Essays on regional trade agreements and international trade

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Essays on
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Sous la direction de :
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For my mom, dad, and my beloved MH.

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Contents

General Introduction

"In the present state of the world, the regional solution would contribute to an increase of world welfare, since integration represents the 'stretching' of frontiers and the suppression of discrimination resulting from trade barriers and national economic policies among the participating countries."

Bela Balassa (1961, p.14), *Towards a theory of economic integration*

"Multilateralism is at a crossroads. Either it advances in the spirit of shared values and enhanced co-operation, or we will face a retreat from multilateralism, at our own peril."

Pascal Lamy, former WTO Director-General, speech at the Humboldt-Viadrina School of Governance in Berlin (26 June 2012)

"Regionalism is sweeping the world trade system like wildfire while WTO talks advance at a glacial rate" (Baldwin and Jaimovich, 2012, p. 1). The growth of regional trade agreements (RTAs) "is the most important source of trade policy reform in the last 20 years for most countries" (Limão, 2016, p. 281).

Since the 1990s, the global trading system has experienced a proliferation in the number of trade agreements. Participation in RTAs is widespread: all 164 member countries of the World Trade Organization (WTO) currently belong to at least one RTA in force. In addition, trade conducted through regional trade agreements has grown faster than global trade since 1990; consequently, in 2008, more than half of world commerce was trade within RTAs, which was up from only 28% in 1990 (World Trade Organization, 2011). Specifically, countries continued to be interested in negotiating and concluding RTAs regardless of the global economic crisis during the period of 2008–2009 both to maintain their level of trade openness in spite of political strain that may reduce the ease of market access and to create greater openness (World Trade Organization, 2011).

Some trade scholars viewed the worldwide expansion of the RTA system as incompatible with the process of multilateral trade liberalization because the proliferation of regional arrangements could not absolutely ensure a rise in nations' welfare and might slow down the Doha Round talks (Bhagwati, 1991; Bhagwati and Panagariya, 1996; Bhagwati, 2008). This view, however, has been countered by a more optimistic theory—the "natural trading partners" hypothesis—of Wonnacott and Lutz (1989), Summers (1991), and Krugman (1991) who argue that RTAs can enhance welfare if they are formed among members that are geographically close to each other and that trade intensively with each other due to a low level of natural trade costs.[1] Interestingly, Freund (2000) reminds us that the surge in regional trade deals only occurred after the conclusion of the Uruguay Round of multilateral trade negotiations (i.e., since the establishment of the WTO in 1995).

There have been significant changes in the past three to two decades in the evolution of RTAs in terms of their geographic extent and provision coverage. First, the recent development of RTAs involves the increasing trend of trade agreements that are concluded by geographically distant trading partners (i.e., trading partners in different regions) (World Trade Organization, 2011; Acharya, 2016). World Trade Organization (2013) pointed out the growing role of cross-regional trade agreements rather than intraregional agreements. Second, countries or regional blocs currently focus more on negotiating and concluding RTAs between developed and developing economies (Schiff and Winters, 2003; Acharya, 2016). Developing countries have also showed their change of interest from unilateral preferential treatments granted by developed economies[2] toward a trade integration formed by exclusively developing countries (World Trade Organization, 2011). The third prominent aspect of the evolution of RTAs involves the broader, deeper expansion of the set of issues that are covered by trade agreements. Traditionally, most RTAs simply have the purpose of removing tariff barriers to trade or trade costs[3] between partner countries and aim to improve market access for members. Since the 2000s, RTAs have gone beyond the conventional liberalization of tariffs on trade in goods to cover nontariff provisions (e.g., technical barriers to trade, sanitary and phytosanitary measures and other related "behind-the-border" standards[4]) and include trade in services.

[1] According to Anderson and van Wincoop (2004) and Bergstrand and Egger (2013), trade costs can be decomposed into natural (or geography-related) trade costs and unnatural (or policy-related) trade costs. Natural trade costs correspond to transportation, shipment, time costs, and other related costs. Unnatural trade costs include a broad group of "artificial" costs that are related to government policy, which are tariffs and nontariff barriers (e.g., technical barriers to trade, sanitary and phytosanitary standards, and quotas).

[2] Developed countries are able to unilaterally provide preferential tariffs to merchandise from developing countries, for example, through schemes such as the Generalized System of Preferences (GSP).

[3] For a complete and comprehensive analysis of the important role of trade costs, see, for example, Anderson and van Wincoop (2004).

[4] Standards or costs that are related to "behind-the-border" issues are discussed in detail in Moïsé and

These tendencies in the evolution of RTAs are likely to reflect the complexity behind negotiations of multilateral liberalization agreements under the umbrella of the WTO in which all WTO member countries are involved, compared to agreements that are formed on a regional or bilateral basis. Thus, the recent rise in the number of RTAs may relate to the slow pace of the Doha Round talks and the weak incentives for both developed and developing economies to successfully conclude this multilateral round (Bhagwati, 2008; Bouët and Laborde, 2010). Additionally, these advancements in RTAs seem to present a drawback for the globalization of trade that relies on a more progressive liberal trading system among nations and new technologies to generate higher levels of trade volumes and foreign investments (Schiff and Winters, 2003).[5]

Issues associated with regional trade agreements continue to be of great interest in international economic research (Limão, 2016) and in policy debates. Specifically, research on the subject has always led to puzzling results. For instance, according to Feenstra (2004, p. 197), "welfare-improving customs unions and FTAs exist, but [...] we should not infer that regional trade agreement in practice is necessarily a good thing." In contrast, Baier and Bergstrand (2007) showed that trading partners have much to be gained from liberalizing trade through an RTA framework since a free trade agreement (FTA) usually essentially doubles two member countries' bilateral trade after ten years. More recently, in the past three years, we witnessed the emergence of trade policies that undermine the free trade movement and instigate protectionist actions. These hostile measures are mainly conducted by some developed countries, such as the United Kingdom, which opted for the withdrawal from the European Single Market, and especially the United States. The latter chose to discontinue its endorsement of the Transatlantic Trade and Investment Partnership (TTIP), to threaten Mexico and Canada with a trade war within the North American Free Trade Agreement (NAFTA) scheme, and to currently engage in a real trade war with China. Nevertheless, there is still a strong dynamism in the process of RTA formation that has occurred in different regions and has involved most countries in the world. For instance, the European Union (EU), the European Free Trade Association (EFTA) and Turkey continue to show the strongest RTA activity in Europe; Singapore, China, Japan, and South Korea take the lead in the number of RTAs in force in Asia; and Chile is the most active South American nation in RTA negotiations.

In light of the explosion of RTAs across the world, the subject of this dissertation focuses on the analysis of different aspects of the relationship between regional trade agreements

Le Bris (2013).

[5]The globalization of trade may refer to higher trade volumes between countries as a consequence of the reduction in transport and communication costs (Limão and Venables, 2001), new technological breakthroughs, and economic and political coordination that lead to the elimination of trade barriers (Keohane and Nye, 2000).

and the multilateral trading system. By emphasizing the heterogeneity of RTAs' trade effects that depends upon various attributes of trade agreements,[6] we aim to provide a fresh understanding and views of the role of RTAs and regionalism in general as an important feature of international trade policy today. **In the first chapter** of this dissertation, we revisit the *ex post* effects of RTAs on member countries' trade and extrabloc trade by adopting an empirical approach. We explore how regional trading blocs have created varied impacts on trade among members as well as on trade with nonmembers. Our analysis confirms the widespread trade-enhancing effects of RTAs on member countries' trade; however, in many cases, they lead to trade diversion effects that are detrimental to the rest of the world.

Chapter two takes a closer look at how the implementation period of trade liberalization and partners' levels of development affect the RTA dynamic effects on trade over time. We obtain distinct patterns of *ex post* RTA effects on trade across North-North RTAs, South-South RTAs and North-South RTAs. We empirically validate that RTAs formed by trading partners experiencing similar economic development status (North-North RTAs or South-South RTAs) are likely to lead to a larger increase in members' trade during a shorter implementation period. **Chapter three** studies the mechanism through which regional trade agreements impact the effect of financial development on manufacturing trade flows between exporting and importing countries. In this joint work with Anne-Gaël Vaubourg, we show that the trade-enhancing role of financial development in the exporting country—especially through intermediated finance—is mitigated when there is an RTA between this country and its trading partner.

This dissertation addresses topics that integrate several facets of trade policy associated with trade agreements: nations' economic growth and development, as well as interactions with trade finance indicators. Nevertheless, there is still a relatively tight connection between the literatures that each chapter revolves around, which all bring into focus the *ex post* impacts of RTAs on both members and international trade flows. Moreover, another angle that unites all of the chapters in this dissertation is their adoption of the empirical approach that is built to some extent on the most recent development of the gravity model in the literature on international trade.

Before providing a short in-depth view of the findings of each of the three chapters of this dissertation, we address the context of regional trade agreements under the WTO framework. Then, we present the objectives of this dissertation that aims to explore the

[6]For instance, Vicard (2011) and Baier, Bergstrand, and Clance (2018) controlled for the degree of the trade liberalization of RTAs or captured various geographic and economic characteristics of RTA member countries.

effects of RTAs on international trade, and we bring into focus the distinct literature to which each chapter endeavors to contribute. Finally, we briefly show the recent advances in the theoretical foundations of the empirical tool that is used throughout the present work—gravity models.

Regional Trade Agreements: Definitions and Context

Regional trade agreements are mainly defined by researchers and policymakers in the literature as agreements with limited membership that are designed to promote regional economic integration and increase market access for members. Balassa (1961) and Limão (2016) proposed the typology of RTAs with increasing levels of economic integration. Accordingly, we progress from nonreciprocal preferential trade agreements (PTAs) (unilateral reduction of tariffs, e.g., the GSP schemes), reciprocal PTAs (two-way elimination of tariffs on a number of sectors) to free trade areas (elimination of trade barriers among member countries on a substantial part of the trade in goods), customs unions (CUs) (a deeper economic integration than FTAs with common external tariffs for nonmembers and common trade policy), common markets (liberalization of movement of production factors), economic and monetary union (harmonization of monetary, economic, fiscal, social policies), and total economic integration (establishment of a supranational authority that substitutes for the national authority in decision making).

The term "regional trade agreements" used throughout this dissertation encompasses the view of the WTO about RTAs as an exception to the WTO rules. Since an RTA is formed by a number of countries, articles included in this treaty only apply to its member countries, implying the discriminatory nature of RTAs (Limão, 2016). It may seem that RTAs contravene the WTO's Article I—the most favored nation (MFN)[7] clause—whereby countries are prohibited from discriminating in their import tariffs between exporters from any trading partners and for given good. However, RTAs that liberalize trade in goods are conceived as an exception to the MFN clause and permitted by Article XXIV of the General Agreement on Tariffs and Trade (GATT) 1994 and the Enabling Clause (GATT 1979)[8]. In fact, worldwide RTAs are operated under the rules introduced by the WTO

[7]MFN treatment requires that "any advantage, favour, privilege or immunity granted by any contracting party to any product originating in or destined for any other country shall be accorded immediately and unconditionally to the like product originating in or destined for the territories of all other contracting parties" (see Article I of General Agreement on Tariffs and Trade–GATT) (World Trade Organization, 2007, p. 109).

[8]While Article XXIV and the Enabling Clause of the GATT represent trade in goods, RTAs covering trade in services are also considered exceptions to the MFN clause allowed by Article V of the GATS (General Agreement in Trade in Services). We do not discuss RTAs in terms of trade in services because

in the context of a multilateral trading system. The WTO must be notified about all RTAs covering the liberalization of trade in goods. Article XXIV of the GATT allows two terms, free trade areas and customs unions, and explains that "the purpose of a customs union or of a free-trade area should be to facilitate trade between the constituent territories and not to raise barriers to the trade of other contracting parties with such territories" (paragraph 4, Article XXIV) and that "duties and other restrictive regulations of commerce [...] are eliminated with respect to substantially all the trade" (paragraph 8, Article XXIV). To meet the specific needs of developing countries, the Enabling Clause permits developing countries to conclude regional or global agreements among themselves for "the mutual reduction or elimination of tariffs" (paragraph 2(c) of the Enabling Clause), but these agreements "shall be designed to facilitate and promote the trade of developing countries and not to raise barriers to or create undue difficulties for the trade of any other contracting parties" (paragraph 3(a) of the Enabling Clause, World Trade Organization, 2007, p. 116).

Most trade agreements incorporated in the WTO context remain at the FTA level of economic integration and do not evolve into a higher degree of liberalization, such as customs union. While FTAs have become ubiquitous, countries are less interested in forming CUs with their trading partners. The number of CUs in force has been trivial compared to the number of FTAs (18 versus 256 trade deals), according to the World Trade Organization (2019). One interpretation is that the formation of CUs requires the application of a common external tariff on goods from nonmembers and more profound trade policy harmonization, which countries are likely to be more cautious about due to the fear of losing national autonomy in matters of trade policy (Fiorentino, Verdeja, and Toqueboeuf, 2007).

This present dissertation employs the term RTA to follow the practice under the GATT/WTO rules and takes into account only agreements that cover the liberalization of trade in goods[9].

it goes beyond the scope of the present dissertation.

[9]Note that the term "regional trade agreements" (RTAs) and "preferential trade agreements" (PTAs) are more or less employed interchangeably in the extant literature because PTAs conventionally show a noticeable regional orientation (World Trade Organization, 2013). Nonetheless, in practice, an RTA is not exclusively formed by member countries located in a specific geographic region since several RTAs are trade arrangements between geographically distant trading partners.

Dissertation's Objectives and Related Literature: RTA Effects on International Trade

The existing literature has addressed different aspects of the RTA effects on international trade. Several studies investigated whether the degree of the trade liberalization of RTAs by means of various types of trade agreements leads to the change in trade impacts (see Balassa, 1961; Baier and Bergstrand, 2007; Magee, 2008; Vicard, 2009). Other analyses focused on the question of how RTA effects on members' trade vary according to the WTO membership of member countries (see Subramanian and Wei, 2007; Eicher and Henn, 2011). In this dissertation, we examine the RTA effects according to (i) the effects on welfare, (ii) the length of RTA implementation periods, (iii) the level of economic development of member countries, and (iv) the interaction effects of RTAs and trading partners' levels of financial development.

The welfare-enhancing effects on member countries following RTA formation have been studied for a long time in traditional economic theory. From the perspective of the traditional theory of gains from trade, the elimination of trade barriers allows both consumers and producers to benefit from the cheapest and most competitive source of supply (Ricardo, 1817; P. A. Samuelson, 1939). Since member countries abolish trade barriers among themselves within an RTA, the latter is likely to produce gains from trade, improve efficiency and increase members' welfare. Smith (1826, p. 504) noted that when a nation involved in a treaty to "exempt the goods of one country from duties to which it subjects those of all others, the country, or at least the merchants and manufacturers of the country, whose commerce is so favoured, must necessarily derive great advantages from the treaty." According to Haberler (1936), member countries must gain from trade arrangements to the detriment of nonmembers or the rest of the world.

Viner (1950) was the first author to revisit the effects induced by the formation of RTAs and challenge the view of traditional theory. The author provided the two prominent concepts relating to trade creation and trade diversion and argued that an RTA does not necessarily enhance member countries' welfare. Viner finds that RTAs are likely to lead to trade creation if high-cost domestic products can be replaced by lower cost imports from partner countries. In this case, RTAs enhance efficiency from both production and consumption and increase welfare for member countries. In contrast, preferential trade deals may lead to trade diversion when imports shift from low-cost products from the rest of the world to higher-cost producers or inefficient suppliers from other members, following the formation of RTAs. This situation results in an inefficiency in world production, which is detrimental to the external producers of RTAs and to the consumer surplus in member

countries. Trade diversion is likely to cause welfare losses not only for the rest of the world but also for members.

According to Viner (1950), the net effect of trade liberalization resulting from the formation of RTAs is ambiguous and depends on the relative dominance of trade creation and trade diversion effects. In his own words, Viner (1950, p. 44) stressed that "where the trade-creating force is predominant, one of the members at least must benefit, both may benefit, two combined must have a net benefit, and the world at large benefits; but the outside world loses, in the short-run at least [...] Where the trade-diverting effect is predominant, one at least of the member countries is bound to be injured, both may be injured, the two combined will suffer a net injury, and there will be injury to the outside world and to the world at large". Later theoretical works attempted to reduce the ambiguity that stems from Viner's findings relating to the static effects of trade agreements. Based on a general equilibrium model, Meade (1955) and Kemp and Wan (1976) show that an RTA is likely to result in welfare-increasing effects for member nations if external tariffs are regulated following the RTA formation to keep external trade with nonmembers constant.[10] Wonnacott and Lutz (1989) and Krugman (1991) argue that RTAs can improve trade creation and increase welfare gains, according to the "natural trading partner" hypothesis.

From an empirical point of view, trade creation and trade diversion effects stemming from the formation of RTAs are also extensively investigated. Most studies assess these effects by employing gravity models. Specifically, these models enhance the setting of the gravity equation to properly estimate variables that indicate whether the levels of RTA member countries' trade within the region and those of trade with outsiders are above or below the expected levels that would be predicted from the gravity model. On the whole, the results from the empirical literature have remained quite inconclusive (Freund and Ornelas, 2010); however, most analyses find evidence of the widespread trade-increasing effects of RTAs on members' intrabloc trade with mixed RTA trade creation and trade diversion impacts on extrabloc trade (Frankel, 1997; Soloaga and Winters, 2001; Carrère, 2006; Magee, 2008; Trotignon, 2010). **Our objective in the first chapter of the present work is to adopt an appropriate estimation of gravity models and to assess the trade creation and trade diversion effects relative to nations' welfare of various specific RTAs that capture the straightforward meaning of regionalism, which encompasses trade arrangements established by nearby trading partners in a common geographic region.**

[10] Freund and Ornelas (2010) and Baldwin (2011b) provide a comprehensive review of the literature on the effects of RTA formation on trade.

The majority of empirical studies relating to the RTA effects on trade do not take into account the heterogeneous effects of RTAs that can be observed over time. As underlined in the economic literature, "the presence of adjustment costs and of incomplete information implies that the adjustment of dependent variables to explanatory ones will not be instantaneous, i.e. importers and exporters will not always be on their long-run demand and supply schedules." (Goldstein and Khan, 1985, p. 1066). On the one hand, importers and exporters cannot immediately adapt to the adjustment of trade costs and the relative prices of imports on domestic goods due to the formation of RTAs between trading partners. Thus, when evaluating issues related to trade policies, it is important for researchers to assess the length of time lags. Baier and Bergstrand (2007, p. 90) stressed that "the entire economic (treatment) effect cannot be captured fully in the concurrent year only" for any trade agreements. Specifically, long-term price elasticities of demand for exports and imports are commonly higher than short-term elasticities in most studies (Beenstock and Minford, 1976; Lawrence, 1978; Deppler and Ripley, 1978; Goldstein and Khan, 1985).[11] Additionally, tariffs and trade liberalization associated with the formation of RTAs result in a variation in the terms of trade of participating countries that could later have slow lagged impacts on their commerce (Mundell, 1964; Bergstrand, Larch, and Yotov, 2015).

On the other hand, trade agreements commonly experience the phasing-in process of tariffs and trade liberalization over several years, i.e., the implementation period of RTAs. According to Crawford (2016), the duration of the RTA implementation period can be defined as the length of time from the date of entry into force of a trade agreement to the date of the final implementation of tariff concessions carried out by the slowest liberalizing participating countries. Dür, Baccini, and Elsig (2014) find evidence that trade agreements in terms of FTAs and CUs require, on average, approximately 4–5 years to complete the process of tariff elimination.[12] Tariff and trade liberalization strategies tend to differ between RTAs. Participating countries in several RTAs are inclined to have the liberalization process be fully "front loaded" at the time of the entry into force of trade agreements; in contrast, member countries in other RTAs have a "back loaded" liberalization procedure during which tariff concessions are phased in toward the end of the RTA implementation period (Grant and Lambert, 2008; Crawford, 2016). Baier and Bergstrand (2007), Kohl (2014), Bergstrand et al. (2015), Anderson and Yotov (2016), Piermartini and Yotov (2016) provide evidence of strong lagged effects of RTAs and significant non-

[11] See Goldstein and Khan (1985) for a comprehensive review of the literature on dynamics and time lags and price elasticities of demand for imports and exports.

[12] Based on a dataset incorporating 587 trade agreements concluded over the period of 1945–2009, Dür et al. (2014) show that the length of the phasing-in process with respect to the tariff elimination of an FTA and a CU on average is 5.7 years and 4.5 years, respectively.

monotonic RTA impacts over the years after becoming effective. For instance, Baier and Bergstrand (2007) found that RTAs can increase members' trade 15 years after coming into effect. Bergstrand et al. (2015) demonstrated that trade increases, on average, by approximately 114% 10 years after the entry into force of RTAs. Kohl (2014) corroborated these findings by providing further empirical validation of RTA lagged effects with the trade-creating impacts of RTAs reaching 50% when incorporating time lags for the phase-in impacts of RTAs. **In the second chapter of the present dissertation, we adopt an empirical approach and emphasize the impact of the RTA implementation period on the overall dynamic effects of an RTA on participating countries' trade.**

Furthermore, the effects of RTAs depend upon aspects of economic development characteristics. The reason is that most empirical studies treated the RTA impacts estimates as homogeneous across all pairs of trading partners. Nonetheless, a recent analysis by Baier et al. (2018) argues that trade elasticities relating to adjustments in trade policies differ among trade relationships that are forged by Northern countries exclusively, by Southern countries exclusively, and by Northern and Southern countries together.[13] The authors demonstrate that developing economies—a country pair having a low level of average per capita income—tend to show a higher effect of trade agreements because developing countries are likely to experience higher fixed trade costs.[14] Baier et al.'s (2018) findings reflect the potential for gains from trade among Southern trading partners, as suggested by Greenaway and Milner (1990) and Regolo (2013). However, Venables (2003) shows that trade agreements formed between developing countries are not capable of generating an effective impact on trade due to the similarity in factor endowments and the lack of complementarities in the exports of developing economies. Thus, puzzling outcomes concerning the impacts of South-South RTAs and North-South RTAs on trade are found in the economic literature.

Baier and Bergstrand (2004) generalize the reasons why countries have motives to be involved in trade arrangements. The authors show that more gain from trade is induced when RTAs are forged by countries with similar and greater economic sizes in terms of intraindustry trade factors. In addition, the authors find that trade creation from an RTA also tends to increase when partner countries experience wider dissimilarity in their factor

[13]By extending the standard Melitz (2003) general equilibrium international trade model with firm heterogeneity, Baier et al. (2018) address several notable adjustments to the setting of trade costs in Melitz's model: e.g., separating variable trade costs (of an iceberg form) from fixed trade costs, distinguishing exogenous fixed costs from endogenous fixed costs, and dividing exogenous fixed costs into distinct exogenous policy export fixed costs and exogenous nonpolicy export fixed costs.

[14]Developing countries encounter higher export fixed costs as a consequence of costly customs and border-crossing procedures and undeveloped trade infrastructures.

endowments due to the Heckscher-Ohlin comparative advantage.[15]

Behar and Cirera-i Crivillé (2013) find variations in the estimates of the RTA effect on trade between different types of RTAs according to members' level of economic development. Specifically, by controlling for multilateral resistance in comparative statics, the authors show that trade agreements formed by developing economies generate the strongest effects on members' trade, with at most 107%, whereas trade deals formed between developed and developing countries increase members' trade by only 53%. Cheong, Kwak, and Tang (2015) express similar views as Behar and Cirera-i Crivillé (2013) by empirically showing that North-South RTAs result in the lowest effect on trade and that the effect of South-South RTAs is more than twice as high as that of North-South RTAs. **In the context of a growing trend of South-South RTAs (World Trade Organization, 2011), in the second chapter, we also study the differences in the RTA effect generated from various forms of trade agreements according to the levels of economic development of participating countries.**

By combining the analysis of the RTA effects according to the levels of the economic development of participating countries with the investigation into the impacts of RTAs over the phase-in period of trade agreements, as previously mentioned, to the extent of our knowledge, we are one of the first studies to analyze together—in chapter two—the important role of both of these factors in RTA effects on trade. Specifically, as will be discussed in more detail in chapter two, North-North RTAs, North-South RTAs and South-South RTAs tend to greatly differ from each other with respect to the length of their RTA implementation periods for trade and tariff liberalization.

Another facet that is associated with the effects of RTAs is the link between trade agreements and financial development. The 1997–1998 Asian financial crisis showed how concerns about financial development can generate negative effects on trade, although these effects were only demonstrated at the regional scale. It was not until the 2008–2009 global crisis that the crucial role of financial development and trade finance were identified in the 2008–2009 "great trade collapse" during which international trade plunged steeply by 12% (Auboin, 2009, 2011; Baldwin, 2009; Chauffour and Malouche, 2011).

Moreover, as underlined in the economic literature, international trade is greatly dependent on financial variables. Kletzer and Bardhan (1987), Baldwin (1989), and Beck (2002) employed a two-country two-sector approach and found that disparities in the financial

[15]The Heckscher-Ohlin model suggests that countries will be inclined to export the goods in which they have a comparative advantage and that "use relatively intensively their relatively abundant factors of production" (Deardorff, 1984, p. 478).

development of trading partners lead to a Heckscher-Ohlin comparative advantage and mutual gains from specialization and trade. Adopting a macrolevel approach, Beck (2002, 2003) validate this theoretical finding. These works provide evidence that financial development variables generate significant and positive effects on exports, especially those related to industries that heavily rely on outside finance.

Considering the firm heterogeneity model developed by Melitz (2003), Manova (2013) and Chaney (2016) find that firms differ in their productivity level and that exporters must confront upfront export fixed costs.[16] These authors stress that only high-productivity firms are involved in export activities, whereas low-productivity firms, which cannot secure enough external funds to cover upfront fixed costs, do not export. At the microlevel, Bellone et al. (2010) also empirically show that only firms having solid financial health are more likely to begin exporting their products. According to Engel, Procher, and Schmidt (2013), the firms' level of financial constraints, characterized by a high leverage ratio or by a low cash-flow ratio, can lead firms to refrain from exporting.

Moreover, the literature on trade and finance underlines the influence of trade costs in the links between trade and finance. Manova (2008) and Becker, Chen, and Greenberg (2013), using trade costs characterized by different proxies (e.g., the degree of trade openness, the level of standardization of the exported goods, and the distance between trading partners), shows that the beneficial effect of an exporting country's financial development on its exports is higher when trade costs are large, i.e., when the level of trade openness is weak. This result is in line with the seminal work of Rajan and Zingales (2003) who argues that financial development is symmetrically highly contingent upon the degree of trade openness.

Nevertheless, the extant literature related to the links between trade and finance has not considered RTAs a tool of trade policies that is able to influence the level of export costs. RTAs allow participating countries to substantially eliminate the conventional tariffs, nontariff barriers, "cross-border" barriers and "behind-the-border" measures between them (Chauffour and Maur, 2010; Pomfret and Sourdin, 2009).[17] Thus, RTAs are likely to mitigate exporting firms' need for external funds to cover upfront export fixed costs. For this reason, we expect a lower favorable impact of financial development on exports when

[16] According to the World Trade Organization (2012, p. 59), upfront export fixed costs represent "costs that are incurred by firms only once in order to access a foreign market, such as market information costs, the cost of setting up a distribution system, or the cost of complying with foreign technical regulations."

[17] "Cross-border" measures could include costs in terms of customs procedures, paperwork, etc., while "behind-the-border" measures cover provisions relating to environmental regulation, employment law, and business environment, aside from barriers such as technical standards and sanitary and phytosanitary conditions (Chauffour and Maur, 2010; Pomfret and Sourdin, 2009).

both the exporting country and importing country participate in an RTA. Interestingly, according to the World Trade Organization (2011, p. 18), "global trade flows rebounded strongly in 2010 following their collapse in 2009. The rise in the volume of goods exports in 2010 was the largest on record, enabling world trade to return to its pre-crisis level". This upward trend in global trade flows coincided with the increasing and continuous interest of most countries in negotiating and forming RTAs in the aftermath of the 2008 financial crisis to improve their degree of trade openness. Given these circumstances, there is a need in the economic literature to verify the existence of such an interaction between trade agreements and financial development, and its effects on trade.

