already low, and RTAs have eliminated or further reduced existing tariffs.

However, the non-tariff barriers are still frequently applied between countries, which may lead to the limited effect of RTAs. Therefore, trade policies should be designed to prevent the emergence of non-tariff barriers; otherwise, RTAs may not be effective and may not generate the expected trade-creating effects.

Moreover, RTAs were signed between countries with different development levels during this period may have caused the adaptation process to take a long time. In this context, trade policies and regulations between countries should be designed to make RTAs more effective and generative, otherwise countries may search alternative trading partners, because the tariff rates are already low in the world economy.

As stated previously, the number of RTAs and their scope are expanding increasingly. In this context today, these agreements cover the service sector environmental and labour regulations. Therefore, if future papers include these points and also analyse the effects of non-tariff barriers, it will be possible to reveal the impact of RTAs on trade volume more clearly. Moreover, global value chains determine and effects the location of the production and trade, hence the relationship between global value chains and regional trade agreement will give important policy implications for both developing and developed countries. Such impactful contributions to RTA and gravity literature will improve the analysis about of the trade creation and diversion of RTA's and revealing volume effects of RTAs precisely and without bias.

Katkı Oranları ve Çıkar Çatışması / Contribution Rates and Conflicts of Interest

Etik Beyan	Bu çalışmanın hazırlanma sürecinde bilimsel ve etik ilkelere uyulduğu ve yararlanılan tüm çalışmaların kaynakçada belirtildiği beyan olunur.	**Ethical Statement**	It is declared that scientific and ethical principles have been followed while carrying out and writing this study and that all the sources used have been properly cited
Yazar Katkıları	Çalışmanın Tasarlanması: EA (%100) Veri Toplanması: EA (%100) Veri Analizi: EA (%100) Makalenin Yazımı: EA (%100) Makale Gönderimi ve Revizyonu: EA (%100)	**Author Contributions**	Research Design: EA (%100) Data Collection: EA (%100) Data Analysis: EA (%100) Writing the Article: EA (%100) Article Submission and Revision: EA (%100)
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Appendix

Table 3 The Course of Globalization

Year	Globalization		Year	Globalization	
1967	-0.0749**	(0.0335)	1994	0.731***	(0.0760)
1968	-0.000476	(0.0350)	1995	0.752***	(0.0745)
1969	0.0234	(0.0393)	1996	0.764***	(0.0750)
1970	0.0854**	(0.0374)	1997	0.848***	(0.0783)
1971	0.0710	(0.0451)	1998	0.920***	(0.0778)
1972	0.117***	(0.0443)	1999	0.930***	(0.0788)
1973	0.180***	(0.0471)	2000	0.989***	(0.0782)
1974	0.234***	(0.0450)	2001	0.988***	(0.0771)
1975	0.176***	(0.0497)	2002	0.982***	(0.0780)
1976	0.218***	(0.0508)	2003	0.968***	(0.0773)
1977	0.214***	(0.0524)	2004	1.003***	(0.0759)
1978	0.236***	(0.0510)	2005	1.014***	(0.0760)
1979	0.300***	(0.0500)	2006	1.114***	(0.0741)
1980	0.365***	(0.0480)	2007	1.087***	(0.0729)
1981	0.331***	(0.0527)	2008	1.097***	(0.0725)
1982	0.371***	(0.0514)	2009	1.016***	(0.0717)
1983	0.387***	(0.0559)	2010	1.081***	(0.0703)
1984	0.402***	(0.0660)	2011	1.099***	(0.0699)
1985	0.430***	(0.0656)	2012	1.091***	(0.0692)
1986	0.441***	(0.0604)	2013	1.097***	(0.0695)
1987	0.403***	(0.0655)	2014	1.119***	(0.0706)
1988	0.495***	(0.0650)	2015	1.171***	(0.0734)
1989	0.513***	(0.0676)	2016	1.153***	(0.0741)
1990	0.525***	(0.0709)	2017	0.953***	(0.0702)
1991	0.588***	(0.0717)	2018	0.954***	(0.0708)
1992	0.596***	(0.0717)	2019	0.979***	(0.0710)
1993	0.621***	(0.0746)	2020	0.971***	(0.0714)

***, **, and * indicate, respectively, the 1, 5, and 10 % levels of statistical significance.
Robust standard errors are in parentheses.