Our objective in the third chapter is to fill the void in the extant economic literature by examining the impacts of the interaction term between financial development and RTAs on international trade. To the best of our knowledge, we are the first to empirically identify such an interaction and the effects of RTAs associated with the level of financial development in exporting and importing countries since RTAs are not employed as proxies for the degree of trade openness or for trade costs in past studies. In contrast to Manova (2008, 2013), we consider different types of financing sources (i.e., intermediated finance and market-based finance), which is consistent with the literature focusing on the important role of intermediated finance as a trade finance tool, as advocated by Amiti and Weinstein (2011), Auboin and Engemann (2014), and van der Veer (2015). We also analyze the intensity of interactions between RTAs and financial development indicators across different types of sectors, as suggested by Rajan and Zingales (1998), Manova (2008), and Manova, Wei, and Zhang (2015).

Empirical Tool: Theoretical Foundations of the Gravity Model

A large amount of empirical work on the effects of RTAs on trade relies on the gravity equation and its solid theoretical underpinnings. Indeed, all of the chapters in this dissertation also unite in estimating gravity equations on bilateral trade flows and resorting to a number of attributes and developments in the structural gravity model. Before presenting a comprehensive summary of the findings in this present work, it is important for us to briefly review the evolution of the theory of the gravity model over time.

Over the past 50 years, the gravity model—inspired by Newton's law of gravitation—has become the most successful and dominant empirical framework for estimating the impacts of different trade policies on international trade (Anderson, 2011; Head and Mayer,

2014).[18] Tinbergen (1962) was the first to introduce the basic gravity equation whose concept adopts the physics equation related to Newton's law of gravity to analyze trade flows. Within the framework of international trade, Tinbergen's (1962) gravity model suggests that international trade between two trading partners is positively related to the product of both countries' market sizes (i.e., their production and expenditure) and inversely related to the distance between the two countries in particular and the trade frictions between them in general. Nevertheless, the use of a gravity model that relies on the similarity with Newton's law of gravitation in economic studies during the 1960s did not have solid underpinnings in economic theory. According to Anderson (2011, p. 134), the gravity model was long considered "an intellectual orphan, unconnected to the rich family of economic theory".

Several works have attempted to improve the theoretical foundations of the gravity model since the late 1970s. Anderson (1979) was the first to pioneer the microfoundations of gravity model based on monopolistic competition with the assumptions of constant elasticity of substitution (CES) and product differentiation by country of origin (Armington, 1969). Krugman (1980) and Bergstrand (1985) also directly derived the gravity model under a monopolistic competition framework in which countries with identical technologies and tastes tend to produce differentiated products to allow a greater variety of goods. Bergstrand (1989) and Deardorff (1998) argued that a gravity model could be built from the structure of the Heckscher-Ohlin model involving differences in factor endowments.

Although having substantial theoretical developments and generating robust empirical findings throughout the 1980s and the 1990s, the gravity model did not receive growing recognition from scholars working on the topic of international economics. Leamer and Levinsohn (1995, p. 1387, Footnote 13) underlined that the theoretical foundation developed by Anderson (1979) "is formally fruitful but seems too complex to be part of our everyday toolkit". However, gravity theory was greatly encouraged during the 2000s by the seminal works of Eaton and Kortum (2002) and Anderson and van Wincoop (2003). On the one hand, Eaton and Kortum (2002) derived a gravity equation stemming from the Ricardian framework[19] with intermediate goods, assuming that each country produces various kinds of merchandise that are homogeneous across different countries. On

[18] According to Newtonian physics, any two objects in the universe will attract each other due to a gravitational force of attraction. The magnitude of this force is proportionally dependent upon the product of both objects' masses and inversely proportional to the square of the separation distance between the centers of both objects. A greater gravitational force of attraction happens when the mass of either object gets bigger or when the distance that separates them gets smaller.

[19] The Ricardian model of international trade assumes the difference in comparative advantage across countries relies only upon the technological difference between nations involved in international trade, while all other factors are comparable across them.

the other hand, Anderson and van Wincoop (2003) popularized the finding in Anderson (1979) involving the Armington-CES model and underscored the need for taking into account the general equilibrium impacts of trade costs.

As introduced by Anderson and van Wincoop (2003), apart from the Newtonian elements of the gravity model concerning nations' economic masses, distance or bilateral trade frictions, the structural gravity model needs to control for multilateral trade resistance that reflects any trade barriers that an exporting country and importing country have to face in their trading activities with all their trading partners. In other words, apart from the bilateral trade cost between an exporting country and an importing country (i.e., a variety of geographic and trade policy factors, for instance, the bilateral distance, tariffs and the existence of trade arrangements between partners), the trade cost term defined in the structural gravity model from Anderson and van Wincoop (2003) also encompasses the inward and outward multilateral resistances, which define the trade frictions that a country faces when importing from all source countries and exporting to all destination countries, respectively.[20] More importantly, Hummels (1999), Feenstra (2004), and Baier and Bergstrand (2007) showed straightforward and rapid methods to fully adopt and implement the multilateral resistance terms in empirical work by making use of a set of importer-time and exporter-time fixed effects, which can surpass the computational hurdles of the custom programming in Anderson and van Wincoop's (2003) original paper.

More recently, the latest developments in the theoretical foundations of gravity models take into account firm heterogeneity and firms' selection into export markets. Melitz (2003), Helpman, Melitz, and Rubinstein (2008), and Chaney (2008) showed that firms tend to differ from each other in their productivity; thus, only the most productive firms are able to export after coping with export fixed costs. In contrast, Chaney (2008) theoretically explained that new and low-productivity firms can enter the export market when trade liberalization leads to a decrease in trade barriers. Hence, the author indicates that the sensitivity of the intensive margin (exports per firm) and the sensitivity of the extensive margin (the number of exporting firms) to changes in trade frictions are dependent upon a certain level of the elasticity of substitution between goods. Applying demand-side structure, Melitz and Ottaviano (2008) pointed out that trade forces the least productive firms to exit by means of the toughness of competition that affects the price elasticity of

[20]The multilateral resistance terms defined by Anderson and van Wincoop (2003) can be interpreted as country-specific characteristics relating to consumer and producer price indexes (Anderson and Yotov, 2010). From the structural gravity model, all else being equal, a rise in outward multilateral resistance terms will result in an increase in exports of the exporting country to all destination countries. In the same way, the importing country will import more from all source countries following the increase in inward multilateral resistance terms.

demand.[21]

Our brief review of the theoretical foundations of the gravity equation presents the significant progress in structural gravity theory and how important solid theoretical underpinnings are to a robust empirical gravity model.[22] **In this dissertation, we mainly make use of one of the most influential structural gravity theories in the economics literature, which was pioneered by Anderson and van Wincoop (2003).**

Summary of the Findings of the Dissertation

In **the first chapter** of this dissertation, we take a fresh look at the following questions: *"Does regional integration by means of RTAs truly increase RTAs members' trade? What are their effects on the rest of the world?"* The motivation for this analysis emerges mainly from the recent increase in the number of cross-regional trade arrangements and the priority of trading partners to conclude bilateral trade agreements in preference to plurilateral RTAs, which are concluded among several countries. Bhagwati (2008) argued that it is likely to be harder to finalize a trade agreement among a large group of nations that may have different economic and political interests.

We select most of the plurilateral RTAs in force around the world over a time period that extends from 1960 to 2014, which includes a total of 18 RTAs. These plurilateral RTAs encompass the "pure" understanding of regionalism that presents trading blocs formed by participating countries within a common geographic region. We aim to explore the effects of most plurilateral RTAs on their intrabloc trade and the propensities of participating countries to trade with the rest of the world in the aftermath of the formation of the RTAs. We also investigate whether regional trading blocs across the world have increased trade among member countries as well as trade with nonmembers or whether they have only promoted members' trade to the detriment of that of outsiders.

We assess the *ex post*[23] effects of RTAs on the international trading system based on a gravity model with solid theoretical foundations consisting of Anderson and van Wincoop's (2003) multilateral resistance terms. Our study comprises aggregate trade data of 160

[21] In Melitz and Ottaviano (2008), the toughness of competition in a market refers to the number and average productivity of firms that compete against each other in that market.

[22] See Anderson (2011), Head and Mayer (2014), and Costinot and Rodríguez-Clare (2014) for more details on the reviews of the theoretical foundations of gravity models.

[23] Gravity models employed in the *ex post* approach make use of historical data to assess the effects of a past policy on trade flows. In contrast, gravity models can also be employed to conduct an *ex ante* simulation of an adjustment in trade policy, i.e., projecting future effects of this adjustment based on fixed circumstances (World Trade Organization, 2015).

countries, on average accounting for over 95% of the value of world trade over the period of 55 years. Additionally, we adopt proper estimation techniques to address the zero trade problem by applying the Poisson pseudo maximum likelihood (PPML) estimator developed by Santos Silva and Tenreyro (2006). It is critical for our analysis to employ proper methods to handle the presence of zero trade flows since the proportion of zero trade amounts to approximately 50% of total potential observations in the dataset. Our analysis confirms the widespread trade-enhancing effects of RTAs on member countries' trade in the wake of their entry into force. We also find that the impacts of RTAs on extrabloc trade are heterogeneous; however, in many cases, they lead to trade diversion effects that are detrimental to the rest of the world. Trade diversion in terms of bloc exports and imports is found mostly in American and African trading blocs. In contrast, export and import creation are more prominent for RTAs in Europe and Asia.

Chapter one aims to contribute to the extant literature on the *ex post* effects of RTAs concerning trade creation and trade diversion by providing an upgraded version of the specialist studies that examine the effects of only a specific RTA or a few individual RTAs. We bridge the gap between the specialist and generalist studies in the empirical literature by making use of a larger sample of countries, a longer period of investigation, more contemporaneously dissected RTAs, and a more appropriate estimation technique than most of the specialist analyses focusing on this subject.

Chapter two aims to answer the following research question: *"Could the duration of the implementation period of tariff concessions and member countries' level of development affect the impact of an RTA on members' trade?"* More specifically, we study whether such an implementation period stimulates the dynamic impacts of a trade agreement on trade flows. Moreover, we explore whether the trade effect of an RTA is determined by the differences in the levels of economic development of participating countries.

From a North-South point of view, developing economies are actively involved in the formation of North-South trade agreements and South-South trade agreements in the post-WTO era. Additionally, the length of the implementation period of RTA tariffs and trade liberalization markedly varies among North-North RTAs, North-South RTAs and South-South RTAs. Hence, it is distinctly relevant for this analysis to control for RTA implementation periods and participating countries' level of development to evaluate the RTA dynamic *ex post* effects on international trade.

By studying almost all RTAs currently in force, comprising a total of 245 trade agreements over the period of 1960–2015, this chapter aims to systematically generalize the effect of RTAs according to members' level of economic development. Our estimation relies on

structural gravity equations and controls for the main challenges with gravity equations, such as multilateral trade resistance terms, the endogeneity of RTAs, the zero trade problem and heteroskedasticity in trade data. Chapter two yields several interesting results. First, we obtain distinct patterns of *ex post* RTA effects on trade across North-North RTAs, South-South RTAs and North-South RTAs. Second, we empirically validate that RTAs formed by trading partners experiencing similar economic development status are likely to lead to a larger increase in members' trade during a shorter implementation period. Third, we provide econometric evidence that the average long-term impacts of RTAs formed by developing countries on members' trade tend to fade away 15 years after their implementation. We obtain consistent results after controlling for Vinerian trade creation and trade diversion impacts and considering new trends in the evolution of worldwide RTAs, i.e., economic integration agreements or cross-regional agreements.

The analysis in chapter two is connected to a relatively small but active empirical literature on the heterogeneous effect of RTAs based on the level of the economic development of participating countries. The main contribution of this study to the existing literature is to shed light on the importance of the RTA implementation period on the trade impacts of North-North, North-South and South-South RTAs and to provide additional convincing evidence supporting this line of research.

Chapter three of this dissertation examines the impacts of RTAs on trade from another perspective. In this joint work with Anne-Gaël Vaubourg, we test the interaction between trade arrangements and the levels of financial development of member countries.

The key theoretical motivation for the impact of finance on trade is that domestic firms need financial support to handle any upfront export costs that firms have to face when they sell abroad. Hence, firms particularly rely upon the strength of their financial constraints and the level of financial development to be able to export goods to other destinations. More recently, the great decline in world trade in the aftermath of the 2008 financial crisis leads once again to the necessity of looking into the linkage between trade and finance. Nevertheless, the economic literature focusing on the links between finance and trade does not take into consideration a prominent factor of trade policies that determines the level of export fixed costs, i.e., the formation of trade agreements between trading partners.

Our empirical investigation proceeds in two parts. First, we study the links between RTAs and financial development based on aggregate bilateral trade data. In the second part, we investigate such interaction by focusing on the sectoral dimension of exports. We estimate a structural gravity model based on a dataset of 69 countries over the period of 1986–2006. Since country-time fixed effects incorporated into the structural gravity

model control for all time-varying country-specific variables (e.g., our variable of interest concerning a country's financial development indicators), these fixed effects preclude any estimations of the impacts of financial development indicators due to the issue of perfect collinearity. Thus, it is important for this analysis to employ a novel empirical technique suggested by Heid, Larch, and Yotov (2017) and Beverelli et al. (2018)—taking into account intranational trade flows in gravity equations—to yield proper estimates for any country-specific determinants of trade. Our empirical results validate the hypothesis that the trade-enhancing role of financial development in the exporting country, especially intermediated finance, is mitigated when this country faces low exporting costs, i.e., when trading partners form RTAs between them. We also find that this mitigating effect of financial development is reduced in financially constrained sectors, where the role of financial development remains crucial. Moreover, our findings support the hypothesis that trade agreements mitigate the favorable impact of financial development not only in the exporting country but also in the destination country.

To the extent of our knowledge, chapter three is one of the first studies to identify the impacts of the interaction term between financial development and trade agreements on international trade. We contribute to the existing literature in several ways: we distinguish between the impacts of intermediated finance ratios and those of stock market indicators on trade; we show dissimilar effects of financial development that vary from the least financially constrained sectors to those being most financially constrained; we empirically assess the interaction between RTAs and financial development in both the exporting country and the importing country; and we are able to identify the effects of such interaction within a panel data gravity model with structural fixed effects by making use of intranational trade flows.

Chapter 1

A New Examination of the Impacts of Regional Trade Agreements on International Trade Patterns[1]

1.1 Introduction

Regional trade agreements have rapidly proliferated around the world in recent years. As of January 2019, there are 291 RTAs currently in force that have been reported to the WTO (World Trade Organization, 2019). This type of trade agreement has become a key component of trade policy for many countries around the globe. Balassa (1961) summarized the various forms of integration for RTAs, such as free trade areas, customs unions, common markets, economic unions and total economic integration. The form of RTAs is based on the different degrees of suppression of discrimination resulting from trade barriers and national economic programs among the member countries.

RTAs have always been accompanied by a multilateral trading system. However, there has been debate on the relationship between regionalism and multilateralism since the early 1990s. The Uruguay Round overcame many challenges in its negotiations before finally being signed in 1994, and the number of RTAs entering into force has steadily increased since 1995, following the establishment of the WTO.[2] Several scholars consider the proliferation of RTAs to be a major challenge to the multilateral trade process. Bhagwati (1991) indicated that regionalism embodies a discriminatory characteristic and could

[1] This chapter is an extended version of the paper published in *Journal of Economic Integration, 2019, Vol. 34 No. 2* (Nguyen, 2019).

[2] Acharya (2016) found that approximately three RTAs on average were notified per year during the GATT period (from 1948 to 1994) compared with the WTO period (since 1995), when, on average, twenty-five RTAs have been notified per year.

induce perverse effects. A steady increase in RTAs could also be detrimental to nonmembers or the rest of the world (Baldwin, 1993). According to Bhagwati (1995), within regional groups, the countries with greater power gain from trade liberalization, while smaller countries lose from trade liberalization. The author also argues that regionalism could increase the risk of conflicts between regional trading blocs.

Conversely, others perceive a regional trading system as a step toward the breakthrough of multilateral trade liberalization under the umbrella of the WTO. Summers (1991) argues that regional trade liberalization generates an advance on multilateralism and leads to more trade creation than trade diversion. Thus, the inclination toward regional trade integration did not hinder the achievement of the Uruguay Round negotiations because the countries driving the multilateral trade system after the Second World War were the same nations that promoted regional trade liberalization (Baldwin, 2004). Moreover, RTAs can also encourage foreign direct investment (Lawrence, 1996; Kimura and Ando, 2005; Freund and Ornelas, 2010) and economic growth in member countries through technological transfer.

The upsurge in RTAs throughout the world over the past two decades has resulted in the emergence of a dense, complex network of RTAs, in which there are several overlapping agreements among the same trading partners. In the context of the multilateral trading system, RTAs operate under rules introduced by the WTO. It may seem that RTAs violate one of the most important pillars of the WTO, the most-favored-nation (MFN) principle, which prohibits countries from discriminating between their trading partners.[3] However, RTAs are considered to be an exception to MFN obligations. In fact, the WTO rules lay down a legal framework for RTAs covering the trade of goods in Article XXIV (GATT 1994) and paragraph 2(c) of the Enabling Clause (GATT 1979). In this study, we focus on the term "regional trade agreements" used under the GATT/WTO rules, which takes into account agreements covering the liberalization of the goods trade, i.e., free trade areas and customs unions.[4]

In the context of the growing trend toward regionalism, owing to the steady increase in the number of RTAs established globally since the early 1990s, this chapter will revisit the *ex post* effects of RTAs on the multilateral trading system over a long time span, i.e., the period from 1960 until 2014. This period covers nearly all of the waves of regionalism worldwide since the Second World War.

[3]The MFN requires that any trade advantages one country grants to another member must also be offered to all other WTO members.

[4]These two terms are adopted in Article XXIV (GATT 1994). See the legal texts of GATT 1994 and of the Enabling Clause in World Trade Organization (2007) for further details.

The motivation for this study comes first from the recent upsurge in the number of regional trade agreements and of cross-regional trade agreements, which involve countries that are geographically distant from each other. Additionally, bilateral agreements have been prioritized with regard to plurilateral RTAs because it is likely to be more difficult to accomplish a trade deal among a broad group of trading partners with diverging economic and political interests (Bhagwati, 2008). Therefore, we are keen to take a fresh look at the following questions: Does regional integration by means of plurilateral RTAs truly increase the members' trade? What are their impacts on the rest of the world?

Keeping this in mind, our choice of trading blocs in this analysis comes from the "pure" form of regionalism, which embraces trading blocs formed by countries in a common geographic area or within close proximity. We aim to study the impacts of most plurilateral RTAs on their intrabloc trade and the tendencies of member countries to trade with the rest of the world in the wake of their formation. We, thus explore whether the regional trading blocs around the world have stimulated trade among members as well as trade with nonmembers or, in an alternate scenario, if they have increased members' trade to the detriment of nonmembers.

Second, researchers have renewed their interest in the application of the gravity model to analyze bilateral trade flows, especially after the emergence of its more solid theoretical foundation in the early 2000s. Over the past fifty years, the gravity equation has become the most fruitful and dominant empirical framework for analyzing international trade. The basic gravity model, which was introduced by Tinbergen (1962), found that the bilateral trade flows between two trading partners depended on their countries' incomes positively and bilateral distance negatively. However, this model, which is inspired by Newton's law of gravity, did not have solid underpinnings in economic theory. Several authors have attempted to develop strong theoretical foundations for the gravity model since the late 1970s.[5] Much improvement has been achieved; more recently and more notably, Anderson and van Wincoop (2003) laid out and popularized a solid theoretical framework of the gravity equation that takes into account multilateral resistance terms, as also introduced by the two authors.

Third, questions have also been raised in the empirical literature regarding the appropriate formulation of variables in the gravity equation, mostly regarding the dummy variables that are used to assess the impacts of RTAs. There has been a revolution in the choice of dummy variables for better examination of the trade effects associated with RTAs in terms of trade creation and trade diversion introduced by Viner (1950). Based on a static

[5] See Anderson (1979); Helpman and Krugman (1985); Bergstrand (1989); Deardorff (1998); Baier and Bergstrand (2001).

and partial equilibrium framework, Viner (1950) argued that an RTA did not necessarily enhance the member countries' welfare. The author found that RTAs under the form of free trade areas or customs unions are likely to produce trade creation if the member countries import more from efficient producers located in other member countries at the expense of less efficient producers in the domestic market. Accordingly, RTAs enhance efficiency from both sides concerning production and consumption and increase the welfare for member countries. By contrast, RTAs may lead to trade diversion when the members discontinue importing from the most efficient suppliers (low-cost producers) in the rest of the world and import instead from inefficient suppliers (higher-cost producers) in other member countries. This situation leads to inefficiency in global production, which is detrimental to the outsiders of RTAs. It can also be harmful to member countries when the consumer surplus does not outweigh the cost of the inefficiency in production.

The net effect of trade liberalization following the formation of an RTA is ambiguous and depends on whether a trade creation effect or the trade diversion effect is dominant.[6] Although Viner's findings only focus on the static impacts of RTAs and do not clearly address their net welfare effects, his two principal concepts of trade creation and trade diversion have significantly inspired later theoretical and empirical studies on the effects of RTAs.[7] Since then, the results from the empirical literature have remained quite mixed. In this chapter, we adopt the method that includes three dummy variables for each RTA to adequately capture the Vinerian trade effects. These dummy variables will explain the impacts of each RTA on intrabloc trade, members' imports, and members' exports to the rest of the world.

Fourth, we are also motivated by the drawback shown in a large stream of literature involving specific studies in which the impacts of one or a few individual RTAs are examined. Since these studies only focus on a specific RTA or a small group of RTAs, they usually examine one geographic region and employ a small sample of countries and a short time span. Moreover, each of the studies following this specialist approach applies a different econometric strategy and does not take into account improvements in the estimation techniques. Although these specific studies could provide interesting insights on the effects of a specific agreement, they do not have enough generalizability in their findings.

[6] Viner (1950, p. 44) states that: "Where the trade-creating force is predominant, one of the members at least must benefit, both may benefit, two combined must have a net benefit [...] Where the trade-diverting effect is predominant, one at least of the member countries is bound to be injured, both may be injured, the two combined will suffer a net injury".

[7] Many authors have found that parts of Viner's analysis were not complete and have thus attempted to enhance the Vinerian theory. They introduced the elasticities of demand or the dynamic effects into the model and took into account the enlargement of trading bloc over time based on a partial equilibrium (Johnson, 1960) or a general equilibrium framework (Meade, 1955; Lipsey, 1970; Kemp and Wan, 1976).

It is extremely challenging to compare the results of RTAs across specific studies. Hence, this analysis will assess the trade impacts of different RTAs by upgrading the specialist approach with a larger sample of countries, more contemporaneously dissected RTAs, a longer study period and enhancements in the econometric method.

Finally, our motivation also comes from a desire for proper estimation techniques that can handle the presence of zero trade, which arises prominently in the trade data. Particularly in this case, when the proportion of zero trade reaches approximately 50% of total potential observations, the choice of a proper estimation technique that can deal with the problem of zero trade is quite important. According to Helpman et al. (2008), studies could generate biased results by excluding the meaningful insight about pairs of countries that do not trade with each other.

To overcome the zero trade problem, we will estimate the gravity equation by applying the Poisson pseudo maximum likelihood (PPML) estimator that was proposed by Santos Silva and Tenreyro (2006). Moreover, these authors also find that this approach is consistent in the presence of heteroskedasticity in trade data. In this chapter, we will show that the PPML estimator can provide convincing results regarding the effects of RTAs on international trade.

This study will contribute to the literature on the *ex post* effects of RTAs concerning trade creation and trade diversion by means of an upgraded version of the specialist studies. We decompose the heterogeneous effects of RTAs using a larger sample of countries and plurilateral RTAs. Furthermore, we employ a longer time span and a more appropriate estimation technique than most of the specialist studies focusing on this question. Thus, we are interested in bridging the gap between the specialist and generalist studies in the empirical literature, as advocated by Kohl (2014).

Within the scope of our study, we cover most of the plurilateral "regional" RTAs in force in the world that have been reported to the WTO, which includes a total of 18 RTAs. We are able to capture the impacts of RTAs around the world and to observe the distinct trade patterns of RTAs that are located in different geographic regions and that have been formed by countries with various levels of development. The main results from the PPML estimator and a theoretically inspired gravity model suggest that in the wake of their entry into force, most RTAs have generated a significant increase in trade flows between member countries. In addition, the impacts of trade agreements on extrabloc trade are heterogeneous; however, in many cases, they are a detriment to the rest of the world, because they cause a decline in bloc imports from nonmembers as well as in exports from the rest of the world, implying a trade diversion effect.

The remainder of the chapter is organized as follows. Section 1.2 summarizes the empirical literature on RTA effects. Section 1.3 briefly specifies our econometric approach, the gravity model and describes the dataset. Section 1.4 presents our main empirical results in terms of the average effects of RTAs over the period of 1960 to 2014. Some robustness analysis is provided in Section 1.5 and Section 1.6 concludes and indicates some caveats in the chapter.

1.2 Literature Review

Beginning with only one dummy variable to capture the effects of RTAs on intrabloc trade, studies on the impacts of RTAs were extended with the addition of second and third dummy variables to measure RTAs' effects on the trade of member countries with nonmembers. This improvement has changed the way researchers interpret the empirical results; now it is possible to more carefully assess the trade creation and trade diversion effects following the creation of RTAs, as introduced by Viner (1950). The effects on the trade flows between regional blocs and the rest of the world resulting from the formation of RTAs can be examined more clearly with the support of different regional dummy variables. In this section, we demonstrate the path of development of the RTA empirical analysis based on the improvement of the set of regional dummy variables.

In the interest of evaluating the effects of an RTA on trade flows, many studies first enhanced the basic gravity model by including a regional dummy variable to measure its effects on the trade flows between member countries. This dummy represents the sum of trade creation and trade diversion effects generated by the RTA, as pointed out by Soloaga and Winters (2001). The results obtained in various studies including just one regional dummy variable have been conflicting. Based on the cross-section gravity model, Aitken (1973), Brada and Méndez (1985) showed that the European Economic Community (EEC) had significant positive effects on trade flows between participating countries, while the works of Bergstrand (1985) and Frankel, Stein, and Wei (1995) found insignificant effects in the same RTA. Meanwhile, Frankel (1997) found a change in the effects relating to the enlargement of the EEC during the period of 1970–1992 from significantly negative to positive impacts.

In the case of trading blocs in America, Frankel (1997) found that the North American Free Trade Agreement (NAFTA) and the Southern Common Market (Mercosur) had positive and significant impacts on intrabloc trade by means of pooled estimation over the period of 1970 through 1992, while the bloc effect of the Andean Community is insignificant. Cheng and Wall (2005) and Bussière, Fidrmuc, and Schnatz (2005) found that these RTAs all

create a positive impact on intrabloc trade based on the panel data method with fixed effects. For the European Free Trade Association (EFTA), Frankel et al. (1995) showed that the coefficients for the bloc effect of EFTA were never significant during the study period. In contrast, Aitken (1973) found strong evidence that the intrabloc trade between EFTA members is above the expected levels predicted from the gravity model following the formation of the bloc, although both studies applied cross-sectional data.

Since the studies including only a single regional dummy variable were not capable of capturing the effect of an RTA on trade flows between bloc members and nonmembers, in the late 1990s, many empirical studies added a second regional dummy variable to measure it. This dummy is a binary variable that assumes the value of one if one of the two countries in a bilateral country pair participates in a given RTA and the other does not, and zero otherwise. Frankel (1997) indicates that this variable accounts for the level of openness of an RTA. Studies can identify the trade creation and trade diversion effects of an RTA separately thanks to the combination of the former regional dummy variable and the more recently developed dummy variable. In the cases when the formation of an RTA leads to an increase in intrabloc trade and promotes extrabloc trade or keeps the latter unchanged, this RTA is likely to have a trade creation effect. However, if an RTA increases the trade flows between member countries to the detriment of their trade flows with the outsiders, it appears to induce a trade diversion effect, since intrabloc trade can substitute for the trade flows that come from nonmembers.

When the openness term of RTAs is taken into account, Frankel (1997) found significantly negative coefficient estimates for trade between members and nonmembers in the cases of EFTA and NAFTA, along with significant and positive coefficient estimates for intrabloc trade. The author also found that Mercosur and the free trade area indicated by the Association of South East Asian Nations (ASEAN) have increased the propensity to trade with nonmembers because the estimated coefficients of both regional dummy variables are positive. For the EEC, Frankel (1997) showed that in 1980 and 1985, the EEC members were more open to trade with the rest of the world than one would predict from the standard gravity variables indicated by the openness coefficient, which was highly significant and positive. By contrast, Bayoumi and Eichengreen (1997) found evidence of negative effects on extrabloc trade following the formation of the EEC in the 1960s. Lee and Park (2005) showed that the European Union (EU), NAFTA, and Mercosur led to an increase in extrabloc trade and greater progress in trade between member countries, whereas the Central American Common Market (CACM) and the Common Market for Eastern and Southern Africa (COMESA) contribute to a significant decrease in extrabloc trade.

Nonetheless, the studies including these two dummy variables seldom precisely identify the trade creation and trade diversion effects of RTAs. Since the dummy variable for the level of openness (extrabloc trade) covers both of the members' total exports and imports of goods, it is not capable of separating the impact of the trading bloc on the extrabloc trade regarding exports from the impact regarding imports. As Soloaga and Winters (2001) noted, the import and export flows of member countries may follow different paths. When an RTA improves the trade with nonmember countries, the gravity model with two regional dummy variables cannot identify whether this effect comes from the exports toward the rest of the world or the imports from nonmembers. Similarly, this problem also arises when an RTA has negative effects on extrabloc trade.

The most recent studies, i.e., those published since the 2000s, once again extend the model by including a third regional dummy variable to create a set of three dummy variables individualized for each RTA. Among these three variables, one measures the intrabloc trade between participating countries, the second attempts to explain the export flows of member countries toward nonmembers, and the third variable captures the import flows from the rest of the world to the member countries. The last two dummies seek to indicate the level of overall openness for the trading bloc in terms of export and import flows.

For the purpose of interpreting the effects of a given RTA, when an RTA induces an increase in intrabloc trade (a positive coefficient) combined with an increase in extrabloc trade in terms of exports or imports with nonmembers (a positive coefficient on extrabloc exports or imports), it identifies that trade is created in terms of export flows or import flows, respectively. By contrast, if an increase in intrabloc trade combines with a decline in extrabloc trade concerning exports or imports (a negative coefficient on extrabloc exports or imports), this situation is determined by an export diversion effect or import diversion effect, respectively.

Regarding the effects of RTAs on welfare, one can identify an RTA as being harmful to nonmembers when the coefficient on the extrabloc trade concerning exports to nonmembers is negative; this leads to a falling inclination of member countries to ship their goods to the rest of the world and results in welfare losses for the outsiders. On the other hand, if it is more costly for the producers within an RTA to produce goods than those in the rest of the world, it indicates inefficiency in the allocation of resources worldwide, which is also detrimental to the outsiders of RTAs (Trotignon, 2010).

In a cross-sectional study by Soloaga and Winters (2001), an import creation effect was present in the cases of the EU, EFTA, NAFTA, and ASEAN and negative effects were found on extrabloc trade for Andean, CACM and Mercosur agreements, on average, over

the period of 1980–1996. Carrère (2006) and Trotignon (2010), who employed the panel data approach, also found an increase in the propensity of the EU to export to the rest of the world. Meanwhile, Endoh (1999) pointed to trade creation effect in the EEC over the period of 1960–1994 through all three channels, i.e., intrabloc trade and extrabloc trade in terms of both exports and imports. For the Andean Community, Mercosur, NAFTA and ASEAN, Carrère (2006) showed a falling propensity to import from the rest of the world in the wake of the formation of these RTAs, while Trotignon (2010) found opposite effects, as the author demonstrated an increase in extrabloc trade in terms of imports coming from nonmembers. Although the two authors both use the panel gravity model, their studies have very conflicting results due to the differences in the econometric methods included in their models.

In summary, many studies have distinctly contributed to the evolution in the empirical analysis of RTA effects on international trade by developing a set of regional dummy variables, i.e., going from a single dummy to three dummies. According to our objective, this chapter is reasonably in line with the specific studies that use a set of three regional dummy variables individualized for each RTA, which has been the most recent development in the set of RTA dummy variables. Most of the empirical studies that include three regional dummy variables agree on the trade creation effects in terms of the intrabloc trade following the creation of RTAs. Nonetheless, they are divided concerning the RTA impacts on extrabloc trade. Soloaga and Winters (2001) and Carrère (2006) show the trade diversion effects in terms of bloc exports and imports for most RTAs, whereas Trotignon (2010) finds trade creation effects regarding the extrabloc trade for a majority of RTAs. Once again, these mixed results stem mostly from differences between these studies in terms of the study period, the sample of countries, and the choices of explanatory variables and estimation techniques.

1.3 Methodology and Data

1.3.1 Econometric Approach

Studies on the *ex post* effects of RTAs some have encountered some problems in the gravity model. The first problem, which is the most relevant for this analysis, concerns zero trade flows between country pairs. In some cases, some of the zero trade flows reflect a random rounding error or random missing data. They may also come from the systematic rounding of very low reported values of bilateral trade. In contrast, the zero trade flows found in the database may naturally originate from the fact that bilateral trade does not exist over a period due to the remoteness of those countries, the prohibitive transport costs or

the small sizes of the economies, as argued by Frankel (1997), Santos Silva and Tenreyro (2006), and Helpman et al. (2008). Martin and Pham (2015) also found that most of the bilateral trade flows in aggregate trade data display a real absence of trade. The problem of zero trade flows is quite serious since almost 50% of the total observations on bilateral trade are zero in the dataset used by Santos Silva and Tenreyro (2006), Helpman et al. (2008), and Burger, van Oort, and Linders (2009). As a result, the problem of zero trade flows must be seriously considered using proper econometric techniques.

The conventional method for estimating the gravity model is to keep the model in log-linear form. However, this approach is inappropriate, because the log-linearized model is not feasible for observations involving zero trade flow because the natural logarithm of zero is undefined. Hence, several methods have been proposed in the empirical literature to address the zero trade flow problem. One of the most prevalent methods to simply exclude the instances of zero trade from the dataset and then estimate the gravity model on a truncated database of country pairs that consists of only positive bilateral trade flows. By omitting observations with zero trade, however, this method overlooks interesting and useful insight into the real nature of zero trade between countries and induces serious problems and biased results, since these zero trade flows are generally not randomly determined, as shown by Burger et al. (2009) and Martin and Pham (2015).

Other studies choose to not exclude zero trade flows, but use some transformation involving the dependent variable, for instance, adding a small number to the zero trade observation (a value of one in most cases) before taking logarithms. Another method uses a Tobit model and keeps the observations involving zero trade. Santos Silva and Tenreyro (2006) argued that these methods induce inconsistent estimates in the case when the constant-elasticity model is used. They also pointed out that the standard methods used to estimate the gravity models can lead to misleading estimated coefficients in the presence of heteroskedasticity, which appears inherently in trade data. If the problem of heteroskedasticity rises in the multiplicative model, then its transformation into log-linear form can lead to a more severe bias in the estimated elasticities. Hence, the authors do not recommend estimating the gravity model based on a log-linearized version.

According to Santos Silva and Tenreyro (2006), the PPML estimator is a natural method to solve the problem of zero trade flows. Specifically, they found that the performance of the PPML estimator is not affected when the proportion of the dependent variable with zero trade is substantial. Since the gravity model is directly estimated from its multiplicative form, where the dependent variable is measured in levels instead of linearizing the model by using logarithms, the zero trade flow problem is handled well. Moreover, they found that the PPML method appears to yield more robust and consistent results than

the other econometric techniques in the presence of heteroskedasticity. Several recent empirical analyses on the gravity model, such as those by Westerlund and Wilhelmsson (2011), Anderson and Yotov (2012), Anderson and Yotov (2016), and Anderson, Larch, and Yotov (2018), have included the PPML method and praised the estimator as a new central tool to assess international trade.

The second problem in the gravity model encountered by many analyses on trade policies involves the endogeneity of RTAs when there is potential reverse causality between RTAs and a higher level of bilateral trade between country pairs. According to the hypothesis of "natural trading partners" or "natural trading blocs" that was introduced by Krugman (1991), countries show a propensity to form RTAs with other partner countries for which there are potentially higher trade volumes between them. Furthermore, there are still many unobserved factors between country pairs that may increase bilateral trade and promote the establishment of an RTA concurrently. As a result, the estimated coefficients are likely to be biased since the RTA dummy variable featuring the existence of the trade agreement is potentially correlated with the error term in the gravity equation.

A majority of empirical studies using cross-sectional data and including dummy variables for trade agreements do not take the issue of RTA endogeneity into account. In the extant literature, Trefler (1993) and Lee and Swagel (1997) published the first studies that attempted to adjust for the endogeneity of trade policies on a cross-sectional framework by using instrumental variables.[8] By contrast, Magee (2003) recently found that the instrumental-variables approach does not appear to be efficient in adjusting the issue of endogeneity bias of a binary RTA dummy variable. The author pointed out that it is difficult to find instruments that are unlikely to be correlated with the error term of the gravity equation.

An alternative method of addressing potential endogeneity with RTAs is to estimate the gravity model with the fixed effects (within) estimator that includes bilateral fixed effects for country pairs. According to Baier and Bergstrand (2007), these fixed effects can address the issue of RTA endogeneity bias because they are able to better deal with the unobserved heterogeneity among pairs of countries—one of the most important sources of the endogeneity problem related to RTAs. In addition, Head and Mayer (2014) found that due to the lack of adequate instrumental variables, the fixed effects (within) estimator is able to control for part of the potential RTA endogeneity bias. Filippini and Molini (2003) likewise used the country-pair fixed effects model and found that long-term data do not have the endogeneity problem and produce unbiased results.

[8] Trefler (1993) and Lee and Swagel (1997) concluded that the impacts of trade liberalization policies tend to be underestimated without considering instrumental variables.

The third prominent challenge to address in the gravity model is Anderson and van Wincoop's (2003) multilateral resistance terms. According to the authors, studies are more likely to be biased because they fail to take into account unobserved price indices. Therefore, their multilateral resistance terms incorporate three trade resistance factors in international trade, which are the bilateral trade barriers, the exporter country's trade resistance toward all other destinations, and the importer country's trade resistance toward all other trading partners.

To carry out an easier computational method for taking into account these multilateral resistance term variables in a panel data setting, Anderson and van Wincoop (2003) and Feenstra (2004) suggest the use of time-variant fixed effects for both the exporter and importer countries. This type of fixed effect can produce unbiased results concerning the gravity estimates and has become the preferred econometric technique of many researchers, like Baier and Bergstrand (2007), Magee (2008), and Kohl (2014).

Our study aims to address these significant problems in the gravity model with the help of the PPML estimator and a theoretically inspired gravity model with a proper specification of fixed effects.

1.3.2 Gravity Methodology

To estimate the effects of RTAs on members' trade, we employ the basic gravity equation that has usually been used in international trade analysis. We first augment the model with the dummy variables for 18 plurilateral RTAs. This brings forth the following equation:

$$X_{ijt} = \beta_0 (GDP_{it})^{\beta_1} (GDP_{jt})^{\beta_2} (DIST_{ij})^{\beta_3} e^{\beta_4 (LANG_{ij})} e^{\beta_5 (CONTIG_{ij})} e^{\alpha^k_{Intra} (RTA^k\_Intra_{ijt})} \psi_{ijt} \tag{1.1}$$

where X_{ijt} is the value of trade flow in terms of goods in current dollar values from exporter country i to importer country j at time t. GDP_{it} and GDP_{jt} are the proxies for the exporter and importer country's economic size (gross domestic product), respectively. The impact of these two variables on bilateral trade flows is expected to be positive. $DIST_{ij}$ is the distance measured in kilometers between country i and country j and we expect its impact on trade flows to be negative. $LANG_{ij}$ is a binary variable that takes the value of one if i and j share a common language, and zero otherwise. The effect of this dummy variable is expected to be positive, given that a common language between two trading partners could facilitate trade deals and, thus, reduce trade costs. $CONTIG_{ij}$ is a binary variable that takes the value of one if i and j have a common land border,

and zero otherwise. The effect of sharing a common land border between two countries is likely to have a positive effect on bilateral trade flows. $RTA^k\_Intra_{ijt}$ assumes the value of one if both trading partners i and j have participated in a common RTA^k at time t, and zero otherwise. This dummy variable dissects the intrabloc trade. Finally, e is the natural logarithm base, and ψ_{ijt} denotes the error term.

The traditional approach to estimating equation (1.1) in the literature is to transform it to a linear model by taking the logarithms, which leads to the following equation:

$$\begin{aligned}\ln(X_{ijt}) = \beta_0 + \beta_1 \ln(GDP_{it}) + \beta_2 \ln(GDP_{jt}) + \beta_3 \ln(DIST_{ij}) + \beta_4(LANG_{ij}) \\ + \beta_5(CONTIG_{ij}) + \alpha^k_{Intra}(RTA^k\_Intra_{ijt}) + \varepsilon_{ijt}\end{aligned} \tag{1.2}$$

where ε_{ijt} $(= \ln \psi_{ijt})$ is the error term of equation (1.2). However, the log-linear model struggles with observations involving zero trade value $(X_{ijt} = 0)$ because the natural logarithm of zero is undefined.

As explained in the previous section, this study applies the PPML estimator to deal with the challenges that the log-linear gravity equation has failed to overcome. Moreover, we employ a fixed effects version of the gravity equation that includes the country-pair and time-varying exporter and importer fixed effects to control for the endogeneity of RTAs and unobservable multilateral resistance terms, respectively.

Thus, the PPML estimation is used to estimate the gravity model, which is written as follows:

$$\begin{aligned}X_{ijt} = \exp\Big[\beta_0 + \beta_1 \ln(GDP_{it}) + \beta_2 \ln(GDP_{jt}) + \beta_3 \ln(DIST_{ij}) + \beta_4(LANG_{ij})\Big] \times \\ \exp\Big[\beta_5(CONTIG_{ij}) + \alpha^k_{Intra}(RTA^k\_Intra_{ijt}) + \gamma_{it} + \eta_{jt} + \lambda_{ij}\Big] \times \varepsilon_{ijt}\end{aligned} \tag{1.3}$$

where γ_{it} and η_{jt} denote the time-varying exporter and importer fixed effects, respectively, and λ_{ij} represents the bilateral fixed effects.

Equation (1.3) remarkably enhances the gravity estimates. However, equation (1.3) cannot take into account the RTA variables on extrabloc trade. Thus, this indicates an important limitation of the gravity specification with exporter-year and importer-year fixed effects. Note that the importer-year fixed effect controls for the variation in the importer country's overall imports in year t. Including this fixed effect does not allow us to simultaneously distinguish the evolution in RTA intrabloc imports and the change in the RTA extrabloc imports, because, as argued by Magee (2008), the latter two values constitute the total change in the importer's total imports. The exporter-year fixed effect

behaves in a similar way.

Accordingly, to analyze the impacts of a trade agreement on its intrabloc trade as well as its extrabloc trade in terms of bloc exports and imports, we estimate the following gravity specification that omits exporter-year and importer-year fixed effects:

$$\begin{aligned} X_{ijt} = \; & \exp\Big[\beta_0 + \beta_1 \ln(GDP_{it}) + \beta_2 \ln(GDP_{jt}) + \beta_3 \ln(DIST_{ij}) + \beta_4(LANG_{ij})\Big] \times \\ & \exp\Big[\beta_5(CONTIG_{ij}) + \lambda_{ij} + \upsilon_t\Big] \times \\ & \exp\Big[\alpha^k_{Intra}(RTA^k\_Intra_{ijt}) + \alpha^k_X(RTA^k\_X_{ijt}) + \alpha^k_M(RTA^k\_M_{ijt})\Big] \times \varepsilon_{ijt} \end{aligned} \tag{1.4}$$

where υ_t denotes year effects to capture common yearly trends and shocks.

Regarding the additional RTA variables, $RTA^k\_X_{ijt}$ assumes the value of one if exporter country i belongs to an RTA in which importer country j does not participate at time t, and zero otherwise. This dummy variable captures the impact of the bloc exports to the rest of the world. Variable $RTA^k\_M_{ijt}$ assumes the value of one if importer country j belongs to an RTA in which exporter country i does not participate at time t, and zero otherwise. This dummy variable tests the impact of the bloc imports coming from the rest of the world.

Hence, the set of prime variables of interest (three RTA dummy variables) allows us to assess the influence of the precisely identified RTA trade effects (introduced by Viner, 1950) on member countries and multilateral trading system. To capture the trade creation and trade diversion effects of a specific RTA, we need to examine the signs of the coefficients of these RTA variables, which are α^k_{Intra}, α^k_X, α^k_M, respectively. If $\alpha^k_{Intra} > 0$, meaning the formation of an RTA stimulates intrabloc trade creation effects between member countries, when both member countries join the RTA, additional trade is induced. More precisely, the domestic production of member countries or the bloc imports coming from the rest of the world can be substituted with the increase in intrabloc trade resulting from the formation of the RTA. Thus, the coefficients of α^k_X and α^k_M will determine the trade creation and trade diversion effects for a specific RTA. We demonstrate our method of analyzing the signs of the RTA coefficients, inspired by Soloaga and Winters (2001), Carrère (2006) and Trotignon (2010), in Table 1.1 as follows.

In summary, when $\alpha^k_{Intra} > 0$ combines with $\alpha^k_X > 0$ ($\alpha^k_M > 0$), it indicates trade creation in terms of bloc exports to the rest of the world and bloc imports from the rest of the world. The variable $\alpha^k_{Intra} > 0$ coupled with $\alpha^k_X < 0$ or $\alpha^k_M < 0$ displays trade diversion regarding bloc exports or bloc imports. The term "export creation/diversion" is used to illustrate

Table 1.1 – Trade creation and trade diversion effects of RTA coefficients

Sign of RTA coefficients			Trade creation and Trade diversion effects
α^k_{Intra}	α^k_X	α^k_M	
> 0	> 0	> 0	Intrabloc trade creation/Export creation/Import creation
> 0	> 0	< 0	Intrabloc trade creation/Export creation/Import diversion
> 0	< 0	> 0	Intrabloc trade creation/Export diversion/Import creation
> 0	< 0	< 0	Intrabloc trade creation/Export diversion/Import diversion

Source: Author.

higher/lower trade when the exporter country is a member of the RTA and the importer country is not, whereas "import creation/diversion" is used for increased or reduced trade when the importer country belongs to the RTA but the exporter country does not. If α^k_X and α^k_M are both negative, then we compare the value of α^k_{Intra} with the absolute value of the sum of α^k_X and α^k_M to examine whether the trade diversion regarding bloc exports and bloc imports can completely outweigh the intrabloc trade creation (in the case when $\alpha^k_{Intra} < |\alpha^k_X + \alpha^k_M|$). Additionally, studying the signs of the RTA coefficients also helps us to assess the welfare of nonmembers. For instance, when $\alpha^k_{Intra} > 0$ combines with $\alpha^k_X < 0$, we find a decrease in the welfare of nonmembers through the export diversion effect.

1.3.3 Data

The model is estimated based on a dataset that includes 160 countries over the period of 1960 through 2014. Appendix A.2 enumerates the countries used in the study. These countries, on average, accounted for over 95% of the total trade in the world over the period of 55 years. The nominal bilateral trade data are collected from the International Monetary Fund's (IMF) Direction of Trade Statistics (DOTS). The nominal GDPs are from Head, Mayer, and Ries (2010) and the World Bank's World Development Indicators. Here we follow the proposition in Baldwin and Taglioni (2006) to remedy their "bronze-medal mistake" in the gravity model estimations. They employed undeflated trade values with a structure of bilateral and time-varying country fixed effects to remove any issues emerging from the omission of the deflation of trade. Consequently, the estimates using real trade flows or nominal trade flows are interchangeable.

The set of control variables involving geographical and cultural characteristics, such as bilateral distance, contiguity, and common language, are sourced from the CEPII gravity database. The dummy variables for RTAs are created from the WTO Regional Trade

Agreements Information System (RTA-IS)[9] complemented with the database of Baier and Bergstrand (2007). In this analysis, we include only full (no partial) plurilateral RTAs covering the liberalization of trade in goods that are notified to the GATT/WTO under GATT Article XXIV or the Enabling Clause for developing countries, which are free trade agreements and customs unions. The date when a given RTA enters into force is used to define whether the dummies for this RTA will take the value of one or zero.

To capture the impacts of the wave of regionalism on the multilateral trading system around the world, we consider 18 RTAs that exist in different regions. Many RTAs were either created or revamped during the late 1980s and early 1990s, such as the ASEAN Free Trade Agreement, NAFTA, Mercosur, Andean Community, and CACM. During the 1990s and 2000s, we also witnessed the great extension of the EU along with the reduction in membership in the EFTA and the establishment of other RTAs located mainly in Africa, Asia, and Central America. Appendices A.1 and A.3 present the list of all of the RTAs, their geographic areas, and member countries that are included in the study.

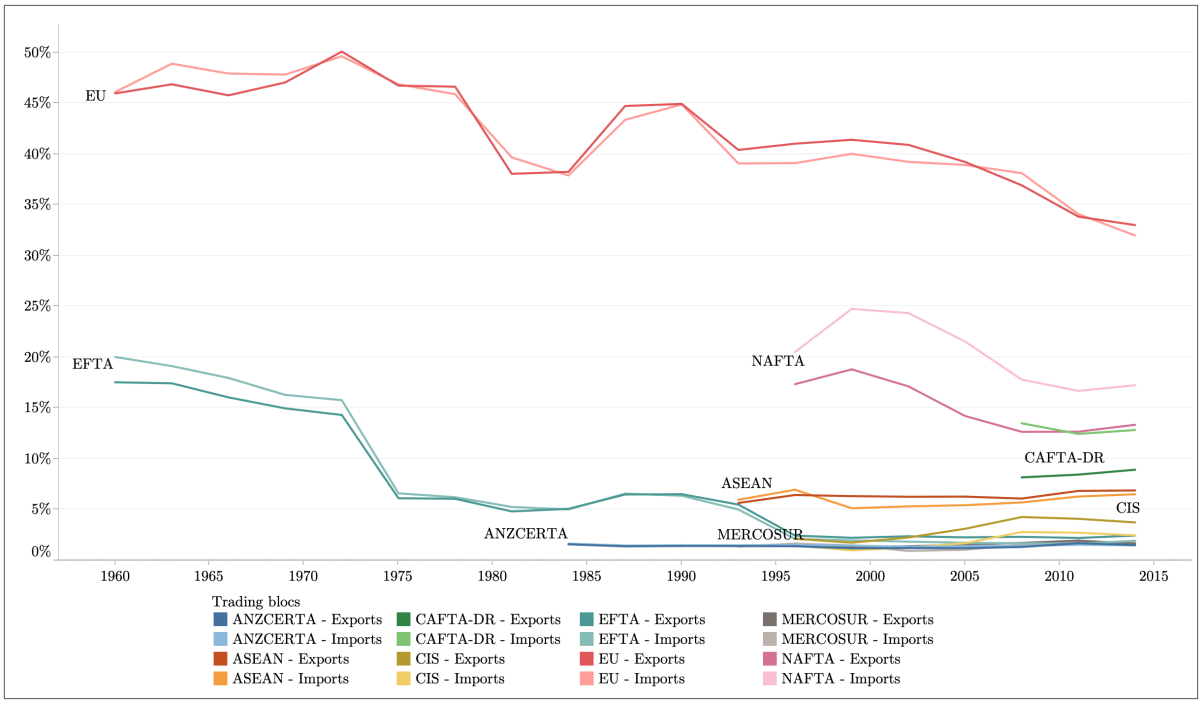


Figure 1.1 – Share of individual RTA's trade flows in global trade following its entry into force, 1960–2014

Note: This figure only shows the trading blocs with a share of their exports and imports more than 1% in world trade. Source: Author's calculations based on the IMF's DOTS.

Figure 1.1 presents the share of an individual RTA's exports and imports in world trade following its entry into force. Most RTAs have had a trivial role in world trade, with the

[9] https://rtais.wto.org/UI/PublicMaintainRTAHome.aspx

exception of the EU and NAFTA. However, the EU and NAFTA's share in world exports and imports experienced a significant downward trend (from approximately 46% in 1960 to about 30% in 2014 and from 20% in 1996 to 17% in 2014, in the case of the EU and NAFTA, respectively). This suggests that the trade flows of these two RTAs encountered smaller increases in value than the rest of the world.

Figure 1.2 reports the share of intrabloc trade in each RTA's total trade value since its entry into force. Only the EU and NAFTA have a share of intrabloc trade more than 50% of their total trade, on average, after their formation, followed by ASEAN and the Commonwealth of Independent States (CIS), with more than 20%. Interestingly, the CIS experienced a steady decrease in its share of intrabloc trade. The intrabloc trade of other plurilateral RTAs is proving to be very negligible compared with their total trade flows.

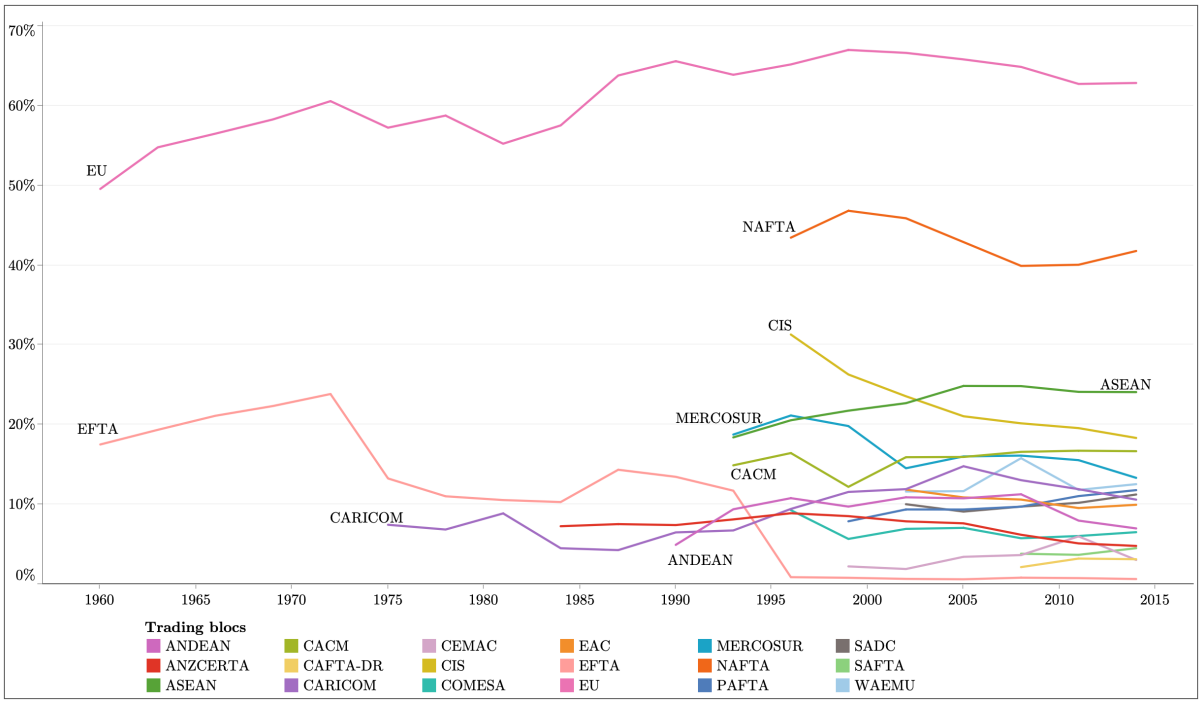


Figure 1.2 – Share of intrabloc trade in each trading bloc's total trade value since its entry into force, 1960–2014

Source: Author's calculations based on the IMF's DOTS.

Because this chapter takes into account unidirectional trade flows as suggested by Baldwin and Taglioni (2006) rather than the average of the two-way exports, our dataset presents a panel structure consisting of a total of 1,399,200 potential annual observations for 25,440 pairs of countries. After missing values are removed, the sample covers 1,136,548 observations.

Compared to other empirical studies involving the assessment of RTA effects on interna-

tional trade, this work has a fairly large sample. Based on the same trade database (IMF's DOTS), Frankel (1997) pooled data from 1970 through 1992 with five-year intervals and examined a total of 6,102 observations; Baier and Bergstrand's (2007) work included a sample of 47,081 observations covering 96 countries from 1960 to 2000 at five-year intervals. Carrère (2006) assesses the impacts of RTAs with a sample comprising 240,691 observations over the period of 1962–1996. Appendix A.4 describes the descriptive statistics of the variables.

Of all of the observations, 32,500 (2.3%) belong to an RTA that is included in our study; these are observations of 1,682 country pairs (6.6%). Among these 18 RTAs, the EU has the most member countries; it has 27 countries[10] and covers 11,910 observations over a time span of 55 years. In comparison, the Australia-New Zealand Closer Economic Relations Trade Agreement (ANZCERTA) involves only two country pairs and covers the least number observations (64 observations).

Table 1.2 – Percentage of zero trade flows

	Bilateral distance	Exporter GDP	Importer GDP
1st to 33th percentile	43.0%	72.8%	67.0%
34th to 66th percentile	51.3%	47.3%	49.1%
67th to 99th percentile	57.3%	36.7%	39.7%

Source: Author's calculations.

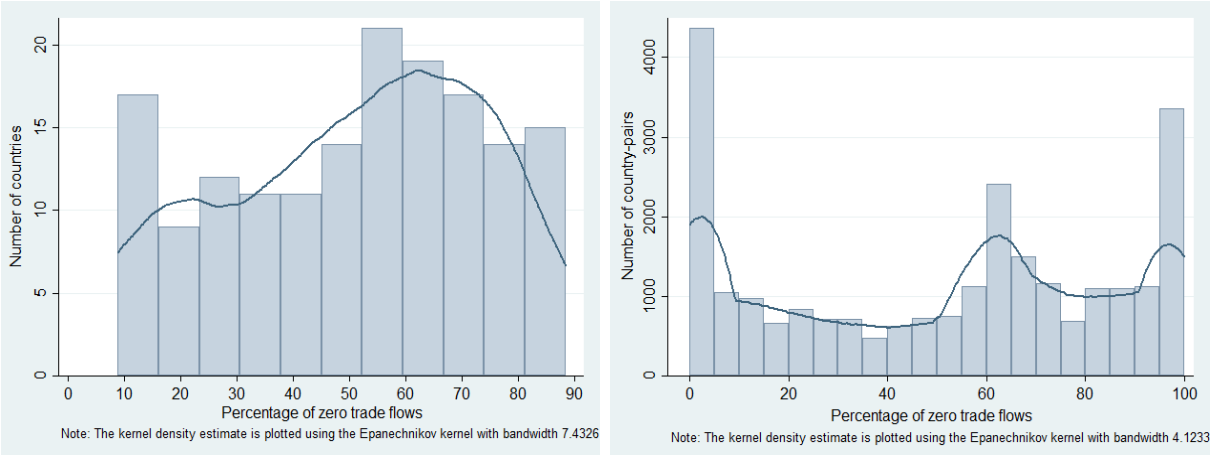
Regarding the issue of zero trade flows, approximately 50.5% of the observations are zero.[11] This proportion of zero trade is similar to other empirical studies. For instance, 47.6% of the observations in Santos Silva and Tenreyro (2006), and about half of the observations in Helpman et al. (2008) and Burger et al. (2009) involve zero trade flows. Table 1.2 features the patterns of zero trade flows in the dataset based on a bilateral distance set and sets of exporter and importer GDPs. We find that the percentage of zero trade flows are higher in the set of the 1st to the 33th percentile of exporter GDP and importer GDP (72.8% and 67%, respectively) than in the set of the 67th to the 99th percentile, which corresponds to countries having greater GDP. Therefore, it seems that smaller countries tend to export to a much smaller number of partner countries than others. In addition, countries are more likely to export to partner countries that are within closer proximity, shown by the percentage of zero trade flows increasing with bilateral distance. The findings from our dataset are in line with the literature, i.e., that bilateral trade is likely absent among small

[10] We do not include Croatia in our sample since Croatia recently joined the EU in mid-2013.

[11] Note that if missing values in trade flows between exporter and importer countries for over ten consecutive years are recorded, we consider them as zero trade flows, following Brun et al. (2005), and Felbermayr and Kohler (2006).

and remote countries due to prohibitive trade costs.

Figure 1.3a shows a histogram and a kernel density plot for the proportion of zeros in the exports of 160 countries included in the study. Among them, 18 countries have total zero trade flows for under 15% of their potential export flows with trading partners from 1960 through 2014. All of these countries are developed countries. Nonetheless, the majority of countries have zero export trade flows with approximately 40% to 70% of their potential partner countries.



(a) On country-level export flows **(b)** On country-pair-level export flows

Figure 1.3 – Proportion of zero trade over the period of 1960–2014

Source: Author's calculations.

On the country-pair level, Figure 1.3b presents a histogram and a kernel density plot for the proportion of zero exports involving 25,440 country pairs. There are 3,975 country pairs that have no zero trade flows over the 55 year period and approximately 49% of the total country pairs have zero trade flows for 60% to 100% of the time. In particular, we find that 2,399 country pairs, most of which include small countries or remote countries, have zero trade entirely during the study period.

Additionally, Figure 1.3 shows that the zero trade flows are nonrandomly distributed, as can be expected from trade theory (Burger et al., 2009). In summary, the dataset used in this chapter suggests again that the issue of zero trade flows is quite crucial, with 50.5% of the observations having zero trade flows. Thus, this finding justifies the need to gather the valuable information that is contained in the zero trade data to address the lack of trade in certain country pairs.

1.4 Empirical Results

1.4.1 Baseline Model Dissecting the Impacts of RTAs on Intra-bloc Trade

Table 1.3 (Panel A) presents estimates of the impacts of the regionalism caused by different RTAs on trade flows. We first carry out some preliminary tests to determine the presence of heteroskedasticity and serial correlation. The White and Wooldridge tests indicate problems of heteroskedasticity and serial correlation in our dataset; therefore, the standard errors from the estimations are clustered by country pair.

The results in Panel A, Table 1.3 are for the traditional gravity model that only includes the variables for different RTAs' intrabloc trade, the logs of GDPs, distance, and some other bilateral control dummies as explanatory variables, as described in equation (1.2). Then, we investigate the impact of controlling for a more structural set of fixed effects. Columns (1) to (3) provide the coefficients estimated using the PPML method. For comparison, columns (4) and (5) list the estimation outcomes resulting from the fixed effects (FE) (within) estimator, which will be discussed later.

Table 1.3 – Estimated impacts of RTAs on intrabloc trade

Specifications	Panel A					Panel B	
	PPML			FE (within)		PPML	FE (within)
Variables	X_{ijt}			$\ln(X_{ijt})$		X_{ijt}	$\ln(X_{ijt})$
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
ln GDP_{it}	0.774***	0.679***		0.712***			
	(0.014)	(0.038)		(0.017)			
ln GDP_{jt}	0.786***	0.651***		0.699***			
	(0.019)	(0.055)		(0.014)			
ln $DIST_{ij}$	–0.645***						
	(0.035)						
$CONTIG_{ij}$	0.518***						
	(0.095)						
$LANG_{ij}$	0.425***						
	(0.073)						
ANDEAN_Intra	–0.168	0.677***	0.969***	1.529***	1.444***	0.986***	1.421***
	(0.181)	(0.134)	(0.165)	(0.154)	(0.212)	(0.184)	(0.207)
ANZCERTA_Intra	1.241***	0.013	0.642***	0.557**	0.381***	0.613***	0.417***
	(0.087)	(0.189)	(0.204)	(0.264)	(0.111)	(0.220)	(0.107)
ASEAN_Intra	1.526***	0.009	–0.206	0.798***	–0.494***	–0.192	–0.479***
	(0.145)	(0.171)	(0.129)	(0.169)	(0.144)	(0.136)	(0.149)
CACM_Intra	0.823***	0.007	–0.315*	0.259***	0.176	–0.335*	0.308*

Table 1.3 continued

Specifications	Panel A					Panel B	
	PPML			FE (within)		PPML	FE (within)
Variables	X_{ijt}			$\ln(X_{ijt})$		X_{ijt}	$\ln(X_{ijt})$
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	(0.201)	(0.139)	(0.179)	(0.098)	(0.133)	(0.196)	(0.158)
CAFTADR_Intra	0.225**	0.026	0.130*	0.710***	0.585***	0.107	0.553***
	(0.114)	(0.110)	(0.079)	(0.121)	(0.134)	(0.082)	(0.145)
CARICOM_Intra	1.995***	–0.278	0.789***	–0.117	1.140***	0.762**	1.187***
	(0.281)	(0.293)	(0.289)	(0.186)	(0.207)	(0.369)	(0.215)
CEMAC_Intra	–0.691**	–0.404	0.055	–0.933**	–0.055	0.056	0.029
	(0.333)	(0.258)	(0.333)	(0.399)	(0.364)	(0.341)	(0.360)
CIS_Intra	1.069***	1.731***	–0.565***	–0.341***	–1.049***	0.376	–0.851***
	(0.222)	(0.265)	(0.126)	(0.130)	(0.169)	(0.279)	(0.181)
COMESA_Intra	–0.465***	0.135	0.907***	0.317***	0.910***	0.926***	0.822***
	(0.170)	(0.124)	(0.165)	(0.115)	(0.119)	(0.187)	(0.133)
EAC_Intra	0.927***	–0.193	–0.015	0.450**	0.895***	–0.126	0.905***
	(0.352)	(0.160)	(0.220)	(0.203)	(0.270)	(0.249)	(0.302)
EFTA_Intra	0.239	0.365***	–0.088	0.348***	0.006	–0.110*	–0.016
	(0.194)	(0.077)	(0.060)	(0.053)	(0.089)	(0.063)	(0.092)
EU_Intra	–0.010	0.408***	0.496***	0.596***	0.926***	0.517***	0.943***
	(0.081)	(0.046)	(0.040)	(0.029)	(0.040)	(0.041)	(0.042)
MERCOSUR_Intra	0.300**	0.579***	0.746***	0.855***	0.500***	0.772***	0.476**
	(0.135)	(0.146)	(0.151)	(0.089)	(0.179)	(0.160)	(0.185)
NAFTA_Intra	0.485***	0.202	0.240***	0.996***	0.047	0.211***	0.035
	(0.171)	(0.132)	(0.065)	(0.213)	(0.125)	(0.065)	(0.127)
PAFTA_Intra	–0.476***	–0.192	0.298*	0.407***	0.520***	0.269	0.579***
	(0.174)	(0.149)	(0.161)	(0.095)	(0.107)	(0.168)	(0.113)
SADC_Intra	1.233***	0.559***	0.720***	0.617***	0.790***	0.671***	0.857***
	(0.238)	(0.129)	(0.161)	(0.182)	(0.211)	(0.164)	(0.237)
SAFTA_Intra	–0.984**	0.327***	–0.021	0.172	–0.518***	–0.064	–0.462**
	(0.447)	(0.108)	(0.150)	(0.245)	(0.174)	(0.135)	(0.188)
WAEMU_Intra	1.040***	0.026	0.494***	0.062	0.688***	0.355**	0.620***
	(0.288)	(0.145)	(0.181)	(0.219)	(0.201)	(0.176)	(0.202)
Observations	1,136,548	1,039,417	994,096	652,223	652,197	331,439	223,977
Country pairs	22,847	22,847	22,847	22,146	22,146	22,031	20,737
Exporter-year, Importer-year FEs	No	No	Yes	No	Yes	Yes	Yes
Country-pair FEs	No	Yes	Yes	Yes	Yes	Yes	Yes
Year FEs	No	Yes	No	Yes	No	No	No

Notes: This table reports estimates of the effects of 18 plurilateral RTAs. Different settings of fixed effects are used across various specifications. Coefficient estimates of the fixed effects are omitted for reasons of brevity. All estimates are obtained in Panel A with data built over consecutive years during the period of 1960–2014. Columns (1), (2), and (3) employ the PPML estimator. Columns (4) and (5) use the panel data technique with the fixed effects (within) estimator. The dependent variable in the PPML regression

is the export flows in levels. The dependent variable in the fixed effects (within) regression is the natural log of the export flows. Panel B employs the data with three-year intervals. Standard errors are reported in parentheses and clustered by country pair. Respectively, *, **, and *** denote significance at the level of 10%, 5%, and 1%.

At first glance, column (1) presents the PPML results of the basic gravity model, in which the GDP level of the exporter and importer countries are highly statistically significant at the 1% level and have the expected positive sign, because bilateral trade flows increase with the size of the GDP of the trading partners. The coefficient on distance is negative and statistically significant at the 1% level as well. The estimated coefficients on contiguity and common language are also positive and highly significant, as expected.

Since the primary interest in this study is to assess the impact of various RTAs on members' trade, we mainly focus on the RTA dummy variables. The traditional gravity model without any fixed effects in column (1) shows significant intrabloc trade in most regional blocs. The median RTA in the first column is estimated to raise intrabloc trade by 127.7% $(= 100 * (e^{0.823} - 1))$. Since this specification ignores the recent developments in the theoretical foundations of the gravity model, these results may suffer from bias.

Column (2) puts the fixed effects for each country pair and for every year into the dissection, which is similar to equation (1.4). We find that when bilateral and year fixed effects are controlled for, the impact of the median RTA on the members' intrabloc trade decreases to 74.9%, which is approximately half of the value in column (1). We show evidence that the gravity models without bilateral fixed effects tend to overestimate the impact of RTAs on trade because the countries engaging in RTAs show a preference for country pairs with historically significant levels of bilateral trade.

Column (3) shows the coefficient outcomes resulting from the preferred specification: equation (1.3) with time-variant fixed effects for exporters and importers as well as country-pair fixed effects.[12] Not surprisingly, the GDP and bilateral control variables are perfectly collinear with the set of country-year and bilateral fixed effects, respectively, and are thus not determined. The results in terms of the impacts of the RTAs on the intrabloc trade reinforce the results from column (2). Including exporter-year and importer-year fixed effects in the model also tends to make the estimated coefficients of the regional bloc smaller. Hence, in specification (3), the median RTA is shown to increase intrabloc trade by only 64.2%.

[12]By means of the Stata package `ppml_panel_sg` that was written by Larch et al. (2017), it is computationally possible to estimate these nonlinear regression models with high-dimensional fixed effects (a total of 43,040 potential dummies in terms of exporter-year, importer-year and country-pair fixed effects for the complete dataset). See Larch et al. (2017) for further details.

Taking a closer look at the individual RTA effects, 11 of the 18 regional blocs remarkably increase the members' trade within the bloc. Significant negative RTA impacts on intrabloc trade are observed for CIS and CACM. Conversely, insignificant negative impacts are observed for ASEAN, the South Asian Free Trade Agreement (SAFTA), and the East African Community (EAC). Most of the coefficients on regional agreements are consistent and comparable between column (2) and column (3). However, some RTAs, such as CIS, EFTA, the Pan-Arab Free Trade Agreement (PAFTA), SAFTA, the Caribbean Community and Common Market (CARICOM), and CACM, are quite sensitive to the choice of fixed effects.

We also conduct a sensitivity analysis using the panel data technique with the fixed effects (within) estimator. Column (5) shows that most regional agreements have consistent effects on intrabloc trade with the results from the PPML estimation. Only EAC and CACM have conflicting effects on intrabloc trade across the PPML and the fixed effects (within) estimations, because they are sensitive to the treatment of zero trade using the PPML estimator. Interestingly, we also observe that most of the estimated coefficients on the RTAs from the fixed effects (within) estimator are consistent regardless of the fixed effects chosen.

1.4.2 Baseline Model Analyzing the Effects of RTAs on Extrabloc Trade

As explained in the previous section, to assess the impacts of RTAs on extrabloc trade, we have to omit the exporter-year and importer-year fixed effects and estimate equation (1.4). The results are summarized in Table 1.4.

The results in Table 1.4 provide an overview of the individual RTA trade creation and trade diversion effects. Nine of the 18 plurilateral RTAs have significant trade-promoting effects on their intrabloc trade, including the Andean Community, COMESA, CIS, EU, EFTA, NAFTA, SAFTA, Mercosur and the Southern African Development Community (SADC). In contrast, significant negative impacts on intrabloc trade are only noticed for EAC.

It may seem surprising that the coefficient for the intrabloc trade is negative for a regional agreement since intrabloc trade tends to increase more than what is predicted by the gravity model following the formation of an RTA. However, Soloaga and Winters (2001), Carrère (2006), Tumbarello (2007), and Kohl (2014) also find a negative sign in the coefficient for intrabloc trade for several RTAs, including ASEAN, CIS, EFTA, and EU. In our case, the negative coefficient for the EAC intrabloc trade could be explained by

Table 1.4 – Overview of the estimated impacts of RTAs on extrabloc trade

	Estimated coefficients from PPML			
Agreement	Intrabloc	Bloc exports	Bloc imports	Overall effects
ANDEAN	0.714***	–0.161	–0.158*	Intrabloc trade creation (+104.2%); Import diversion (–14.6%)
ANZCERTA	0.039	–0.294***	–0.068	Export diversion (–25.5%)
ASEAN	0.012	0.137	0.093	No significant effects
CACM	0.056	0.216*	0.372***	Export creation (+24.1%); Import creation (+45.1%)
CAFTADR	–0.001	–0.083	–0.099	No significant effects
CARICOM	–0.711	–1.279***	–0.448**	Export diversion (–72.2%); Import diversion (–36.1%)
CEMAC	–0.373	–0.133	–0.122	No significant effects
CIS	1.809***	1.418***	0.695***	Intrabloc trade creation (+510.4%); Export creation (+312.9%); Import creation (+100.4%)
COMESA	0.243*	–0.237**	–0.279***	Intrabloc trade creation (+27.5%); Export diversion (–21.1%); Import diversion (–24.3%)
EAC	–0.361**	–0.610***	–0.020	Export diversion (–45.7%)
EFTA	0.598***	0.307***	0.276***	Intrabloc trade creation (+81.8%); Export creation (+35.9%); Import creation (+31.8%)
EU	0.567***	0.091*	–0.045	Intrabloc trade creation (+76.3%); Export creation (+9.5%)
MERCOSUR	0.605***	–0.134*	0.115	Intrabloc trade creation (+83.1%); Export diversion (–12.5%)
NAFTA	0.290**	–0.195***	0.094	Intrabloc trade creation (33.6%); Export diversion (–17.7%)
PAFTA	–0.145	–0.164**	–0.084	Export diversion (–15.1%)
SADC	0.745***	0.174	0.182*	Intrabloc trade creation (+110.6%); Import creation (+20.0%)
SAFTA	0.310***	0.369***	0.475***	Intrabloc trade creation (+36.3%); Export creation (+44.6%); Import creation (+60.8%)
WAEMU	0.067	–0.330***	–0.121*	Export diversion (–28.1%); Import diversion (–11.4%)

Notes: This table provides an overview of the estimated effects of trade agreements on intrabloc trade and extrabloc trade. All estimates are obtained by using the PPML estimator with country-pair and year fixed effects. The estimates of the fixed effects and standard errors are omitted for brevity. Appendix A.5 shows the full regression output. Respectively, *, **, and *** denote significance at the level of 10%, 5%, and 1%.

the lack of real effort to promote intrabloc trade between its African member countries through, for example, reducing tariff barriers or enhancing transportation networks.

Regarding the assessment of the trade creation and trade diversion effects of RTAs in terms of the trading bloc exports and imports, there is great heterogeneity in these effects across the regional blocs. A useful approach to analyze these impacts is to group the RTAs based on their geographic area or levels of development.

Trade agreements involving European countries, including EU, EFTA, and CIS, witness export creation by means of significant positive coefficients on bloc exports along with an increase in their intrabloc trade. Import creation is also observed in the cases of EFTA and CIS. Interestingly, we find that European RTAs have had a strong trade-promoting impact on both intrabloc trade and extrabloc trade. For instance, intra-EU27 trade is 76.3% above the levels that are predicted by the gravity model along with a propensity to export to nonmembers increasing by 9.5% on average over the period of 1960–2014.

Our findings in terms of the EU27 effect are in line with the results from Soloaga and Winters (2001), Carrère (2006) and Trotignon (2010) that indicate export creation for the EU. The EU does not have any significant effect on its bloc imports, which is akin to the findings of Soloaga and Winters (2001). Additionally, we do not find any evidence that the regional integration of EU members negatively impacts EU exports and imports to/from the rest of the world, thus imposing costs on nonmembers. Specifically, our findings cover all of the enlargement processes of the EU from EU9 to EU27. Nonetheless, our results of the effects on EU extrabloc trade are quite different from the findings of Frankel (1997) and Sapir (1998), which do not cover the recent expansion of the EU.

In the case of EFTA, its extrabloc trade patterns reflect its openness toward European neighbors, especially its former members that joined the EU during the 80s and 90s. This result is also in line with Soloaga and Winters (2001).

Note that CIS experiences an excessively high level of trade creation effects in terms of both intrabloc trade and extrabloc trade. This might be explained first by the strong trade ties between CIS members, which are former members of the Soviet Union. Second, as argued earlier, CIS intrabloc effects are very sensitive to the set of country-pair and year fixed effects. Therefore, we do not take into account the effects of CIS on its members' intrabloc and extrabloc trade at the further stage of our analysis.

Turning to the RTAs formed by countries in America, most plurilateral trade agreements were found to have extrabloc trade diversion effects in terms of bloc exports or imports despite the members' levels of economic development. We show a negative propensity to export to the rest of the world for NAFTA and Mercosur countries, with an average decline of 17.7% and of 12.5%, respectively. This result is in line with the findings of Soloaga and Winters (2001) concerning both RTAs and of Trotignon (2010) with regard to NAFTA but are contradictory to the findings of Carrère (2006). The latter study revealed significant import diversion and negligible effects on bloc exports for these two trading blocs.

In addition, an import diversion effect is found for Andean, which is also found by Soloaga

and Winters (2001) and Carrère (2006). We also obtain export and import diversion effects for CARICOM. Only CACM shows a tendency to increase extrabloc exports and imports with the rest of the world, which is in line with the findings of Trotignon (2010). We do not find any trade impacts for the Dominican Republic-Central America Free Trade Agreement (CAFTA-DR) in the setting of equation (1.4), since it entered into force only recently (in 2006).

Turning next to the RTAs in Asia-Pacific, the SAFTA and ASEAN have positive coefficient estimates for extrabloc trade in terms of exports and imports, but the coefficient estimates are insignificant in the case of ASEAN. This result may suggest that the trade patterns of their member countries are actively oriented toward trade with the rest of the world. They possess huge consumer markets for goods imported from the rest of the world as well as large global markets for their potential exports from different sectors, such as agriculture, the textiles and apparel industry, the electronics industry, among others.

On the other hand, PAFTA demonstrates export diversion. However, since several of the countries participating in PAFTA are member countries of the Organization of the Petroleum Exporting Countries (OPEC), like Saudi Arabia, Kuwait, Qatar, and the United Arab Emirates, these countries' petroleum export policies likely induced complex impacts on the trade patterns of PAFTA. ANZCERTA also shows an export diversion effect at the expense of the rest of the world, since Australia and New Zealand are quite distant from other countries.

For African RTAs, we study the effects of several agreements, including COMESA, SADC, and EAC in South East Africa, the West African Economic and Monetary Union (WAEMU) and the Economic and Monetary Community of Central Africa (CEMAC). Note that there is a complex network of RTAs in Africa, with several overlapping trading blocs that have been established by the same trading partners.[13] We find that there is no significant trade-creating effect in terms of intrabloc trade for several African RTAs, except for COMESA and SADC. Most African RTAs have a negative propensity to export and import with the rest of the world, especially WAEMU and COMESA. The findings are likely to reflect the strong connection among African countries in East Africa and among former French colonies in West Africa through a tendency to trade with member countries, which is detrimental to nonmembers. Nonetheless, COMESA is the only RTA that is experiencing an increase in intrabloc trade; however it is entirely offset by a lower propensity to export and import. In contrast, an import creation effect is only found for SADC, which is likely driven mainly by the dynamics of imports by

[13]For instance, Tanzania has joined all of the three RTAs in South East Africa (COMESA, SADC, and EAC), and Madagascar has also participated in COMESA and SADC.

South Africa (a BRICS member) from the rest of the world.

In short, four main findings emerge from our study. First, intrabloc trade creation effects are found for most plurilateral RTAs. There are indeed increases in trade between member countries in the wake of the establishment of several RTAs. Second, the impacts of regional agreements on extrabloc trade are heterogeneous. Export and import diversion effects are significant in many RTAs based in America and Africa, regardless of whether they are formed by developed countries or developing countries. In contrast, there are more export and import creations resulting from the formation of RTAs in Europe and Asia. Third, when the impact of an RTA on extrabloc trade in terms of both bloc exports and imports is significant, we do not discover any RTA that has a contradictory sign of the estimated coefficients on the RTA's exports and imports. This suggests that there is no evidence that export diversion effect couples with the import creation effect and vice versa. Finally, the estimated impacts of RTAs on international trade are still very consistent and comparable with the findings from the literature when zero trade flows are taken into account by using the PPML estimator.

1.5 Robustness Checks and Extension

1.5.1 Adjustment in Trade Flows

Since bilateral trade flows need time to adjust to changes in trade policies or trade costs, our first robustness check uses panel data with three-year intervals in preference to data compiled over consecutive years, as proposed by Baier and Bergstrand (2007), Olivero and Yotov (2012), Kohl (2014) and Anderson and Yotov (2016).

The results for the adjustment in trade flows from the specification using only RTA intrabloc trade dummies are presented in Panel B, Table 1.3. We find that 11 of the 18 plurilateral RTAs have consistent trade-promoting effects in terms of intrabloc trade, as obtained by the PPML estimator. Only CAFTA-DR and PAFTA have negligible effects on members' trade instead of significant impacts resulting from the estimation based on a dataset built over consecutive years. In addition, there are then only two RTAs with conflicting effects on intrabloc trade between the PPML and the fixed effects (within) estimations (EAC and CACM).

Interestingly, Asian RTAs, such as ASEAN and SAFTA, continue to show insignificant impacts on intrabloc trade in the results of the PPML regression (column (6), Table 1.3) and significant negative impact in the results from the fixed effects (within) estimation (column (7), Table 1.3). This reflects their long implementation period in terms of trade

liberalization schedules.[14] ASEAN has implemented tariff concessions for over 26 years (from 1992 to 2018), while the SAFTA has an implementation period of over ten years (from 2006 to 2016). This means that ASEAN members have gradually lowered their trade barriers (both tariff and nontariff barriers) for goods coming from other members. Thus, the slow decrease in trade barriers within ASEAN does not generate substantial impacts on their intrabloc trade.

Figure 1.4 – Overview of the effects of RTAs on extrabloc trade based on different intervals panel data

Notes: Only estimates for the effects of RTAs that are statistically significant at least at the level of 10% are shown in this figure. Results are estimated using the PPML estimator with country-pair and year fixed effects. The vertical axis reports the RTAs. The effects of RTAs on trade flows are indicated on the horizontal axis. The trade creation impact is represented by a positive effect, whereas the trade diversion impact is indicated by a negative effect. Appendix A.5 shows the full regression output. Source: Author's calculations.

[14] Each RTA is subject to a different liberalization procedure and schedule. In some RTAs, the liberalization of intrabloc trade takes place upon the date of entry into force of the trade agreement. In this study, this date is used to define whether the dummies for the RTA take the value of one or zero. More common for RTAs is a phased implementation of tariff concessions over a period. The WTO's data on RTAs determines that the implementation period for a given RTA is the date of final implementation of tariff eliminations undertaken by the slowest liberalizing member.

Regarding the effects of RTAs on both intrabloc trade and extrabloc trade that are presented in Figure 1.4, the gravity estimates that are obtained with three-year intervals deliver consistent results with regard to the baseline results built on consecutive years. Thus, the effects of individual RTAs on intrabloc trade and extrabloc trade in terms of exports and imports are very similar for 14 of the RTAs. Only a few additional effects are found, such as import diversion for CAFTA-DR and export creation for SADC.

We also experiment with data composed of four-year gaps and find that the similarity in the results always holds for most of the RTAs included in this study. Surprisingly, the import creation effect is indicated for ASEAN, as discussed, these member countries have a propensity to exchange goods with the rest of the world. This finding is consistent with Soloaga and Winters (2001) and Carrère (2006). In addition, we no longer find any significant extrabloc trade effects for the EU.

Moreover and as expected, the consistency in our results covering three-year and four-year intervals data is in line with the work of Olivero and Yotov (2012). They find that a dataset with three-year, four-year or five-year intervals provides similar results for the estimates of gravity variables in terms of magnitudes, significance, and signs.

1.5.2 Phase-In Period of Regional Trading Blocs

As regional agreements potentially have a phase-in period, we employ lagged RTAs variables to account for these dynamic effects of RTAs. Following the proposition of Baier and Bergstrand (2007), our second robustness check includes three- and six-year lags of the set of RTA variables in our estimation. Thus, our gravity specification becomes the following:

$$\begin{aligned} X_{ijt} = \; & \exp\Big[\beta_0 + \beta_1 \ln(GDP_{it}) + \beta_2 \ln(GDP_{jt}) + \beta_3 \ln(DIST_{ij}) + \beta_4(LANG_{ij})\Big] \times \\ & \exp\Big[\beta_5(CONTIG_{ij}) + \lambda_{ij} + \upsilon_t\Big] \times \\ & \exp\Big[\alpha^k_{Intra}(RTA^k\_Intra_{ijt}) + \alpha^k_X(RTA^k\_X_{ijt}) + \alpha^k_M(RTA^k\_M_{ijt})\Big] \times \\ & \exp\Big[\sigma^k_{Intra}(RTA^k\_Intra_{ijt-3}) + \sigma^k_X(RTA^k\_X_{ijt-3}) + \sigma^k_M(RTA^k\_M_{ijt-3})\Big] \times \\ & \exp\Big[\theta^k_{Intra}(RTA^k\_Intra_{ijt-6}) + \theta^k_X(RTA^k\_X_{ijt-6}) + \theta^k_M(RTA^k\_M_{ijt-6})\Big] \times \varepsilon_{ijt} \end{aligned} \tag{1.5}$$

Figure 1.5 summarizes the estimated results from specification (1.5) and shows the total average treatment effect (ATE) in terms of intrabloc trade, bloc exports and imports, respectively. Total ATE is the sum of the statistically significant RTA estimated coefficients following Baier, Bergstrand, and Feng (2014).

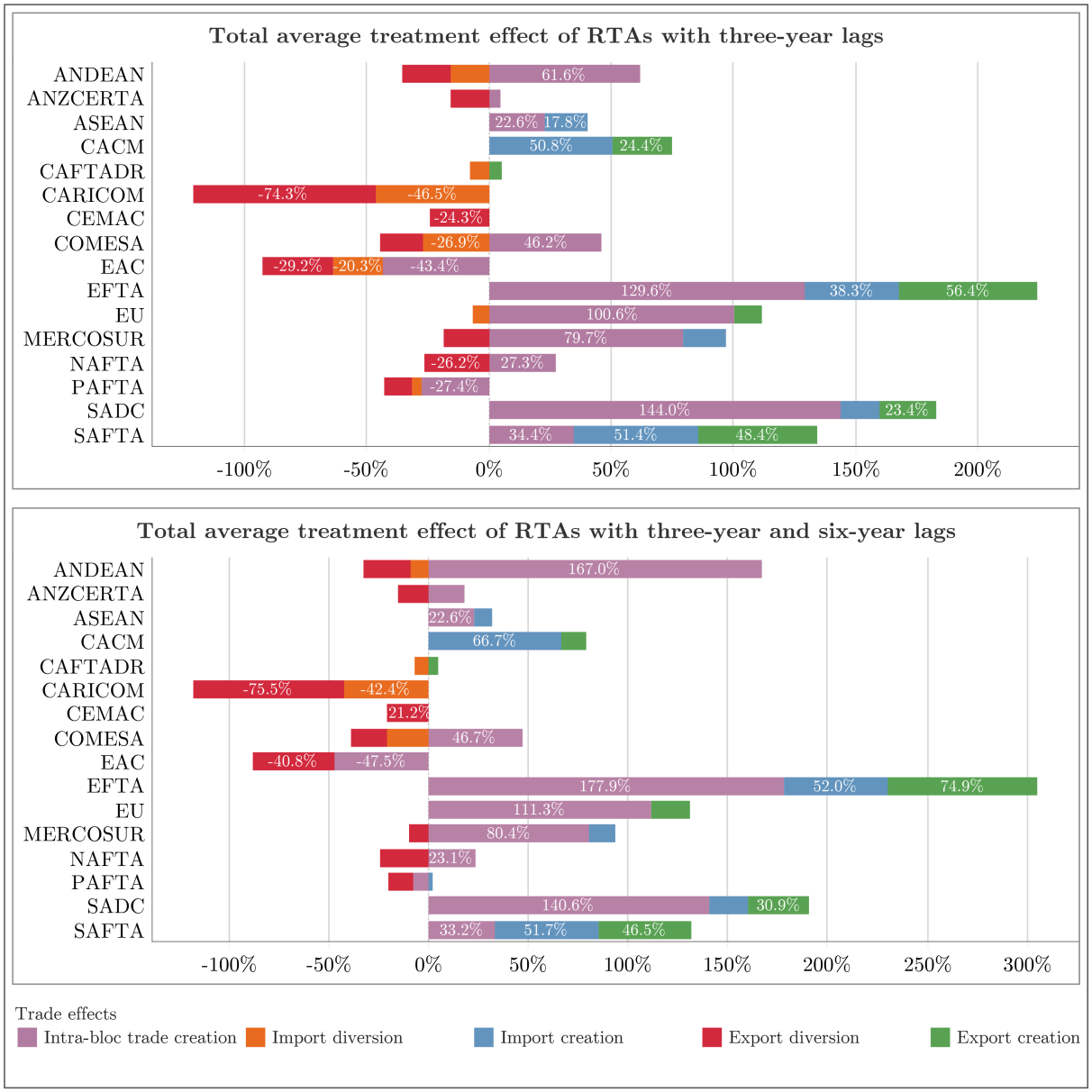


Figure 1.5 – Total average treatment effect of RTAs with phase-in periods

Notes: Only estimates for the effects of RTAs that are statistically significant at least at the level of 10% are shown in this figure. Results are based on the data with three-year intervals and estimated using the PPML estimator with country-pair and year fixed effects. The vertical axis reports the RTAs. The effects of RTAs on trade flows are indicated on the horizontal axis. The trade creation impact is represented by a positive effect, whereas the trade diversion impact is indicated by a negative effect. The full regression output is available in Appendix A.6. Source: Author's calculations.

First, we find that trade agreements continue to yield effects on the members' trade flows up to six years after they have entered into force. Fourteen of the 18 RTAs show consistent overall effects on intrabloc trade and extrabloc trade regardless of the inclusion of one or two lagged variables; the exceptions are EU, PAFTA, and EAC. This suggests that

including three-year and six-year lags leads to variation in the effects of these RTAs on their extrabloc trade, e.g., no more import diversion for the EU and EAC after six years and an import creation effect for PAFTA in place of import diversion after six years. The WAEMU is the only trading bloc that does not experience any significant effects on members' trade.

Moreover, our results including RTA lagged variables are consistent with our baseline model in the previous section. We do not find that any RTAs have conflicting trade effects with the specification excluding the lagged terms. Interestingly, the addition of the RTA lagged variables leads to an emergence of RTA phase-in effects that cannot be obtained at the year of entry but instead, are obtained after a certain period of time. Thus, intrabloc trade creation for ASEAN, ANZCERTA, and COMESA appears after three years of entry into force; import diversion also emerges for CAFTA-DR, PAFTA, and EAC in the specification with the RTA lagged terms.

1.5.3 Effects of RTAs on Individual Member Countries

For this extension to the analysis, we take into account the effects of RTAs on each member country individually. Countries involved in an RTA may experience different impacts on their intrabloc trade following the introduction of the trade agreement because they differ substantially in economic and geographic characteristics (i.e., GDP, trade openness, distance to the rest of the world, etc.). Thus, we expect heterogeneous intrabloc trade effects of RTAs on an individual member.

Based on our preferred gravity equation (1.3), we add a country dummy as suggested by Herderschee and Qiao (2007) and Soete and Van Hove (2017) to estimate this individual effect for member countries. Equation (1.3) then becomes the following:

$$\begin{aligned} X_{ijt} = \; & \exp\Big[\beta_0 + \beta_1 \ln(GDP_{it}) + \beta_2 \ln(GDP_{jt}) + \beta_3 \ln(DIST_{ij}) + \beta_4(LANG_{ij})\Big] \times \\ & \exp\Big[\beta_5(CONTIG_{ij}) + \alpha^k_{Intra}(RTA^k\_Intra_{ijt}) \times C_{jt} + \gamma_{it} + \eta_{jt} + \lambda_{ij}\Big] \times \varepsilon_{ijt} \end{aligned} \tag{1.6}$$

Here, we employ an importer country dummy (C_{jt}) to better acquire the trade-promoting effects of an RTA with regard to intrabloc imports on a member country by means of a reduction in the importer's tariffs and other nontariff barriers. Likewise, we use an exporter country dummy (C_{it}) to obtain the effects of a trade agreement concerning intrabloc exports. However, we cannot include both dummies in the same equation due to the problem of collinearity.

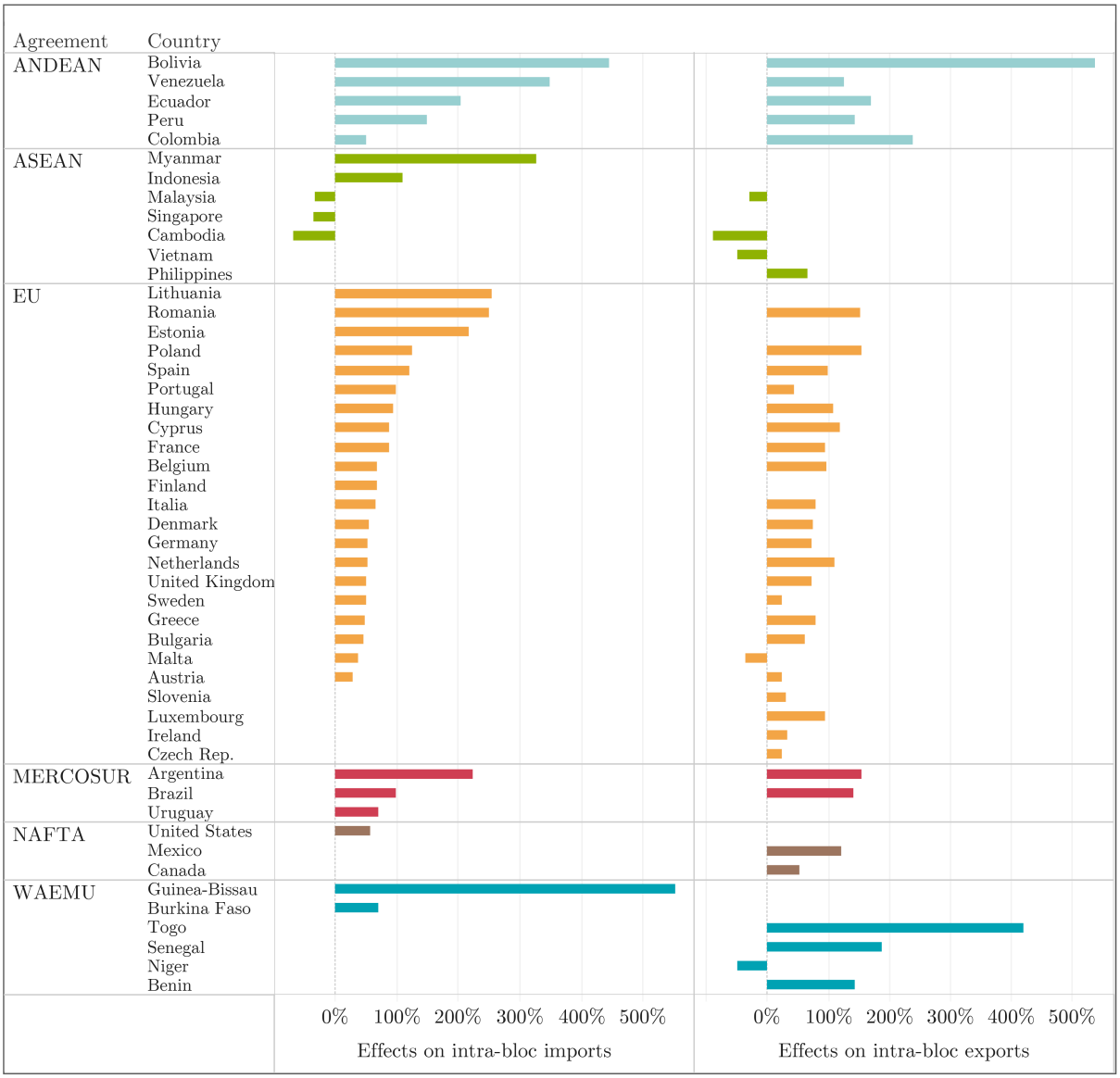


Figure 1.6 – Effects of RTAs on individual member countries

Notes: Only estimates for the effects of RTAs on their members' trade that are statistically significant at least at the level of 10% are shown in this figure. Results are based on the data with three-year intervals and estimated using the PPML estimator with exporter-year, importer-year and country-pair fixed effects. The full regression output is available upon request. Source: Author's calculations.

Figure 1.6 presents results that involve six plurilateral RTAs that have an important share of intrabloc trade in their total trade flows and a high level of depth of integration. These RTAs tend to increase the intrabloc trade of their member countries; however, these trade-promoting effects are not significant nor are they experienced by every member. We find that only the Andean Community increases the intrabloc imports and exports among all of its members. The EU is found to significantly increase the intrabloc trade in terms of both imports and exports for only its 17 members. Interestingly, ASEAN boosts intrabloc

imports in the case of Indonesia and Myanmar but decreases intrabloc imports in other ASEAN members (i.e., Cambodia, Singapore, and Malaysia). The Philippines experiences a significant increase in its intrabloc exports at the expense of Malaysia, Cambodia, and Vietnam. Moreover, most countries that join the ASEAN do not experience any positive effects of this trade agreement on trade flows.

Only the United States experiences an increase in its intrabloc imports within NAFTA. Nonetheless, NAFTA boosts the intrabloc exports of Canada and Mexico. For Mercosur, almost all of their member countries experience significant trade-promoting effects from their respective regional agreement, especially Argentina and Brazil, which obtain a more pronounced increase in their intrabloc trade than Paraguay and Uruguay.

In addition, we obtain great heterogeneity in the magnitude of the effects of RTAs on intrabloc imports and exports for most of the plurilateral RTAs, such as the EU, WAEMU, and Andean Community. For instance, the EU increases imports from other members by approximately 250% for Romania and more than 210% for Estonia but only by 30% for Austria. Our findings suggest that countries taking part in the recent expansion of the EU (i.e., Romania, Poland, and Hungary) experience a more prominent impact on trade from the EU in terms of intrabloc imports and exports than other EU member countries.

1.6 Conclusions

This chapter revisits the *ex post* effects of RTAs on member countries' trade by applying some of the most up-to-date methodological improvements in the empirical literature on trade. By adopting the PPML estimator and a theoretically-motivated fixed effects gravity model, we find significant intrabloc trade creation for most of the plurilateral RTAs included in our analysis, such as the EU, Andean, NAFTA, and Mercosur. The Asian RTAs, such as ASEAN and SAFTA, do not appear to have significant impacts on their intrabloc trade among members immediately upon their entry into force. It is because these RTAs have a long implementation period concerning trade liberalization procedures. The sensitivity analyses consistently displayed that the trade-promoting role is robust for more than half of the 18 RTAs across various specifications, allowing for adjustments of trade flows and the phase-in effects of trade agreements.

This finding has important implications for future trade policy. It would be interesting to assess the impacts of new RTAs based on their own trade liberalization schedules. Some trading blocs expect a longer period of time during which tariffs are phased out and removed to generate a true trade-creating effect for members' trade. Furthermore, member countries, especially the developing economies in RTAs, want to quickly reduce tariffs on

imports from other members and expedite the phase-in period. In any case improvements in infrastructure should be continued within various RTAs formed by developing countries (e.g., the RTAs located in Africa) to facilitate trade links among members.

Other interesting findings are revealed with regard to RTAs' impacts on bloc exports and imports. The impacts of regional agreements on extrabloc trade are heterogeneous. However, a majority of the RTAs show evidence of trade diversion effects in terms of extrabloc trade. In particular, we observed significant export and import diversion in many RTAs based in America and Africa, despite the nature of the RTAs as agreements formed by developed countries or developing countries, such as NAFTA, Mercosur, Andean, WAEMU, COMESA, and EAC. In contrast, export and import creations are more prominent for RTAs in Europe and Asia.

Interestingly, our results, featuring the increase in intrabloc trade coupled with trade diversion in terms of extrabloc trade for most RTAs are in line with previous studies, such as Soloaga and Winters (2001) and Carrère (2006). Moreover, these results are consistent across different specifications, including lagging RTA variables by three years or six years. For most RTAs, the effects of trade diversions on extrabloc trade are still predominant six years after their entry into force. Our findings suggest that the propensity of regional integration around the world has improved the performance of intrabloc trade for many RTAs; nonetheless, it is detrimental to the rest of the world. Hence, this result appears plausible in the light of the upsurge in RTAs over the past two decades and the failure of the Doha Round of the WTO, which aims to improve the multilateral trading system.

It seems that African and American trading blocs, which are formed in the same geographical areas, should enhance the coherence between them in terms of tariff cuts and the setting up of more transparent and less complex rules of origin. This mechanism would be useful to limit the welfare losses that emerge from trade diversion. In addition, the WTO might have a pivotal contribution toward "open regionalism" and the multilateralization of existing plurilateral trading blocs. The WTO could coordinate RTAs and narrow down the differences in the collections of rules and margins of preference across those trading blocs, as advocated by Baldwin and Thornton (2008).

Our results also show that a plurilateral RTA can have very heterogeneous impacts on its member countries. This suggests that the governments involved in trade deals may not systematically seek homogeneous effects for all partners. Instead, the extent of the trade-creating effect of an RTA on member countries is likely to be driven by the gains or losses from their own trade policies, i.e., from specialization based on differences in

resource endowments or from intraindustry trade based on scale economies and product differentiation among the member countries. Thus, policymakers need to be cautious in making use of RTAs as an indisputable tool to promote trade liberalization and spur economic benefits to the global trading system.

Some caveats should be considered in future research. First, further studies on this question should focus more on the dynamic trade creation and trade diversion effects of RTAs that can vary over time and how trade agreements are designed in terms of policy area coverage (see Kohl, 2014). Second, future studies should more closely consider the impacts of RTAs on the extensive margin of trade by making use of disaggregated trade data because a significant impact of a trade agreement could only be acquired for a limited range of products.

Chapter 2

Implementation Period of Trade Liberalization and Economic Development: Do They Matter to Regional Trade Agreements?[1]

2.1 Introduction

Since the early 1990s, the number of regional trade agreements[2] has drastically increased; in particular, most countries are involved in the worldwide proliferation of RTAs. All 164 members of the WTO have participated in at least one RTA.[3]

Economic integration and trade liberalization through RTAs are widely known for their prominent role in national economic development programs and the international trading system (Acharya, 2016; Limão, 2016). In particular, RTAs have become an omnipresent and key feature of the global trading system due to the insubstantial breakthrough of the Doha Round of multilateral trade negotiations. At first, most RTAs were regionally formed to foster trade with members being geographically close to each other. In recent RTA developments, many countries and regional blocs have looked beyond their

[1] This chapter is based on the paper submitted for publication in the *Review of World Economics*.

[2] Different forms of integration for RTAs are reviewed by Limão (2016). In practice, RTAs are used to cover a set of trade agreements, such as FTAs, CUs and common markets. These forms suggest an increase in the economic integration among member countries by the degree of trade liberalization. In an FTA, countries give two-way preferential tariffs and liberalize most of the intrabloc trade and tariffs. CUs correspond to FTAs with common external tariffs. Common markets enhance CUs by providing the free movement of capital and labor.

[3] Mongolia is the last member of the WTO that has an RTA in force after the recent signing of a bilateral trade agreement with Japan in June 2016.

own regional boundaries and forged cross-regional arrangements with other partners that are geographically distant (e.g., Chile–Japan FTA, EU-Korea FTA, EU-Central America FTA). Although trade agreements are commonly focused on the expansion of trade in goods by eliminating tariffs on imports, the new generation of RTAs strives for a deeper integration covering broader issues well beyond tariff barriers, e.g., liberalization of investment and harmonization of nontariff measures and environment policies, etc. (Baldwin, 2011a).

The purpose of this study is to answer the following research question: Could the duration of the implementation period of tariff concessions and member countries' level of development affect the impact of RTA on members' trade? More specifically, on the one hand, we aim to investigate whether such an implementation period determines the dynamic effects of an RTA on trade; on the other hand, we explore whether the trade impact of an RTA is affected by the differences in partner characteristics, i.e., the level of development.

The scope and coverage of RTAs tend to vary from one to another in terms of products, tariff lines and trade liberalization schedules. The implementation period of trade liberalization for a given RTA is the time of final implementation of tariff concessions undertaken by the slowest liberalizing member countries (Crawford, 2016). In some RTAs, such implementation takes place upon the entry into force of the agreement. In others, member countries choose to use a phased implementation in which tariff liberalization takes place over a transition period. For instance, the FTA formed by China and New Zealand entered into force in 2008, and its implementation period ended in 2019. In other words, this RTA had a transition period of 11 years, during which its members reduced gradually and reciprocally their trade barriers through several duty phase-out periods. At the end of the agreement's implementation period in 2029 for both countries, almost all of their tariffs will be eliminated.[4]

The trading partners involved in trade agreements also require time to adjust trade costs and relative prices of imports to domestic goods, as underlined in the literature (Goldstein and Khan, 1985). For instance, "an FTA which enters into force in 1960, and which is even fully 'phased-in' by 1965, might still have an effect on trade flows in 1970" (Baier and Bergstrand, 2007, p. 90). For Aitken (1973), Baier and Bergstrand (2007), and Kohl (2014), there are positive and significant impacts of RTAs on trade during the implementation period of trade and tariff concessions. These effects are interpreted by these authors as RTA lagged effects.

The length of the implementation period of RTA trade liberalization also greatly differs

[4]We discuss RTA implementation periods in detail in Section 2.2.

from North-North RTAs to North-South and South-South RTAs. The level of economic development of member countries participating in RTAs indeed affects their trade liberalization strategies. As will be discussed in more details in Section 2.2, the agreements concluded between developing countries, based on our own calculations, spend an average of 7.4 years to liberalize tariffs and trade, while North-North RTAs and North-South RTAs take up approximately 10.1 and 11.3 years, respectively.

Moreover, regional trade agreements engage not only developed countries but also developing countries since the 1990s. From a North (advanced economy)-South (developing economy) perspective, North-South trade agreements and South-South trade agreements present more prominently among RTAs currently in force in the post-WTO era. To a certain extent, developing countries have renewed their interest in reciprocal North-South trade agreements instead of focusing on unilateral programs such as the Generalized System of Preferences (GSP) (Acharya, Crawford, and Maliszewska, 2011). Since these GSP programs' nature is unilateral concessions from developed countries to developing countries, importing countries (advanced economies granting preferences) are free to set a collection of standards and rules.[5] Consequently, developing countries have dealt with many strict restrictions within these preference-granting programs. Alternatively, they can have more involvement in negotiations with developed countries through RTAs when both sides can contribute to the setting of the provisions of trade agreements. For instance, the United States and the EU have recently formed RTAs with developing countries in Central America and the Caribbean region that had already benefited from their GSP programs in the past, such as the Dominican Republic-Central America-United States FTA (CAFTA-DR), EU-Central America FTA, and EU-Caribbean Community (EU-CARICOM) FTA.

Trade among Southern partners has also become a predominant feature of the world economy since the beginning of the new millennium. Several countries, developing countries in particular, are dissatisfied with the advancement of the WTO because most of the pledges of the Uruguay Round negotiation to bolster worldwide trade have not become fruitful in practice. Furthermore, lack of eagerness from developed countries to open market access and expand multilateral trade has provoked developing countries to strive for agreements on a regional basis.

Greenaway and Milner (1990) highlight some sources of trade among Southern trading

[5]These conditions and standards stipulate which developing economies are able to export their products under different grades of preferential coverage, which goods are eligible, which goods are covered, and criteria requiring labor and environmental standards or protection of intellectual property. In most cases, agriculture products and some sensitive goods are regularly excluded from the scope of these preferential programs initiated by Northern partners (World Bank, 2005).

partners and find that South-South trade could thrive, although it has to confront a strong heterogeneity across countries and an interindustry specialization based on comparative advantage, production differences and factor endowments. Regolo (2013) noted that trading partners experiencing similar factor endowments and a comparable level of development are more likely to sharply raise bilateral trade than are trading partners having dissimilar economies. In addition, developing countries seem to have to accept disadvantageous terms when signing trade deals with Northern countries due to the disparity in negotiation power, as suggested by Perroni and Whalley (2000).

Consistent with a landscape where developing countries actively take part in the formation of RTAs, a key question has arisen with regard to whether RTAs formed between Southern countries foster more trade among themselves than do RTAs formed by Southern countries and their Northern partners. To that end, we aim to study the differences in levels of development of member countries that are involved in trade agreements.

This chapter bridges several recent strands of literature on the effects of RTAs. The idea of the impacts of an RTA over the phase-in period has been approached by Baier and Bergstrand (2007) and Kohl (2014). A substantial number of studies have been conducted on the general effects of RTAs on members' trade and have found evidence of a trade-creating effect (Frankel, 1997; Baier and Bergstrand, 2007; Magee, 2008). This trade-promoting effect of RTAs is likely to vary according to the types of RTA based on the dissimilarity between members' characteristics, as demonstrated in some *ex ante* studies such as Ethier (1998), Krueger (1999), and Baier and Bergstrand (2004). However, few papers have addressed the *ex post* heterogeneous impacts of RTAs on trade by dissecting RTAs based on different levels of development of member countries. To the best of our knowledge, Vicard (2011), Behar and Cirera-i Crivillé (2013), and Cheong et al. (2015) are the only three studies that explicitly estimate empirically how the effects of RTAs on trade vary across North-North, North-South and South-South RTAs. While Vicard (2011) finds no evidence of a relationship between the RTA effect and country characteristics, Behar and Cirera-i Crivillé (2013) and Cheong et al. (2015) show that the impacts of an RTA on trade are quite different from South-South agreements to North-South agreements.

Our chapter is distinguished from extant studies in several aspects. First, we extend the study period, the country coverage and the number of RTAs to incorporate more countries, more-recent years and more-recent trade agreements than do Vicard (2011) and Behar and Cirera-i Crivillé (2013). Note that changing the sample of countries leads to differences in the estimates of RTA effects, as argued by Haveman and Hummels (1998). In addition, by studying almost all RTAs currently in force, this study was designed to systematically generalize the heterogeneous impact of RTAs based on members' economic

development. Second, we employ the theoretically motivated gravity model (Anderson and van Wincoop, 2003) and make use of PPML fixed effects (Santos Silva and Tenreyro, 2006, 2011; Fally, 2015) to handle the main problems encountered in the empirical literature involving the gravity model: multilateral resistance terms, endogeneity of RTAs, presence of zero trade flows, and heteroskedasticity in trade data. This chapter is one of few studies that apply some of the most up-to-date methodological advances in the literature to examine the heterogeneous impacts of RTAs on trade according to members' development characteristics. Third, we emphasize the importance of taking into account the phase-in period of RTAs in our specifications to fully capture the dynamic *ex post* RTA effects on trade (a shortcoming of Vicard, 2011; Cheong et al., 2015). The reason is that trade agreements are likely to generate different particular effects at distinct point in time. The fourth distinguishing feature of our chapter is that it empirically answer our research question by recognizing deep integration, cross-regional agreements and the trade creation and trade diversion effects of RTAs.

The main contribution of this study is to shed light on RTA impacts through the implementation period of tariff and trade liberalization on members' trade across various kinds of RTAs and to provide additional convincing empirical evidence supporting this line of research. By using structural gravity equations and a worldwide database with 160 countries over the period 1960–2015, we find distinct patterns of *ex post* RTA effects on trade across different types of RTA categorized by the level of economic development of member countries. We obtain consistent results from our PPML specifications. Our results emerging from this study are threefold. First, RTAs tend to increase intrabloc trade among member countries following their entry into force and during their implementation period in the cases of RTAs formed by partner countries experiencing similar levels of economic development. Second, we find the disparity in impacts on members' trade between North-North RTAs, South-South RTAs and North-South RTAs. We validate empirically that RTAs formed by trading partners having similar economic development levels are likely to result in a greater increase in members' trade during a shorter implementation period. Third, we provide econometric evidence that the average long-term impacts of South-South RTAs on members' trade tend to decline after they have been in force for 15 years. Our findings are reinforced by allowing for agreements in terms of shallow versus deep integration, for cross-regional RTA or controlling for RTA trade creation and trade diversion effects.

The remainder of this chapter is structured as follows. Section 2.2 briefly describes some stylized facts about the dissection of the implementation period of RTAs by development characteristics of member countries. Section 2.3 reviews the relevant literature. Section 2.4 explains the empirical framework and describes the dataset. The main results are

presented and discussed in Section 2.5. Section 2.6 provides some sensitivity analysis and extensions of our basic model. Section 2.7 concludes the chapter.

2.2 Implementation Period of RTAs: Some Stylized Facts

Focusing on the trade and tariff liberalization process, we witness different approaches of RTA member countries. Figure 2.1 presents the average tariff liberalization for 61 WTO member countries applied in their RTAs by showing the average percentage share of duty-free lines upon entry into force of trade agreement and comparing it to that at the end of the liberalization period. Several countries achieve high tariff liberalization for their RTA partners upon the entry into force of trade agreements; specifically, it reaches 100% in the cases of large transport hubs for merchandises such as Hong Kong and Singapore. Others have the percentage share of duty-free lines across all goods rising gradually from the entry into force of their RTAs to the end of the liberalization period. A more conventional pattern among developing member countries in their RTAs is a phased implementation of tariff concessions over an established transition period, suggesting that the degree of tariff and trade liberalization across RTAs in developing countries has been phased in over RTA implementation periods. For instance, China, Mexico, Morocco, Vietnam liberalize on average approximately 40% of their tariff lines upon entry into force throughout their RTAs, and reach on average a level of approximately 90% by the end of the liberalization process. In contrast, developed countries (e.g., Canada, Norway, New Zealand) tend to eliminate substantially restrictions and tariff barriers on their RTA trading partners from the entry into force of trade agreements.

Table 2.1 shows an example of the process of liberalization of trade and tariff lines applied in a North-South RTA. We depict the timetable of tariff elimination applied by China (the Southern country) to the imports from New Zealand (the Northern country), which entered into force in 2008. Its implementation period will end in 2019. There are 639 tariff lines already duty-free on an MFN basis before the entry into force of this agreement.[6] Upon its entry into force, a supplementary 1,204 tariff lines, which were equivalent to 15.7% of the tariffs, became duty-free for imports from New Zealand. The rest of the tariffs were increasingly removed beginning in 2012. By the end of the implementation period in 2019, 97.1% of tariff lines in total will be duty-free.

[6]The applied MFN tariff is essentially used as the base rate for the negotiation between RTA members in terms of tariff concessions among them. If countries impose a smaller percentage of MFN duty-free lines, they have greater scope to offer preferences to their RTA partners and vice versa.

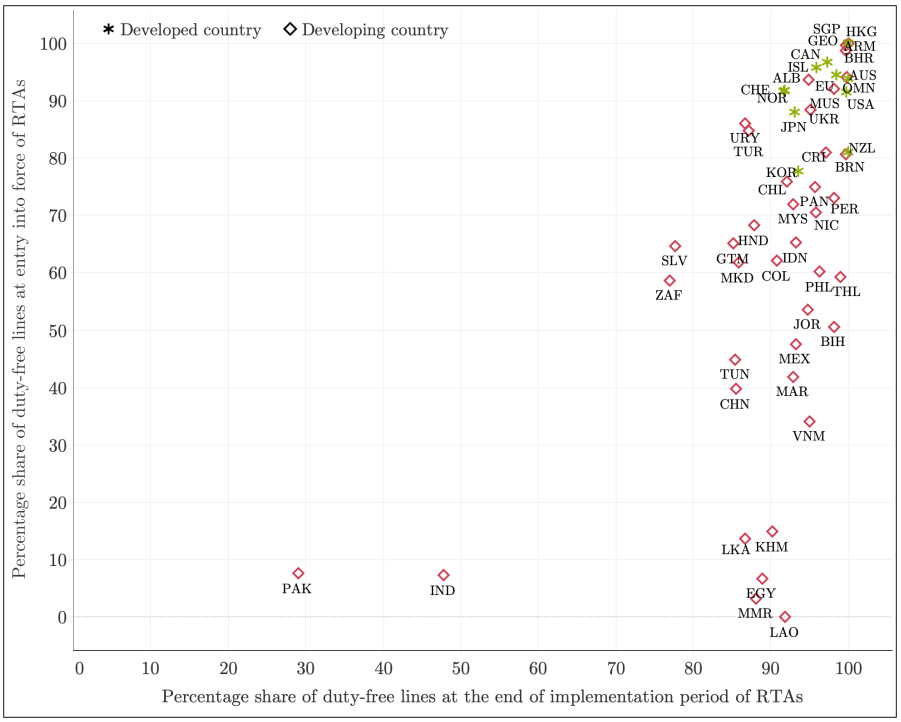


Figure 2.1 – Average tariff liberalization for WTO member countries in their RTAs

Source: Based on data from Crawford (2016).

Concerning New Zealand, 63.3% of New Zealand's tariff lines became duty-free for imports from China upon entry into force of the agreement because 57.6% of New Zealand's tariffs were duty-free on an MFN basis before the entry into force of the agreement. The remaining tariffs are to be gradually abolished in four phases between 2012 and 2016. While 2.9% of China's tariff lines will remain dutiable by the end of the implementation period, 100% of New Zealand's tariffs will be duty-free for imports from China. Interestingly, New Zealand (a developed country) has liberalized trade and tariff lines quicker than China (a developing country) has within the framework of their FTA.

Otherwise, Table 2.2 details an illustration of the tariff elimination timetable of member countries under a South-South RTA between Peru and China. Upon entry into force of the agreement, China immediately liberalized 4,098 tariff lines, accounting for 52.8% of its tariffs, and brought the total lines up to approximately 61.2% by the end of 2010. This figure is quite equivalent to 63.4% of Peru's total tariff lines at the same stage of tariff and trade liberalization. The rest of the tariffs of both countries were progressively eliminated in the next phases. At the end of the agreement's implementation period in 2026 for both countries, 94.6% of Chinese tariff lines and 91.9% of Peru's tariff lines will be liberalized. As a result, we observe here a very harmonious schedule of tariff concessions undertaken by two developing countries having similar levels of development.[7]

[7]For brevity, Appendix B.3 provides an example of the tariff elimination commitments of member

Table 2.1 – Example of North-South RTAs: Tariff elimination commitments applied by China and New Zealand under the China–New Zealand FTA

China			New Zealand		
Duty phase-out period	Number of tariff lines	Total lines in China's tariff schedule (%)	Duty phase-out period	Number of tariff lines	Total lines in New Zealand's tariff schedule (%)
MFN duty-free (2008)	639	8.4	MFN duty-free (2008)	4,190	57.6
2008-2011	1,204	15.7	2008-2011	415	5.7
2012	5,100	66.7	2012	1,967	27.1
2013-2015	437	5.7	2013	86	1.2
			2014-2015	466	6.4
2016	32	0.4	2016	146	2
2017-2018	7	0.1			
2019	4	0.1			
Remain dutiable	223	2.9			
Total	7,646	100	Total	7,270	100

Source: World Trade Organization (2010a).

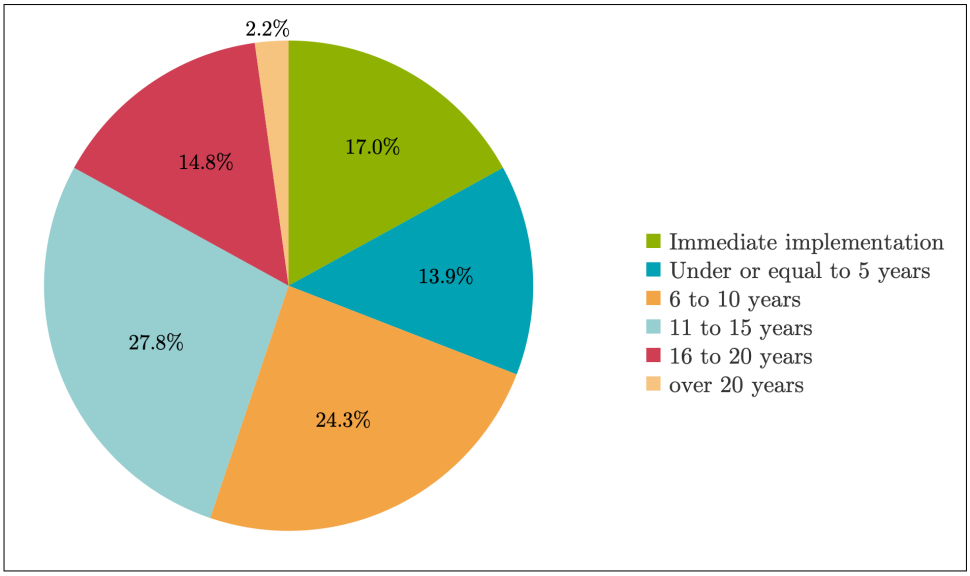


Figure 2.2 – Duration of RTA implementation periods

Source: Author's calculations.

Table 2.2 – Example of South-South RTAs: Tariff elimination commitments applied by China and Peru under the China–Peru FTA

China			Peru		
Duty phase-out period	Number of tariff lines	Total lines in China's tariff schedule (%)	Duty phase-out period	Number of tariff lines	Total lines in Peru's tariff schedule (%)
MFN duty-free (2010)	649	8.4	MFN duty-free (2010)	3,957	53.8
2010	4,098	52.8	2010	709	9.6
2014	908	11.7	2014	941	12.8
2016	2	0			
2017	14	0.2			
2019	1,604	20.7	2019	1,037	14.1
2021	24	0.3	2021	4	0.1
2024	12	0.2	2024	13	0.2
2025	5	0.1	2025	87	1.2
2026	20	0.3	2026	11	0.1
Remain dutiable	422	5.4	Remain dutiable	592	8.1
Total	7,758	100	Total	7,351	100

Source: World Trade Organization (2010b).

The breakdown of RTAs all over the world until 2015 based on the duration of their implementation period is set out in Figure 2.2. We analyze 230 RTAs that consist of details about the end of their liberalization period from the WTO Regional Trade Agreements Information System (RTA-IS).[8] Trade agreements generally take an average of 9.5 years to liberalize tariffs and trade among member countries after their entry into force. Of those RTAs, 17% are subject to an implementation period taking place immediately at their entry into force, implementation periods of up to five years occur in 13.9%, and 24.3% of RTAs had their implementation period vary from six to ten years. Additionally, 44.8% of RTAs have the phase-in period of trade and tariff liberalization exceeding ten

countries under a North-North RTA between the United States and South-Korea. We also note that the timetable of tariff concessions undertaken by two developed countries is harmonious.

[8]In this analysis, we follow the definition of the WTO, which refers to RTAs encompassing reciprocal agreements that involve the elimination of restrictions on a "substantial" part of the goods trade and are notified to the WTO under General Agreement on Tariffs and Trade (GATT) Article XXIV or the Enabling Clause for developing countries, i.e., FTAs and CUs. We exclude agreements covering unilateral trade preferences, which are defined by the WTO as preferential trade agreements (PTAs).

years.

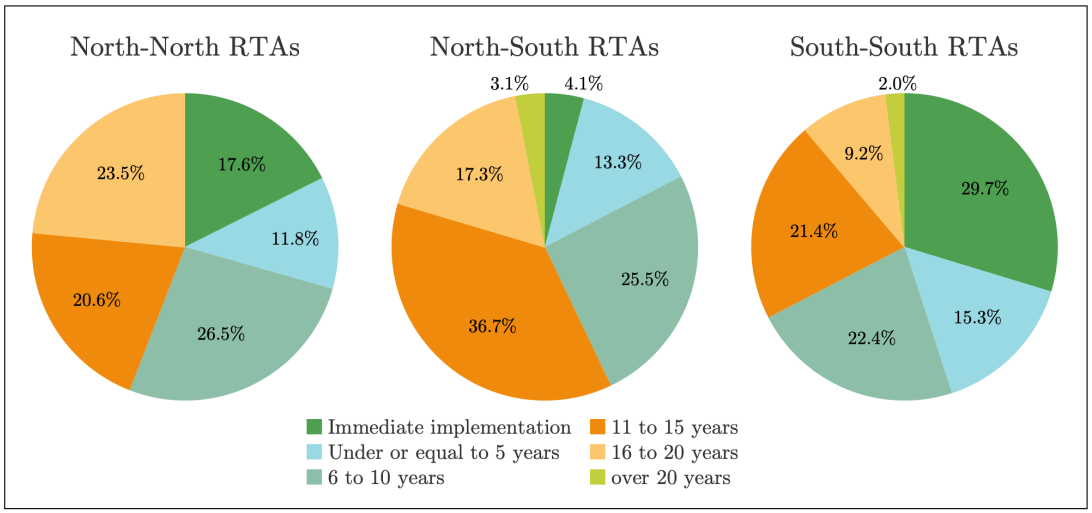


Figure 2.3 – RTA implementation periods based on different types in terms of partners' level of development

Source: Author's calculations.

Figure 2.3 provides detailed insight into RTA implementation periods based on different types in terms of partners' level of development. South-South RTAs take an average of 7.4 years to liberalize tariffs and trade. Concerning North-North and North-South RTAs, the average length of their implementation period is approximately 10.1 years and 11.3 years, respectively. Thus, RTAs formed between developing countries are likely to achieve the end of their liberalization phase faster than are North-North and North-South RTAs. Trade deals established by partners with similar characteristics regarding their level of development seem to undertake a shorter transition period. Of the RTAs studied, 55.9% of North-North RTAs and 67.3% of South-South RTAs are subject to a transition period of up to ten years. In contrast, RTAs witnessing an asymmetry of economic development characteristics among members, such as North-South RTAs, tend to undertake a longer implementation period. Phase-in periods of less than ten years happened in only 42.9% of North-South RTAs.

Given these facts, in this chapter, we should expect to find evidence of smaller, more-delayed impacts of North-South RTAs on members' trade compared with North-North and South-South RTAs.

2.3 Related Literature

The present chapter relates to several recent strands of literature that involve the following: (i) implementation period of trade agreements and time lags, (ii) RTA trade creation

effects, and (iii) RTA effects with a development focus.

2.3.1 Implementation Period of Trade Agreements and Time Lags

As is documented in a large international economics literature, importers and exporters cannot instantaneously respond to the adjustment of trade costs and relative prices of imports to domestic goods (Goldstein and Khan, 1985). Hence, the incorporation of time lags in trade equations is important for evaluating many trade policy issues regarding changes in tariffs barriers, exchange rates, etc. Prices of imports relative to domestic goods also play a major role in the demand for total imports and exports of a given country, especially in the long term (see Houthakker and Magee, 1969; L. Samuelson, 1973; Stern, Francis, and Schumacher, 1976; Goldstein and Khan, 1978). According to Goldstein and Khan (1985), short-term price elasticities of demand for imports and exports are significantly smaller than long-term elasticities. The authors also point out that only approximately 50% of the final relative price alteration occurs within a one-year time frame. In particular, the long-term (more than two years) price elasticities of demand for imports and exports was approximately twice that measured in the short term (zero to six months), as showed in Beenstock and Minford (1976), Lawrence (1978), and Deppler and Ripley (1978).

Alternatively, tariffs and trade liberalization may be gradually implemented during several years after the trade agreement takes effect. Aitken (1973) is among the first empirical studies to examine the lagged effect of trade agreements. The author found a potential lagged effect of European trade liberalization when analyzing the effect of the European Economic Community (EEC) and the European Free Trade Association (EFTA) on European countries' trade. Additionally, Mundell (1964) found impacts of RTAs on the terms of trade of member countries. Changes in the terms of trade stemming from RTA formations could later induce lagged effects on trade volumes, as argued by Bergstrand et al. (2015). As a result, RTAs do not expect to have complete economic effect immediately on the year of their entry into force, but more likely anticipate completed effect after their implementation period of trade and tariff liberalization.

Covering 587 trade agreements concluded between 1945-2009, Dür et al. (2014) find that the tariff eliminations procedure of an FTA and a CU needs on average 5.7 years and 4.5 years, respectively, to be completely implemented. Baier and Bergstrand (2007), Olivero and Yotov (2012), Kohl (2014), and Anderson and Yotov (2016) empirically investigated effects of the implementation period of various RTAs. Most studies show significantly

lagged effects of RTAs on intrabloc trade. These studies confirmed the impacts of the gradual liberalization of trade and tariffs in different RTAs. Using the first-differencing technique, Baier and Bergstrand (2007) showed that FTAs are able to affect trade among members 15 years after taking effect. Kohl (2014) found that trade agreements boost trade by approximately 50% when recognizing the broader period of time for phase-in effects of RTAs. Anderson and Yotov (2016) stated that from an economic perspective, the intuition for the phasing-in effects is that private agents in the trading partners increasingly adjust to the new economic conditions under a recently implemented trade agreement. In contrast, Olivero and Yotov (2012) showed that contemporaneous RTA effects and their lagged effects should have opposing impacts, as predicted by their theory concerning dynamic gravity framework with asset accumulation. In their work, the authors found a negative lagged RTA effect, but it was not statistically significant.

2.3.2 RTA Trade Creation Effects

In his seminal work, Viner (1950) proposed the two prominent concepts of trade creation and trade diversion and argued that RTAs did not necessarily enhance member countries' welfare. Accordingly, the net effect of trade liberalization resulting from the formation of RTAs is ambiguous and depends on whether the trade creation effect or the trade diversion effect is dominant.

The uncertainty in Viner's (1950) conclusion in terms of the net welfare effect of RTAs has provoked a critical debate among trade theorists about the outcomes from RTAs. Bhagwati (1995) and Bhagwati and Panagariya (1996) found that the trade diversion is likely greater than the trade creation in most trade arrangements. Additionally, Panagariya (1998) and Schiff and Winters (2003) argued that RTAs formed by small trading partners apparently lead to a welfare loss of members.

This view has been contested by Summers (1991), who argued that RTAs could bring beneficial effects to member countries because the diversion effect was likely to result in mild impact on their members. RTAs improve welfare in nature and are unlikely to result in any negative impact on the multilateral trade system. The opinion of Summers (1991) was supported by theoretical work introduced by Wonnacott and Lutz (1989) and Krugman (1991). These two works found that countries involved in RTAs are most likely to experience an intrabloc trade increase following the formation of RTAs. To some extent, these authors explain that many trade agreements are formed regionally due to the "natural trading partners" hypothesis, which means that countries would likely have higher trade volume between them when they are geographically close to each other and their transport costs are lower. Frankel et al. (1995) and Frankel (1997) suggest similar

views. Two partner countries that are less distant from each other will likely form an RTA between them due to more potential trade creation effects.

For concerns related to empirical studies, Magee (2003) employed a model taking into account simultaneous equations to prove empirically that greater bilateral trade flows indeed enhance the likelihood that countries will create RTAs. Hence, trade arrangements are likely to lead to more trade creation effects between countries that are not situated too far away. Several studies also showed evidence for intrabloc trade creation following the formation of RTAs (Carrère, 2006; Baier and Bergstrand, 2007; Magee, 2008). However, these empirical analyses focused only on several specific RTAs and the general effect of trade agreements, and did not attempt to generalize the heterogeneous impacts of RTAs based on partner countries' economic characteristics.

2.3.3 RTA Effects Based on the Development Characteristics of Member Countries

We have focused on the contributions that revolve around the effects of RTAs on trade volume and take account of development aspects. Concerning theoretical studies, Baier and Bergstrand (2004) employed a computational general equilibrium (CGE) model to indicate that, aside from the distance between countries (geographical factors), more potential trade is generated between two trading partners that experience similar and greater economic sizes in terms of intraindustry trade factors from making use of economies of scale due to differentiated products. Countries geographically close to each other are likely to experience similar development characteristics. For this reason, trade agreements formed by those countries are expected to be trade creating. Moreover, Baier and Bergstrand (2004) argued that trade creation tends also to be greater between two countries if they *ex ante* largely differ from each other in their factor endowments due to Heckscher-Ohlin comparative advantage in terms of interindustry trade.

Krueger (1999) showed that developed and developing countries appeared to benefit more from North-South RTAs than are realized from trade agreements among only developed or only developing countries, since North-South agreements engage trading partners with significant differences in factor endowments. Ethier (1998) offered a similar view, as developing countries are likely to gain more success from forming trade arrangements with Northern partners in terms of trade reforms, triggering trade and investment activities from developed countries and securing greater market access to developed countries. Moreover, developing countries have a propensity to adopt open trade policies since they cannot benefit from access to larger markets unless they are open and internationally

competitive. Thus, Southern countries can be expected to have a greater openness to international trade (Kuznets, 1960; Alesina and Wacziarg, 1998; Armstrong and Read, 1998).

As noted by Chauffour and Maur (2011), the rationales underlying the formation of North-South, South-South and North-North RTAs diverge remarkably. The UNCTAD (United Nations Conference on Trade and Development, 2007) focuses on the motivations of developing economies for accomplishing regional trade agreements with developed countries. First, Southern countries hope to gain more concessions that are not given to other countries, especially a more advantageous market access for their goods. Second, another incentive for joining an RTA is the fear of losing competitiveness to other developing countries that might have concluded an RTA with the same trading partners, according to Shadlen (2008). Lawrence (1996) pointed out that although there is an asymmetrical power relationship in North-South RTAs, small countries do not necessarily lose in these agreements. Instead, they can have larger gains from realizing scale economies.

In contrast, Panagariya (1999) finds that when deep integration is involved in North-South RTAs, welfare-enhancing does not exist within RTAs between partners with unequal negotiation power. The main reason is that the liberalization timetable and the harmonization of regulations are likely to be imposed by developed economies; thereafter, poor, small economies have to adjust their standards, regardless of whether these adjustments are appropriate to their own conditions (Perroni and Whalley, 2000). Thus, the North-South RTAs, by virtue of the reciprocity condition, have placed Southern states at an unfavorable position compared with their developed partners (United Nations Conference on Trade and Development, 2007). The reason is that developing countries participate in trade arrangements at a less advanced stage of economic development than do advanced economies in terms of industrial progress and standards (e.g., labor standards, nontariff measures, intellectual property rights, rules of origin, etc.). Consequently, developed countries often impose these terms at the expense of their developing partners (Perroni and Whalley, 2000).

Kee, Nicita, and Olarreaga (2009) found that trade barriers to imports of developing countries' manufactured products are higher in markets of Southern partners than in the Northern partners' markets. According to Behar and Cirera-i Crivillé (2013) and Baier et al. (2018), developing economies might benefit more trade-enhancing effects from South-South trade agreements than from North-South trade agreements because developing countries commonly face higher fixed trade costs in the absence of South-South agreements. However, in reality, South-South RTAs often experience a weak implementation with time consuming and costly tariff liberalization schedules and lack of improvement in

customs procedures and trade facilities (World Bank, 2005; South Centre, 2005).

In a global analysis on the effects of RTAs that are distinguished by the characteristics of economic development of members, Behar and Cirera-i Crivillé (2013) find trade creation impacts on members' trade from all types of RTAs. The authors estimated that South-South trade agreements increase bilateral trade by at most 107%, whereas the effect of North-South trade deals is only 53%. Controlling for lagged RTA variables and multilateral resistance terms, the authors find that North-South RTAs are likely to increase bilateral trade less than will South-South RTAs. Cheong et al. (2015), using a set of model interaction terms, estimate that developing countries could gain more—roughly twice as much—from trade deals among themselves than from deals including developed countries. Based on the new quantitative trade models,[9] a more recent analysis from Baier et al. (2018) explained the heterogeneous effects of trade agreements conditional on various theoretically motivated factors and found that a pair of developing economies tends to have higher partial effects of trade agreement. In contrast, Vicard (2011) showed that North-North, North-South and South-South RTAs do not generate dissimilar impacts on trade.

More distantly connected are several studies that compare the trade creation effects of North-South and South-South agreements covering economic integration agreements (EIAs) and manufactured goods exports. For instance, Disdier, Fontagné, and Cadot (2015) investigated North-South and South-South RTA effects in the context of a deep integration and found that trade volume within North-South trade deals is negatively affected when these trade agreements include provisions on regional standards harmonization in terms of nontariff measures and other technical barriers. Dahi and Demir (2013) show that RTAs formed by developing countries have a significant trade-creating effect on manufactured products; in contrast, no such impact is discovered within RTAs concluded by advanced economies.

The empirical evidence proposed in this chapter could provide more insights to explain the differences in the trade-boosting effects between trade deals formed by member countries experiencing diverse levels of development.

[9] See Head and Mayer (2014) and Costinot and Rodríguez-Clare (2014) for more details.

2.4 Methodology Framework and Data Description

2.4.1 Econometric Specification and Estimation Issues

To investigate the impacts of different types of RTAs on trade flows based on the level of development of member countries, we make use of a structural gravity model. Indeed, there have been many attempts to develop strong theoretical foundations for the gravity model over the course of several decades. The basic model of Tinbergen (1962), which is derived from Newton's law of gravity, has been gradually revamped by incorporating different microeconomic components and supporting the new international trade theory models.[10]

Recently, studies focusing on proper economic foundations for the theoretical gravity equation have drawn attention to the need to account for price levels to avoid bias due to the omission of multilateral resistance terms involving exporting and importing countries (Anderson and van Wincoop, 2003; Head and Mayer, 2014). In a seminal study, Anderson and van Wincoop (2003) popularized a theoretical gravity equation stemming from the Armington hypotheses on specialization, using a constant elasticity of substitution among goods from different countries (σ) as follows:

$$X_{ij} = \frac{Y_i E_j}{Y_w} \left(\frac{\tau_{ij}}{P_i P_j} \right)^{1-\sigma} \tag{2.1}$$

Equation (2.1) demonstrates the positive and proportional impact of two trading partners' economic size (Y_i and E_j) on bilateral trade flows (X_{ij}), the contrary effects of bilateral trade costs (τ_{ij}) and trade costs between trading partners and other exporting and importing countries due to the relative price effects (P_i and P_j). To account for Anderson and van Wincoop's (2003) multilateral resistance terms within a panel data framework, we make use of country-time fixed effects as in Hummels (1999), Feenstra (2004) and Baier and Bergstrand (2007).

One of the predominant issues that many analyses on trade policies confront in the gravity model involves the presence of potential endogeneity. It is an expected problem stemming from the incorporation of political variables in the gravity specification. By means of an investigation into the economic determinants of RTAs, Baier and Bergstrand (2004) found significant cross-section evidence that trading partners tend to choose their RTA partners; i.e., countries that participate in an RTA tend to share their economic characteristics to

[10] See Head and Mayer (2014) for a comprehensive survey of the improvement of the structural gravity model.

increase benefits from the regional trade integration. However, many unobserved factors between country pairs that may increase bilateral trade and promote the establishment of an RTA concurrently were not identified in their study. This problem results in an important heterogeneity. Baier and Bergstrand (2007) underline that the issue of heterogeneity related to the commonly unobservable determinant of trade in gravity equations is negatively associated with the decision to implement an RTA. Several earlier studies adjust for the potential endogeneity of RTAs by using instrumental variables.[11] Nonetheless, Magee (2003) and Baier and Bergstrand (2007) find that an instrumental variable approach does not appear efficient at adjusting the issue of endogeneity bias, and it is hard to find exogenous instruments that are not likely correlated with the error term of the gravity equation.

To treat this endogeneity problem, Baier and Bergstrand (2007) proposed the use of panel data analysis with bilateral fixed effects and first-differencing, both with country-time fixed effects.[12] On the one hand, these econometric methods help to remove the bias arising from the omission of unobserved variables affecting both bilateral trade flows and the RTA membership indicator variable and allow us to take into account the issue of endogeneity and the multilateral resistance terms. On the other hand, by using the complete set of fixed effects, one does not need to worry about the sensitivity of the gravity model estimates of RTA impacts in terms of control variables and country coverage.[13] Head and Mayer (2014) also stated that the use of time-varying country-specific fixed effects and country-pair fixed effects within a structural gravity model is the most used in the literature.

Our theory-consistent structural gravity equation will be log-linearized in the following

[11] Trefler (1993) and Lee and Swagel (1997) were the first works that use instrumental variables to control for the endogeneity of trade policies and concluded that the impacts of trade liberalization policies tend to be underestimated without considering instrumental variables. Egger et al. (2011) also adopt instrumental variable approach in their cross-sectional study by using indicator variables for a shared colonial past within a country pair as instruments for trade agreements. Chen and Mattoo (2008) make use of disaggregated data and employ the data on standards harmonization of adjacent industries (i.e., those industries classified in the same two-digit sector level) as the instrument for harmonization to deal with the potential endogeneity of standards harmonization—an element of RTAs.

[12] Wooldridge (2010) recommends reporting using both methods—panel data analysis with bilateral fixed effects and first-differencing—when the number of observed periods is greater than two, because choosing between these two techniques is difficult.

[13] Ghosh and Yamarik (2004) stressed that the gravity model results are quite sensitive to the variables included in the model and to the beliefs of the researchers.

form:

$$\begin{aligned}\ln X_t^{ij} = \beta_0 + \beta_1 M_t^{i(j)} + \beta_2 D^{ij} + \alpha_1 NN\_RTA_t^{ij} + \alpha_2 NN\_RTA_{t-k}^{ij} \\ + \delta_1 NS\_RTA_t^{ij} + \delta_2 NS\_RTA_{t-k}^{ij} \\ + \theta_1 SS\_RTA_t^{ij} + \theta_2 SS\_RTA_{t-k}^{ij} + \gamma_t^i + \eta_t^j + \lambda^{ij} + \varepsilon_t^{ij}\end{aligned} \tag{2.2}$$

Here, X_t^{ij} is the value of exports of country i to country j at time t. The vector $M_t^{i(j)}$ includes the traditional time-varying monadic variables such as the log of GDP of the exporter and the importer countries ($GDP_t^{i(j)}$). D^{ij} is a vector representing conventional time-invariant dyadic determinants (i.e., the log of the geographical distance between the two trading partners, common colony, common border, colonial relationship, and shared language).

Turning to our variables of interest, $NN\_RTA_t^{ij}$ is a binary variable taking the value of one if both trading partners are developed countries and both have joined a North-North RTA at time t, and zero otherwise. $SS\_RTA_t^{ij}$ equals one if i and j are both developing countries and participate in the common South-South trade agreement at time t, and zero otherwise. $NS\_RTA_t^{ij}$ is set to one if the exporting and importing countries are from the North and the South (or vice versa) and they are involved in a North-South RTA, and zero otherwise. As argued in the previous section, the date of entry into force of an RTA does not result in its full implementation of trade and tariff liberalization because trade agreements generally require a certain period of time before becoming fully effective. Furthermore, the trading partners also need time to adjust trade costs and relative prices of imports to domestic goods, as underlined in the literature. Therefore, RTA dummy variables at time t (contemporaneous effect) cannot account for the effect over the phase-in period and the cumulative average treatment effect of a trade arrangement. Our specification of the structural gravity model in equation (2.2) allows for phasing-in of the RTA effects. The term k denotes the lagged level of each type of RTA dummy. In our simplest specification, we only incorporate one lag by using $t-1$ (i.e., k equals one). Then, we have also attempted to expand our gravity equation up to two and three lagged RTA variables ($t-2$ and $t-3$). To assess the cumulative average treatment effects of RTAs, it is reasonable to jointly evaluate all contemporaneous and lagged values of RTAs (Baier and Bergstrand, 2007; Kohl, 2014).

Additionally, in equation (2.2), λ^{ij} is bilateral fixed effects, which control for any time-invariant country-pair heterogeneity; γ_t^i and η_t^j are exporter-time and importer-time fixed effects, respectively, that control for any time-varying country heterogeneity, i.e., the multilateral resistance terms, unilateral policy adjustments or business cycles, as recommended by Anderson and van Wincoop (2003), Baldwin and Taglioni (2006), Baier and

Bergstrand (2007), and Magee (2008).[14] Finally, ε_t^{ij} denotes the error term.

The specification of our first-differencing gravity model is given in the following form:

$$\begin{aligned} d\ln X_{t-(t-1)}^{ij} = {} & \beta_1 dM_{t-(t-1)}^{i(j)} + \alpha_1 dNN\_RTA_{t-(t-1)}^{ij} + \alpha_2 dNN\_RTA_{t-k-(t-k-1)}^{ij} \\ & + \delta_1 dNS\_RTA_{t-(t-1)}^{ij} + \delta_2 dNS\_RTA_{t-k-(t-k-1)}^{ij} \\ & + \theta_1 dSS\_RTA_{t-(t-1)}^{ij} + \theta_2 dSS\_RTA_{t-k-(t-k-1)}^{ij} \\ & + d\gamma_{t-(t-1)}^{i} + d\eta_{t-(t-1)}^{j} + d\varepsilon_{t-(t-1)}^{ij} \end{aligned} \tag{2.3}$$

Complying with the estimation procedure in Baier and Bergstrand (2007), this first-differencing equation will also solve the issue related to time-invariant unobserved variables.

Since we have an important proportion of zero trade flows in our dataset and encounter the issue of heteroskedasticity due to Jensen's inequality, which is commonly recognized in trade databases, we have recourse to the PPML estimator.[15] This method is the most pertinent compared to the other conventional techniques[16] to address the presence of zero trade values and heteroskedasticity (Santos Silva and Tenreyro, 2006, 2011; Head and Mayer, 2014; Fally, 2015).

Summarizing, our study will try to address these significant issues in the gravity model with the help of the econometric techniques mentioned above. Country-time fixed effects are included in our specifications to take into account the unobserved multilateral resistance terms. Country-pair fixed effects are also employed to deal with the potential endogeneity of RTAs. Finally, we use the PPML estimator to account for zero trade flows and heteroskedasticity bias. As the PPML estimator has more conveniences than other methods, we use it as a benchmark, and we will report results from panel data analysis with fixed effects and from the first-differencing techniques for comparison purposes.

[14] When country-pair and time-varying country-specific fixed effects are both controlled for, the variables included in vectors $M_t^{i(j)}$ and D^{ij} will inevitably be omitted since they are absorbed by the set of fixed effects.

[15] Santos Silva and Tenreyro (2006, p. 653) noted that "when there is evidence of heteroskedasticity, the Poisson pseudo-maximum-likelihood estimator should be used as a substitute for the standard log linear model."

[16] The conventional methods to deal with the zero trade problem involve adding a value of one to the zero trade values, simply truncating them to account for only positive trade flows, and using a Tobit model. However, as pointed out by Santos Silva and Tenreyro (2006, 2011) and Westerlund and Wilhelmsson (2011), these techniques may lead to sample selection bias, loss of interesting insight related to true zero trade flows, and then induce misleading estimated coefficients for variables of interest, particularly in the case of heteroskedasticity.

Hence, we employ the PPML method with fixed effects to estimate equation (2.4), described as follows:

$$\begin{aligned} X_t^{ij} = \; & \exp\left[\beta_0 + \beta_1 M_t^{i(j)} + \beta_2 D^{ij} + \alpha_1 NN\_RTA_t^{ij} + \alpha_2 NN\_RTA_{t-k}^{ij}\right] \times \\ & \exp\left[\delta_1 NS\_RTA_t^{ij} + \delta_2 NS\_RTA_{t-k}^{ij}\right] \times \\ & \exp\left[\theta_1 SS\_RTA_t^{ij} + \theta_2 SS\_RTA_{t-k}^{ij} + \gamma_t^i + \eta_t^j + \lambda^{ij}\right] \times \varepsilon_t^{ij} \end{aligned} \tag{2.4}$$

As suggested in the studies discussed in the previous section, our hypothesis is that North-North and South-South RTAs will have positive and significant estimated coefficients at the current trade level and at earlier lagged levels, while North-South RTAs lead to lower positive impact on trade than that relating to the others and need a certain amount of time to increase intrabloc trade. Thus, we should then expect to find a positive and significant estimated coefficients for the dummy relating to North-North and South-South RTAs at the contemporaneous trade level ($\alpha_1 > 0, \theta_1 > 0$) and at earlier lagged levels (e.g., $\alpha_2 > 0$ with $k = 1$, $\theta_2 > 0$ with $k = 1$). In contrast, we should expect to find a positive and significant coefficient estimate for the dummy relating to North-South RTAs at latter lags than that relating to North-North and South-South RTAs ($\delta_2 > 0$ with greater k, i.e., $k = 2, k = 3$).

2.4.2 Data Description

The model is estimated based on a dataset including 160 countries and investigated over the period 1960–2015.[17] On average, these countries accounted for over 95% of the annual total trade in the world over the period of 56 years. For this analysis, we only make use of the studied period at five-year intervals, which leads us to a sample of potentially 160 countries over 12 periods, with gaps (1960, 1965, 1970, ..., 2015).[18] As highlighted in Cheng and Wall (2005, p. 52, Footnote 8), "fixed-effects estimation is sometimes criticized when applied to data pooled over consecutive years on the grounds that dependent and independent variables cannot fully adjust in a single year's time". Our approach is compatible with the five-year intervals in Baier and Bergstrand (2007), the four-year intervals in Anderson and Yotov (2016), and the three-year intervals in Trefler (1993) and Olivero and Yotov (2012). Moreover, Wooldridge (2012, p. 463) confirms the reduction in standard errors of coefficient estimates using changes over longer periods of time than using "year-to-year" changes.

The nominal bilateral flows are taken from the International Monetary Fund's (IMF)

[17] See Appendix B.2 for a list of countries used in this analysis.
[18] Note that one lag in our study captures a five-year period.

Direction of Trade Statistics.[19] Concerning the issue of zero trade flows, approximately 18.1% of the observations are zero in the dataset at five-year intervals. The exporter and the importer GDPs are collected from the World Bank's World Development Indicators (WDI) and complemented with Head et al. (2010) when the World Bank's WDI is unavailable. The set of dyadic control variables for geographical, cultural, and historical ties that may affect the probability of an RTA are sourced from the CEPII gravity dataset presented by Head et al. (2010). The WTO's Regional Trade Agreement Information System (RTA-IS),[20] complemented with the dataset of Head et al. (2010) and Baier and Bergstrand (2007), is used to collect information of all RTAs in force that are pertinent to our analysis. Ultimately, we have a total of 245 RTAs in force between 1960 and 2015. Appendix B.1 provides the list of all of the trade agreements that are included in the analysis. The RTA variable is constructed using the date when a given RTA comes into force, i.e., when this dummy takes the value of one or zero.

For categorizing and defining the Northern and Southern countries, especially for the post-1990 period, we consider the classification of the IMF as in Cheong et al. (2015). The IMF classification includes 36 advanced economies in this study. Some countries in this category have evolved from developing country into advanced country based on the IMF's criteria.[21]

We would like to focus on our key variables regarding the three RTA dummies based on levels of economic development characteristics of partner countries. Of all country pairs in our sample, approximately 2.4% on average have concluded a South-South RTA among them. This figure is approximately 1% and 1.9% for North-North RTAs and North-South RTAs, respectively. Figure 2.4 shows the evolution in the number of country pairs that have concluded North-North RTAs, North-South RTAs and South-South RTAs from

[19] As advocated by Baldwin and Taglioni (2006), we employ undeflated trade values and make use of the set of country-time and bilateral fixed effects to ease any problems related to the absence of the deflation of trade. By doing so, we obtain identical coefficient estimates resulting from the use of either nominal trade flows or real trade flows.

[20] The WTO's Regional Trade Agreement Information System (RTA-IS) can be accessed at `https://rtais.wto.org/UI/PublicMaintainRTAHome.aspx`.

[21] For instance, Israel, Hong Kong, Korea, and Singapore were added to the advanced economies group in the late 1990s to reflect their rapid economic development and their characteristics, which are akin to those from other advanced economies in terms of "relatively high income levels (comfortably within the range of those in the industrial country group), well-developed financial markets and high degrees of financial intermediation, and diversified economic structures with rapidly growing service sectors" (International Monetary Fund, 1997, p. 118). Since 2000, several European countries were included by the IMF as developed economies as a result of their participation in the EU. We refer readers to Nielsen (2011) for a useful discussion of how international organizations build their country classification systems based on countries' level of development.

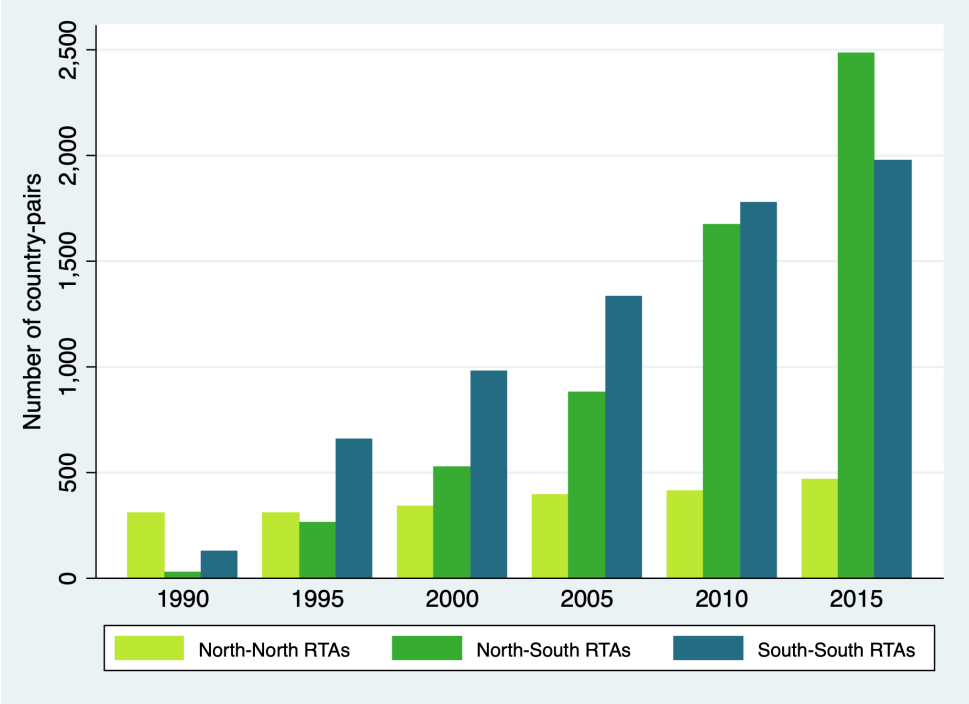


Figure 2.4 – Evolution in the number of North-North, North-South and South-South RTAs, 1990–2015

Source: Author's calculations.

1990 to 2015. Interestingly, the number of country pairs that are involved in trade deals formed by developed and developing countries and by exclusively developing countries has steadily surged over the years, especially following the establishment of the WTO in 1995. This trend may reflect the motivation of developing countries for participating in RTAs due to their disappointment in the advancement of the WTO and particularly in the slow progress of the Doha Round of multilateral trade negotiations. As of 2015, there are 2,482 country pairs participating in at least one North-South RTA. This type of RTA takes the lead in the number of country pairs, followed by South-South RTAs with 1,976 country pairs and by trade arrangements between developed countries with only 470 country pairs.

2.5 Main Results

Our results concerning the effects of RTAs on member countries' trade during their implementation period are reported in Table 2.3. We present the estimated results by lagging the RTA variables by one, two and three periods. We privilege the analysis of results from the PPML estimator with fixed effects for its robustness properties, as discussed earlier.

At first glance, we remark that monadic control variables, which are exporter-specific and

Table 2.3 – Coefficient estimates for baseline specification

Variables	(1) PPML	(2) PPML	(3) PPML	(4) Fixed effects	(5) Fixed effects	(6) Fixed effects	(7) First-differencing	(8) First-differencing	(9) First-differencing
	X_t^{ij}	X_t^{ij}	X_t^{ij}	$\ln X_t^{ij}$	$\ln X_t^{ij}$	$\ln X_t^{ij}$	$d\ln X_{t-(t-1)}^{ij}$	$d\ln X_{t-(t-1)}^{ij}$	$d\ln X_{t-(t-1)}^{ij}$
North-North RTAs									
$NN\_RTA_t^{ij}$	0.070	0.074	0.078*	0.030	0.052	0.072*	0.159***	0.163***	0.165***
	(0.049)	(0.048)	(0.047)	(0.044)	(0.043)	(0.044)	(0.043)	(0.043)	(0.043)
$NN\_RTA_{t-1}^{ij}$	0.127***	0.048	0.044	0.405***	0.150***	0.153***	0.123***	0.126***	0.127***
	(0.040)	(0.039)	(0.038)	(0.043)	(0.037)	(0.037)	(0.035)	(0.035)	(0.035)
$NN\_RTA_{t-2}^{ij}$		0.115***	0.087***		0.339***	0.092**		0.103***	0.105***
		(0.026)	(0.021)		(0.045)	(0.037)		(0.035)	(0.035)
$NN\_RTA_{t-3}^{ij}$			0.042			0.329***			0.030
			(0.026)			(0.047)			(0.032)
North-South RTAs									
$NS\_RTA_t^{ij}$	0.011	0.012	0.004	−0.035	−0.013	−0.003	0.051	0.057	0.059
	(0.059)	(0.060)	(0.060)	(0.034)	(0.034)	(0.035)	(0.036)	(0.037)	(0.037)
$NS\_RTA_{t-1}^{ij}$	−0.042	−0.058	−0.054	0.344***	0.129***	0.130***	0.112***	0.118***	0.121***
	(0.047)	(0.040)	(0.039)	(0.040)	(0.042)	(0.042)	(0.041)	(0.041)	(0.041)
$NS\_RTA_{t-2}^{ij}$		0.029	−0.01		0.476***	0.307***		0.123***	0.126***
		(0.035)	(0.032)		(0.045)	(0.043)		(0.035)	(0.035)
$NS\_RTA_{t-3}^{ij}$			0.108**			0.379***			0.075*
			(0.042)			(0.048)			(0.041)
South-South RTAs									
$SS\_RTA_t^{ij}$	0.167***	0.163***	0.165***	0.201***	0.209***	0.210***	0.060	0.062	0.063
	(0.051)	(0.050)	(0.051)	(0.047)	(0.047)	(0.047)	(0.051)	(0.051)	(0.051)
$SS\_RTA_{t-1}^{ij}$	0.003	0.029	0.022	0.421***	0.272***	0.273***	0.184***	0.188***	0.189***
	(0.047)	(0.034)	(0.035)	(0.047)	(0.049)	(0.049)	(0.048)	(0.047)	(0.047)
$SS\_RTA_{t-2}^{ij}$		−0.046	0.007		0.257***	0.172***		0.027	0.029
		(0.044)	(0.036)		(0.049)	(0.050)		(0.048)	(0.048)
$SS\_RTA_{t-3}^{ij}$			–0.114***			0.159***			0.007
			(0.044)			(0.058)			(0.061)
Cumulative	0.197***	0.236***	0.252***	0.435***	0.541***	0.646***	0.282***	0.392***	0.426***
NN_RTA effect	(0.062)	(0.063)	(0.061)	(0.053)	(0.059)	(0.065)	(0.052)	(0.057)	(0.067)
Cumulative	−0.032	−0.017	0.048	0.309***	0.591***	0.812***	0.163***	0.298***	0.381***
NS_RTA effect	(0.099)	(0.112)	(0.107)	(0.044)	(0.054)	(0.067)	(0.05)	(0.061)	(0.073)
Cumulative	0.17***	0.146*	0.080	0.622***	0.738***	0.815***	0.244***	0.277***	0.289***
SS_RTA effect	(0.062)	(0.075)	(0.09)	(0.05)	(0.058)	(0.068)	(0.061)	(0.073)	(0.087)
Observations	202,041	202,041	202,041	153,157	153,157	153,157	122,296	122,296	122,296
R^2				0.475	0.476	0.476	0.156	0.157	0.157
Exporter-year FEs	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Importer-year FEs	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country-pair FEs	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No
First-differencing	No	No	No	No	No	No	Yes	Yes	Yes

Notes: All estimates are obtained with the dataset at five-year intervals over the period 1960–2015. Columns (1), (2), and (3) employ the PPML estimator. Columns (4), (5), and (6) use the panel data technique with the bilateral fixed effects estimator. Columns (7), (8), and (9) use the first-differencing technique. The dependent variable in the PPML regression is the export flows in levels. The dependent variable in the fixed effects and the first-differencing regressions is the natural log of the export flows. All specifications control for phasing-in of the RTA effects. In this study, the Northern countries as defined by the IMF include 36 advanced economies: Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Japan, Luxembourg, Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom, United States, Israel (since 1996), Hong Kong (since 1996), Singapore (since 1996), South Korea (since 1996), Cyprus (since 2000), Slovenia (since 2006), Malta (since 2007), Czech Republic (since 2008), Slovakia (since 2008), Estonia (since 2010), Latvia (since 2013), Lithuania (since 2014), Macao (since 2015). The coefficient estimates for the RTA cumulative average treatment effect are computed using the Delta method. Standard errors are reported in parentheses and clustered by country pair. Respectively, *, **, and *** denote significance at the level of 10%, 5%, and 1%.

importer-specific variables (e.g., $\ln GDP_t^i$, $\ln GDP_t^j$), are absorbed by the exporter-time and by the importer-time fixed effects as expected. Time-invariant bilateral determinants of trade flows, such as geographical distance, contiguity, common language, and colonial relationship, are also absorbed by the use of country-pair fixed effects.

We choose to make use of fixed effects rather than random effects estimation in this study because the Hausman test for a gravity model with fixed effects rejects the existence of random effects (as commonly underlined in the literature, e.g., Egger, 2000; Baier and Bergstrand, 2007). Moreover, we prefer the fixed effects model since the assumption of a correlation between the RTA indicator variable and unobserved time-invariant bilateral variables is less restrictive than one in the random effects model, which imposes this correlation to be zero.

Focusing on our key variables of interest, South-South RTAs lead to a significant increase in intrabloc trade at the 1% level by approximately 18% ($e^{0.167} = 1.182$; $e^{0.163} = 1.177$; $e^{0.165} = 1.179$, from columns (1), (2) and (3), respectively) at their entry into force in all three specifications, with RTA lagged levels estimated by the PPML estimator. This result is consistent with the fact that South-South RTAs tend to undertake shorter implementation periods for trade and tariff liberalization than do other types of RTAs. Thus, the positive impacts of South-South RTAs on member countries' intrabloc trade are obtained at their entry into force. However, there are insignificant effects for South-South RTAs at further lagged levels, with the exception of the specification including three lags of RTAs.

Column (3) shows a negative and significant coefficient for $SS\_RTA_{t-3}^{ij}$. It seems that South-South RTAs do not have strong long-term impacts on the growth momentum of trade. This outcome can be explained by the fact that some developing countries, although they formed mutual trade agreements long ago[22], have not sufficiently improved their intrabloc trade due to lack of commitment to eliminating trade barriers among them or to simplifying customs procedures, and to lack of development in trade infrastructure.[23] This problem in RTAs among developing countries has been widely discussed in the literature (World Bank, 2005; South Centre, 2005). Note that the nature of most South-South RTAs is only free trade area, which expects to have had lower degree of trade liberalization and economic integration. Additionally, the majority of South-South RTAs were created after 2000; consequently, their effect at the third lagged level is not fully captured in our period

[22]The existence of these RTAs is long enough to be observed at the third lagged levels (15 years after coming into force).

[23]For instance, there are developing countries involved in the Central American Common Market (CACM) in the 1960s, the CARICOM in the 1970s, and the Common Market for Eastern and Southern Africa (COMESA) in the 1990s.

of investigation.

In contrast, North-North RTAs result in a positive and significant impact on intrabloc trade at their lagged levels. Bilateral trade flows increase by 13.5% ($e^{0.127} = 1.135$) in year 5 (column (1)) following their entry into force and by 12.2% ($e^{0.115} = 1.122$) in year 10 (column (2)) if the pair of countries has a North-North RTA. All PPML specifications show a marginal increase in intrabloc trade at the entry into force of North-North RTAs, which reflects the slow start for RTAs between developed countries and the fact that the average implementation period in North-North RTAs is up to ten years. Hence, the immediate impact of trade agreements between developed countries is unlikely to be significant upon their entry into force.

Unlike North-North and South-South RTAs, North-South RTAs do not experience any significant effect on members' trade upon their entry into force or their lagged levels (after five years at $t-1$ and after ten years at $t-2$). However, the PPML specification with three lags of North-South RTAs reveals an increase in bilateral trade flows between developed and developing economies of 11.4% ($e^{0.108} = 1.114$) in year 15. This outcome confirms that North-South RTAs tend to have a longer transition period than others do since the levels of economic development of their members are less symmetrical than are those of North-North and South-South RTAs. Overall, this finding appears to be consistent with Dahi and Demir (2013) because no evidence is found by the authors that North-South trade agreements have any significant positive effect on Southern exports in terms of manufactured goods to the Northern members. One possible economic explanation for this result is that developing countries seem to benefit more trade-creating effects from South-South RTAs than North-South RTAs due to larger reduction in fixed export costs that are initially higher prior to South-South agreements (Baier et al., 2018).[24] Additionally, there exists a dissimilarity in negotiation strength by which Southern countries tend to accept unfavorable trade terms imposed by developed countries (Perroni and Whalley, 2000).

Turning our focus to the cumulative average effects on trade for each type of RTA, PPML estimations do not provide significant effects for North-South RTAs, regardless of how many lagged levels of RTA dummy are included in the regression. Column (3) shows a positive coefficient for the cumulative North-South RTA effect after 15 years being in force, but its magnitude is marginal and statistically negligible. Conversely, total average effects on trade for RTAs between developed countries and those between developing countries are both significant. The average North-North RTA raises intrabloc trade by 28.7% after

[24] Developing economies are likely to experience higher fixed export costs (e.g., customs procedures and border-crossing costs, and weaker trade infrastructures).

being effective for 15 years ($e^{0.252} = 1.287$), while South-South RTAs improve trade among members by 18.5% ($e^{0.17} = 1.185$) on average after coming into force for five years and by 15.7% ($e^{0.146} = 1.157$) on average after ten years. These estimates mean that the dynamic long-term effect of South-South RTAs peaks in the fifth year after their start and then declines further after that point. Interestingly, the PPML specification with three lags for RTA variables in column (3) reveals that the significantly negative impact of South-South RTAs on intrabloc trade in year 15 of their existence has canceled out their own positive effect at the beginning, which results in a negligible and small cumulative average effect on trade for South-South RTAs after being in place for more than a decade. The cumulative effect of trade agreements between developed countries on intrabloc trade peaks in the 15th year following their entry into force. At this stage, the effects of RTAs formed within the developed countries and within the developing countries are significantly higher than are the effects of those RTAs formed by Northern and Southern countries (at one and two RTA lags), which is consistent with Cheong et al.'s (2015) finding and with Baier and Bergstrand's (2004) conclusion.

Panel data with fixed effects (columns (4)–(6)) and first-differencing data (columns (7)–(9)) give us a direct comparison to our benchmark specifications with the PPML estimator. The number of observations included in these specifications dropped considerably compared with the PPML estimator because they cannot deal with zero trade flows. Results from these methods are quite consistent with those from PPML specifications (including one and two lags) regarding the impact of North-North and South-South RTAs on intrabloc trade at their entry into force, at lagged levels and at their total average effect. However, fixed effects and first-differencing techniques produce more statistically significant coefficients at RTA lagged levels and higher magnitudes for RTA coefficients. The magnitude of RTA effects from our fixed effects specifications are akin to the results in Behar and Cirera-i Crivillé (2013) since they use the same method with country-time and bilateral fixed effects, showing that the South-South agreements experience a higher proportional impact than do North-South agreements.

Interestingly, results from fixed effects and first-differencing methods are in line with those from PPML estimator in terms of the North-South RTA contemporaneous effect. All estimation methods do not show any significant impact on intrabloc trade at the entry into force for North-South RTAs. However, results from panel data techniques diverge greatly from PPML specifications on the impact of North-South RTA lagged levels by virtue of the statistically significant and positive coefficients.[25] As a result, these outcomes lead to a significant and positive cumulative average effect on trade for RTAs between

[25]PPML gravity equation coefficient estimates often differ from their equivalents in different methods (e.g., OLS) (see Bergstrand et al., 2015).

Table 2.4 – Wald tests of equality of estimates of the RTA cumulative average effect

Specifications	Cumulative RTA effect			
	NN_RTA & *NS_RTA*	*NS_RTA* & *SS_RTA*	*NN_RTA* & *SS_RTA*	All types of RTA
With one lag of RTA				
(1) PPML	5.30**	5.01**	0.1	6.57**
(4) Fixed effects	3.85**	25.39***	6.08**	12.86***
(7) First-differencing	2.93*	1.18	0.22	1.6
With two lags of RTA				
(2) PPML	5.29**	2.86*	0.85	5.52*
(5) Fixed effects	0.46	4.07**	5.26**	2.97*
(8) First-differencing	1.42	0.06	1.47	0.96
With three lags of RTA				
(3) PPML	3.51*	0.13	2.55	3.76
(6) Fixed effects	3.74*	0	2.88*	2.2
(9) First-differencing	0.24	0.76	1.45	0.73

Notes: *, ** and *** indicate that the null hypothesis of equality of estimates can be rejected at the level of 10%, 5% and 1%, respectively.

Northern and Southern partner countries.

We resort to the Wald test to scrutinize the equality of estimates of the cumulative effect on trade for the three types of RTA throughout all specifications. Table 2.4 reveals that the hypothesis of equality of coefficients on our different types of RTA cannot be rejected in first-differencing specifications when checking by pairs or altogether. In fixed effects, the Wald test shows that the outcomes vary greatly across specifications with one, two or three RTA lagged levels. In contrast, only PPML specifications show consistency of results from the Wald test. The hypothesis of equality of estimates for North-North and North-South RTAs and for South-South and North-South RTAs can be rejected at traditional levels of significance in the PPML specifications with one and two RTA lagged levels. In other words, the cumulative effects on trade of North-North and South-South RTAs are different from that of North-South RTAs. Furthermore, it may seem that RTA impact on members' trade is likely to be quite sensitive and overestimated when one does not address the zero trade flows and heteroskedasticity bias by employing the PPML estimator.

Overall, by using the PPML estimator with fixed effects, we find that RTAs reflecting the North-North trade relation and the South-South trade tie tend to increase intrabloc trade upon their entry into force and during their implementation period of tariff and trade liberalization. These RTAs require a shorter time to result in the increase in members' trade than do North-South RTAs, which experience a difference in their members' level

of economic development. This disparity is likely to cause RTAs involving Northern and Southern partners to take more years to liberalize trade and tariffs among them; consequently, the beneficial impact of this type of RTA seems to take more time to happen. These findings appear to be consistent with the predictions of several theoretical studies favoring South-South trade (Perroni and Whalley, 2000; Regolo, 2013; Baier et al., 2018) and to be in line with the outcomes from a number of empirical analyses detecting a higher effect on trade of South-South RTAs than of North-South RTAs (Behar and Cirera-i Crivillé, 2013; Dahi and Demir, 2013; Cheong et al., 2015), which suggests that Southern countries could foster more trade by enhancing integration among themselves.

Interestingly, coefficients for RTA impact at the year of entry into force and at lagged levels do not indicate an evolution of such impact over time, especially in the case of RTAs concluded between developing countries. RTAs do not necessarily increase their intrabloc trade in a gradual way over the years after coming into effect with stronger RTA effects obtained at subsequent lags than those of previous lags. This result is in line with findings from Baier and Bergstrand (2007) and Anderson and Yotov (2016). Indeed, this outcome agrees with the fact that each stage during the implementation period of RTAs has a different percentage of tariff lines (i.e., products) becoming duty-free among member countries. The next liberalization step may not necessarily have more impact on the RTA trade-promoting effects than did the previous liberalization phase.

2.6 Sensitivity Analyses and Extensions

In Sections 2.6.1 and 2.6.2, we try to test for potentially reverse causality between trade and RTAs and the sensitivity of the classification of Northern and Southern countries. In Section 2.6.3, we test for the sensitivity of previous findings by controlling for cross-regional RTAs or shallow integration versus deep integration. We measure trade creation and trade diversion of different types of RTAs in a gravity model setting that allows for the implementation period of trade liberalization in Section 2.6.4.

2.6.1 Strict Exogeneity of RTAs

To test for the strict exogeneity of RTAs, we take into account the suggestion of Wooldridge (2010) and Baier and Bergstrand (2007) by including in the regression a future level of RTA. There is no potential reverse causality between trade changes and RTA changes when the future level of RTAs (RTA^{ij}_{t+1}) is uncorrelated with the current trade flows at time t when trade deals begin. Columns (1) and (2) in Table 2.5 show PPML specifications including one future level of RTA dummies and two or three RTA

lagged levels, respectively. The coefficients for all kinds of RTAs at the entry into force and lagged levels are consistent with previous findings presented in Table 2.3. The results from both PPML specifications confirm the strict exogeneity in the case of North-North RTAs because the effect of $NN\_RTA^{ij}_{t+1}$ is marginal and insignificantly different from zero.[26]

Concerning South-South RTAs, both columns (1) and (2) present a positive future level of the RTA effect on trade, which exhibits an anticipatory effect of this type of RTA when firms are likely to promote trade even before a trade deal becoming effective, as argued in McLaren (1997) and Baier and Bergstrand (2007). In contrast, RTAs between developed and developing countries suggest strict exogeneity when their effect before the entry into force is not significant. The long-term cumulative effect of North-South RTAs remains negligible across PPML specifications, while the long-term effects of South-South RTAs are reinforced since they have a positive anticipatory impact on trade. It is also important to note that, when we introduce the future level of RTA in the model, the contemporaneous and lagged RTA coefficient estimates do not remarkably vary.

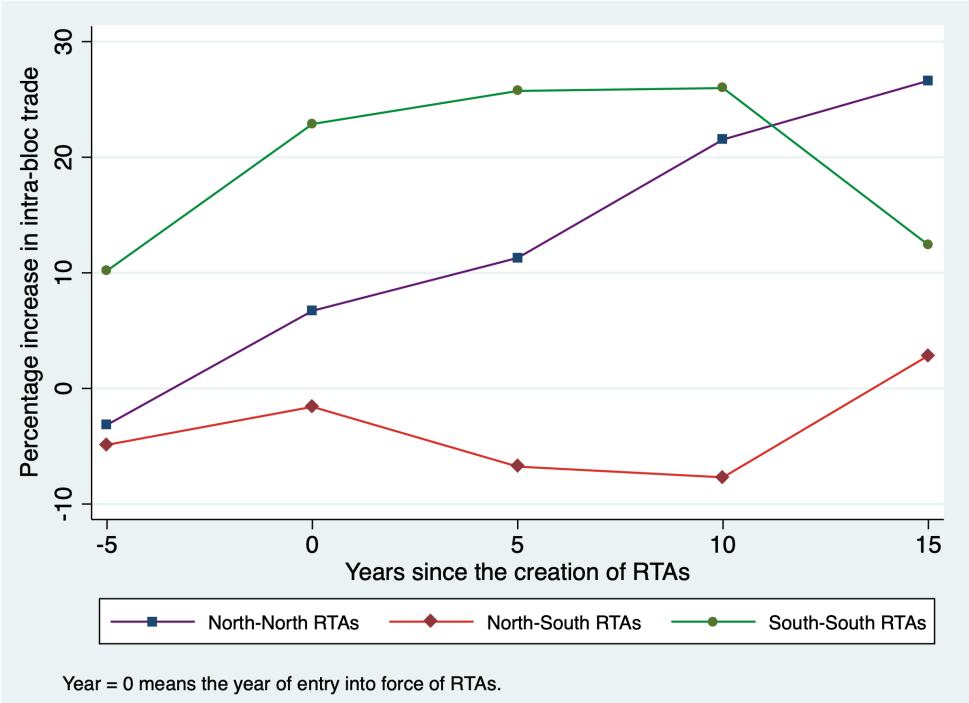


Figure 2.5 – Time paths of the dynamic cumulative effects of North-North, North-South, and South-South RTAs on intrabloc trade

The dynamic cumulative effects over the years of North-North RTAs, North-South RTAs, and South-South RTAs on intrabloc trade are illustrated in Figure 2.5. North-North RTAs

[26] The estimated coefficient of −0.033 for North-North RTAs could hint that firms in developed countries have the propensity to delay trade in anticipation of new trade agreements between developed members or new phases of tariff and trade liberalization.

Table 2.5 – Coefficient estimates for sensitivity analyses

Variables	(1) PPML	(2) PPML	(3) PPML	(4) PPML
North-North RTAs				
$NN\_RTA^{ij}_{t+1}$	−0.033	−0.032	0.099	0.098
	(0.046)	(0.046)	(0.065)	(0.065)
$NN\_RTA^{ij}_{t}$	0.094**	0.097**	0.111***	0.112***
	(0.040)	(0.039)	(0.034)	(0.034)
$NN\_RTA^{ij}_{t-1}$	0.046	0.042	0.070**	0.072**
	(0.039)	(0.038)	(0.031)	(0.031)
$NN\_RTA^{ij}_{t-2}$	0.114***	0.088***	0.145***	0.132***
	(0.026)	(0.021)	(0.027)	(0.022)
$NN\_RTA^{ij}_{t-3}$		0.041		0.017
		(0.026)		(0.027)
North-South RTAs				
$NS\_RTA^{ij}_{t+1}$	−0.049	−0.050	–0.087**	–0.087**
	(0.035)	(0.035)	(0.034)	(0.034)
$NS\_RTA^{ij}_{t}$	0.041	0.034	0.100***	0.098***
	(0.048)	(0.048)	(0.030)	(0.030)
$NS\_RTA^{ij}_{t-1}$	−0.058	−0.054	0.035	0.034
	(0.040)	(0.039)	(0.030)	(0.030)
$NS\_RTA^{ij}_{t-2}$	0.029	−0.010	0.045	0.025
	(0.035)	(0.032)	(0.034)	(0.025)
$NS\_RTA^{ij}_{t-3}$		0.108**		0.044
		(0.042)		(0.034)
South-South RTAs				
$SS\_RTA^{ij}_{t+1}$	0.094**	0.097**	−0.041	−0.042
	(0.046)	(0.046)	(0.055)	(0.055)
$SS\_RTA^{ij}_{t}$	0.108**	0.109**	−0.028	-0.030
	(0.045)	(0.046)	(0.065)	(0.065)
$SS\_RTA^{ij}_{t-1}$	0.030	0.023	–0.093**	–0.096**
	(0.034)	(0.035)	(0.042)	(0.042)
$SS\_RTA^{ij}_{t-2}$	−0.051	0.002	−0.053	−0.037
	(0.044)	(0.037)	(0.038)	(0.037)
$SS\_RTA^{ij}_{t-3}$		–0.114**		−0.048
		(0.044)		(0.044)
Cumulative NN_RTA effect	0.22***	0.236***	0.425***	0.431***
	(0.071)	(0.070)	(0.072)	(0.071)
Cumulative NS_RTA effect	−0.037	0.028	0.093	0.114
	(0.123)	(0.118)	(0.074)	(0.082)
Cumulative SS_RTA effect	0.182**	0.117	−0.216	−0.253
	(0.085)	(0.099)	(0.157)	(0.161)
Classification	IMF	IMF	United Nations	United Nations
Observations	202,041	202,041	202,041	202,041
Exporter-year FEs	Yes	Yes	Yes	Yes
Importer-year FEs	Yes	Yes	Yes	Yes
Country-pair FEs	Yes	Yes	Yes	Yes

Notes: All estimates are obtained by using the PPML estimator with country-pair and country-time fixed effects. All specifications control for both periods—before and after the entry into force of RTAs—by including RTA future and lagged levels in the regressions. Columns (1) and (2) report the results using the IMF's classification of developed and developing countries. Columns (3) and (4) report the results from the United Nations' classification. The coefficient estimates for the RTA cumulative average treatment effect are computed using the Delta method. Standard errors are reported in parentheses and clustered by country pair. Respectively, *, **, and *** denote significance at the level of 10%, 5%, and 1%.

result in a steady increase in members' trade from five years prior to their entry into force to 15 years after they have started. By year 15, trade within RTAs between developed countries had risen by 26.6% on average, although it began with a decrease of 3.1% on average before the start of North-North RTAs. For South-South RTAs, intrabloc trade increases by approximately 10% five years prior to the beginning of these trade deals, and their cumulative effect peaks after ten years from their start. After that point, trade within such RTAs starts to decline to approximately 12.4% by the third lagged level. The intrabloc trade of North-South RTAs starts to rise ten years after they come into effect but only reaches a small increase of 2.8% by year 15.

2.6.2 Different Classification of Northern and Southern Countries

Columns (3) and (4) in Table 2.5 present a sensitivity check in terms of definition of developed and developing countries. Different from the methodology of the IMF, the United Nations has proposed another group of developed countries and developing countries, including all the advanced economies as defined by the IMF excluding Israel, Hong Kong, South Korea, Singapore, Macao, and with the incorporation of Bulgaria, Hungary, Poland, and Romania.[27]

The results from the United Nations' classification are compatible with previous findings for the North-North RTA effect on intrabloc trade. Specifications (3) and (4) find an additional impact of North-North RTAs at first lagged level; thus, the cumulative average effect of such trade agreements is higher than that in the PPML specification using the IMF's classification of Northern and Southern economies. We notice more changes in the coefficient estimates for North-South RTA and South-South RTA effects. Statistically significant increases in trade within member countries of North-South RTAs are found at the contemporaneous trade level in specifications (3) and (4), but there is no additional effect at RTA lagged levels such as in specification (2). In contrast, specifications using the United Nations' classification of developed and developing countries do not find any significant anticipatory effect or any significant impact on intrabloc trade at the entry into force for South-South RTAs compared with specifications using the IMF's categorization of Northern and Southern countries.

Overall, the effects on intrabloc trade of North-North RTAs are quite robust; consequently, to some extent, this outcome confirms that the enlargement of the EU toward countries

[27] We also use the World Bank's definition of developed and developing countries as a robustness check. Because there is not much difference between the IMF and World Bank definitions, we find that the RTA coefficient estimates are more comparable across these classifications. Results using the World Bank's classification are available in Appendix B.4.

in Eastern Europe produces beneficial impacts on trade within this region. Nonetheless, considering the EU-27 countries Northern trading partners when they are involved in the EU enlargement process[28] and including some Asian countries (i.e., South Korea, Singapore, and Hong Kong) in the group of developing countries has indeed led to some changes in the effect on trade of North-South and South-South RTAs.[29] One possible reason for the differences in the coefficients of South-South and North-South RTAs is that these abovementioned Asian countries have signed several trade agreements with a number of both developed and developing countries, but the pre-RTA duty-free line (the MFN tariff rate) is already on a high level (e.g., 100% in the cases of Singapore and Hong Kong). Hence, these countries have no more breadth to offer tariff preferences to their Northern or Southern RTA partners, which explains a trivial trade-promoting effect for these types of RTAs.

2.6.3 Test for Cross-Regional RTAs, RTAs Before 2010, and for Shallow Integration Versus Deep Integration

In the post-WTO era, several trade arrangements have been formed among countries that are not located in the same geographical regions. For instance, a Southern trading partner such as Chile in South America has concluded trade deals with countries in Asia such as China, Vietnam or Japan. Hence, we test for the robustness of the RTA effect on trade for the occurrence of cross-regional North-North, North-South and South-South RTAs. Table 2.6(a) shows that cross-regional trade agreements between developing countries result in an intrabloc trade increase by 28.2% on average at their entry into force. After ten years from their start, the effect of cross-regional South-South RTAs on trade within members has begun to decline. This outcome is consistent with the previous results. We obtain a similar consistency in the case of cross-regional North-South RTAs, with no significant effect whatsoever. Regarding RTAs formed by developed countries that are located in different regions, we only find a negative and significant coefficient for their effect on intrabloc trade five years after coming into force.[30] Taken together, it is likely that cross-regional trade deals including a developed country tend to take a longer period of time to produce beneficial impacts on trade within member countries compared with South-South RTAs formed by developing countries located in different regions. Interestingly, this finding again shows a strong openness to international trade among developing countries

[28] We do not include Croatia in the analysis since Croatia recently joined the EU in mid-2013.

[29] We also experiment with other PPML specifications including only RTA lagged levels to compare the results from the two classifications of developed and developing countries. Both specifications drive conclusions that match the ones deduced from Table 2.5.

[30] Note that RTAs formed between developed economies have contributed in small part to the recent proliferation of RTA activity.

Table 2.6 – Estimated impacts of RTAs when controlling for various aspects of trade agreements

	(a)			(b)	
Variables	Cross-regional RTAs	RTAs before 2010	Variables	EIAs	
North-North RTAs			North-North EIAs		
$NN\_RTA_t^{ij}$	0.010	0.050	$NN\_EIA_t^{ij}$	0.100***	
	(0.067)	(0.056)		(0.038)	
$NN\_RTA_{t-1}^{ij}$	–0.164*	0.058**	$NN\_EIA_{t-1}^{ij}$	0.012	
	(0.090)	(0.024)		(0.031)	
$NN\_RTA_{t-2}^{ij}$	–0.058	0.087***	$NN\_EIA_{t-2}^{ij}$	0.010	
	(0.048)	(0.021)		(0.022)	
$NN\_RTA_{t-3}^{ij}$	–0.141	0.041	$NN\_EIA_{t-3}^{ij}$	–0.029	
	(0.117)	(0.026)		(0.026)	
North-South RTAs			North-South EIAs		
$NS\_RTA_t^{ij}$	–0.07	–0.001	$NS\_EIA_t^{ij}$	0.065	
	(0.045)	(0.072)		(0.066)	
$NS\_RTA_{t-1}^{ij}$	–0.008	–0.055*	$NS\_EIA_{t-1}^{ij}$	–0.059	
	(0.040)	(0.032)		(0.040)	
$NS\_RTA_{t-2}^{ij}$	–0.046	–0.007	$NS\_EIA_{t-2}^{ij}$	–0.103**	
	(0.040)	(0.033)		(0.042)	
$NS\_RTA_{t-3}^{ij}$	–0.035	0.106**	$NS\_EIA_{t-3}^{ij}$	–0.212**	
	(0.048)	(0.042)		(0.085)	
South-South RTAs			South-South EIAs		
$SS\_RTA_t^{ij}$	0.249***	0.169***	$SS\_EIA_t^{ij}$	0.087*	
	(0.092)	(0.055)		(0.051)	
$SS\_RTA_{t-1}^{ij}$	0.078	0.019	$SS\_EIA_{t-1}^{ij}$	–0.060	
	(0.052)	(0.036)		(0.044)	
$SS\_RTA_{t-2}^{ij}$	–0.233**	0.007	$SS\_EIA_{t-2}^{ij}$	–0.252***	
	(0.106)	(0.036)		(0.083)	
$SS\_RTA_{t-3}^{ij}$	–0.099	–0.116***	$SS\_EIA_{t-3}^{ij}$	–0.153	
	(0.067)	(0.044)		(0.123)	
Observations	202,041	202,041	Observations	202,041	
Exporter-year FEs	Yes	Yes	Exporter-year FEs	Yes	
Importer-year FEs	Yes	Yes	Importer-year FEs	Yes	
Country-pair FEs	Yes	Yes	Country-pair FEs	Yes	

Notes: All estimates are obtained by using the PPML estimator with country-pair and country-time fixed effects. All specifications control for phasing-in of the RTA effects. Standard errors are reported in parentheses and clustered by country pair. Respectively, *, **, and *** denote significance at the level of 10%, 5%, and 1%.

(Kuznets, 1960; Alesina and Wacziarg, 1998; Armstrong and Read, 1998).

In Table 2.6(a), we also test for the robustness of previous findings to the exclusion of

RTAs that entered into effect after 2010, since we cannot observe impacts on trade of these RTAs at all three lagged levels. The results are quite compatible with those in the previous section. North-North and South-South RTAs are likely to require a smaller number of years following their entry into force to result in an intrabloc trade increase compared with North-South RTAs. The latter continue to show a positive and significant effect on trade within members only at the third lagged level.

In this sensitivity analysis, we also tried to capture diverse RTA effects by drawing a distinction between deep and shallow RTAs.[31] Based on the same database of RTAs provided by the WTO, we categorize an RTA as deep integration if it is also an economic integration agreements. Otherwise, we consider it shallow integration only (i.e., an FTA or a CU). Anderson and Yotov (2016) have used the same method to distinguish between deep versus shallow RTAs. Consistent with the previous results that include the shallow RTAs, we find in Table 2.6(b) an increase in intrabloc trade for North-North EIAs and South-South EIAs from their date of entry into force. The dynamic effect of South-South EIAs is quite akin to the previous findings regarding the shallow form of South-South RTAs, as they tend to produce a negative effect on intrabloc trade ten years after coming into effect. Interestingly, we find a negative impact of North-South deep integration on intrabloc trade at the second and third lagged levels. This result seems to be consistent with the findings in Disdier et al. (2015) that trade volume within North-South trade deals is negatively affected when these trade agreements include provisions on regional standards harmonization.

2.6.4 Trade Creation and Trade Diversion of RTAs Based on Members' Level of Economic Development

Along with the effect of RTAs on intrabloc trade, we also focus on the effects of RTAs on extrabloc trade with the rest of the world to capture the trade creation and trade diversion proposed by Viner (1950). To investigate this issue, we introduce two extra dummy variables for each type of RTA^k (North-North, North-South or South-South RTA)

[31] Deep integration within RTAs indicates a greater degree of policies and standards harmonization among member countries that goes beyond tariff barriers. In recent years, we have witnessed a rise in the number of EIAs, which depict a deeper integration than do FTAs and CUs.

and estimate the following equation:

$$\begin{aligned} X_t^{ij} = \; & \exp\left[\beta_0 + \beta_1 M_t^{i(j)} + \beta_2 D^{ij} + \alpha_1 RTA^{k\,ij}_{\;\;t} + \alpha_2 RTA^{k\,ij}_{\;\;t-k}\right] \times \\ & \exp\left[\delta_1 RTA^k\_X_t^{ij} + \delta_2 RTA^k\_X_{t-k}^{ij}\right] \times \\ & \exp\left[\theta_1 RTA^k\_M_t^{ij} + \theta_2 RTA^k\_M_{t-k}^{ij} + \gamma_t + \lambda^{ij}\right] \times \varepsilon_t^{ij} \end{aligned} \tag{2.5}$$

Here, the first new variable ($RTA^k\_X_t^{ij}$), which captures the impact of the members' exports to the rest of the world, assumes the value of one if exporter country i belongs to an RTA^k in which importer country j does not participate at time t, and zero otherwise. The second new variable ($RTA^k\_M_t^{ij}$), which measures the impact of the members' imports coming from the rest of the world, assumes the value of one if importer country j belongs to an RTA^k in which exporter country i does not participate at time t, and zero otherwise.

Table 2.7 shows our findings concerning the trade creation and trade diversion of North-North, North-South and South-South trade deals. Due to the problem of collinearity, exporter-time and importer-time fixed effects have a significant drawback; they cannot result in the estimates for the two added dummy variables regarding RTA effects on extrabloc trade. Consequently, we include in specification (2.5) only country-pair fixed effects (λ^{ij}) and year effects (γ_t) to fully capture the trade creation and trade diversion effects of RTAs. Consistent with our previous PPML specifications, we also allow for phasing-in periods. Concerning North-North RTAs, we find evidence of trade diversion effects in terms of members' exports and imports at second and third lagged levels. In other words, North-North RTAs are likely to result in a decrease in welfare for nonmembers in the long term.

Not surprisingly, North-South RTAs lead to trade creation in terms of both channels—bloc exports to nonmembers and bloc imports from the rest of the world—because their effect on intrabloc trade is commonly not significantly different from zero at the contemporaneous trade level, or at the first or second lags. Turning to South-South RTAs, we find a strong effect on intrabloc trade, coupled with a tendency toward trade creation in terms of members' exports and imports from the rest of the world. Once again, this outcome reinforces the very dynamic characteristics of developing countries on the global trading system because their exports and imports are strongly outward oriented.

Table 2.7 – Estimated impacts of RTAs when controlling for trade creation and trade diversion effects

Variables	PPML					
$\ln GDP_t^i$	0.528***					
	(0.0375)					
$\ln GDP_t^j$	0.607***					
	(0.027)					
North-North RTAs		North-South RTAs		South-South RTAs		
$NN\_RTA_t^{ij}$	0.117	$NS\_RTA_t^{ij}$	0.071	$SS\_RTA_t^{ij}$	0.549***	
	(0.073)		(0.051)		(0.068)	
$NN\_RTA_{t-1}^{ij}$	–0.081**	$NS\_RTA_{t-1}^{ij}$	0.092	$SS\_RTA_{t-1}^{ij}$	0.086*	
	(0.038)		(0.062)		(0.044)	
$NN\_RTA_{t-2}^{ij}$	–0.112***	$NS\_RTA_{t-2}^{ij}$	–0.006	$SS\_RTA_{t-2}^{ij}$	–0.065	
	(0.033)		(0.049)		(0.054)	
$NN\_RTA_{t-3}^{ij}$	–0.080*	$NS\_RTA_{t-3}^{ij}$	0.429***	$SS\_RTA_{t-3}^{ij}$	–0.124**	
	(0.044)		(0.052)		(0.054)	
$NN\_RTA\_X_t^{ij}$	–0.019	$NS\_RTA\_X_t^{ij}$	–0.001	$SS\_RTA\_X_t^{ij}$	0.253***	
	(0.033)		(0.025)		(0.058)	
$NN\_RTA\_X_{t-1}^{ij}$	–0.108***	$NS\_RTA\_X_{t-1}^{ij}$	0.077***	$SS\_RTA\_X_{t-1}^{ij}$	0.054	
	(0.031)		(0.018)		(0.034)	
$NN\_RTA\_X_{t-2}^{ij}$	–0.209***	$NS\_RTA\_X_{t-2}^{ij}$	0.004	$SS\_RTA\_X_{t-2}^{ij}$	–0.033	
	(0.026)		(0.020)		(0.029)	
$NN\_RTA\_X_{t-3}^{ij}$	0.041	$NS\_RTA\_X_{t-3}^{ij}$	0.024	$SS\_RTA\_X_{t-3}^{ij}$	0.01	
	(0.034)		(0.022)		(0.033)	
$NN\_RTA\_M_t^{ij}$	0.020	$NS\_RTA\_M_t^{ij}$	0.082***	$SS\_RTA\_M_t^{ij}$	0.186***	
	(0.041)		(0.021)		(0.037)	
$NN\_RTA\_M_{t-1}^{ij}$	–0.041	$NS\_RTA\_M_{t-1}^{ij}$	0.055***	$SS\_RTA\_M_{t-1}^{ij}$	0.077***	
	(0.041)		(0.019)		(0.029)	
$NN\_RTA\_M_{t-2}^{ij}$	–0.037	$NS\_RTA\_M_{t-2}^{ij}$	–0.017	$SS\_RTA\_M_{t-2}^{ij}$	–0.073***	
	(0.030)		(0.017)		(0.023)	
$NN\_RTA\_M_{t-3}^{ij}$	–0.065**	$NS\_RTA\_M_{t-3}^{ij}$	0.064***	$SS\_RTA\_M_{t-3}^{ij}$	0.025	
	(0.030)		(0.021)		(0.028)	
Observations	192,473					
Exporter-year FEs	No					
Importer-year FEs	No					
Country-pair FEs	Yes					
Year FEs	Yes					

Notes: This table shows the estimation results for equation (2.5), using the PPML estimator with country-pair and year fixed effects. All specifications control for phasing-in of the RTA effects. Standard errors are reported in parentheses and clustered by country pair. Respectively, *, **, and *** denote significance at the level of 10%, 5%, and 1%.

2.7 Concluding Remarks

This chapter investigates whether the implementation period of trade liberalization and economic development characteristics of member countries influence the effects of RTAs on members' trade. Applying the PPML techniques on a theoretically motivated gravity model, the key finding of this empirical analysis is that RTAs formed by trading partners that have a similarity in economic development characteristics (North-North and South-South RTAs) result in a greater increase in members' trade during a shorter implementation period than do North-South trade arrangements, which experience longer phasing-in periods and slower-paced tariff reductions. Our PPML specifications with bilateral fixed effects and country-time fixed effects are robust across various sensitivity analyses. In particular, North-North and South-South EIAs, which feature a deeper integration, also find an increase in intrabloc trade quicker than do North-South EIAs.

These findings are consistent with the argument that RTAs are likely to increase trade flows among the most homogeneous member countries in terms of economic development, as pointed out by Baier and Bergstrand (2004). We do not find any strong evidence that developing countries could experience beneficial effects on trade upon the entry into force of their RTAs that are forged with developed countries.

There are several possible interpretations of why North-South trade agreements cannot produce immediate and effective trade-promoting impacts on trade between the Northern and Southern member countries. One could argue that the pre-RTA tariff rates imposed by advanced economies are already low (close to the MFN rates). Within a North-South RTA, developing countries commonly liberalize trade and reduce tariffs over a longer period of time than do their developed partners. Additionally, Northern countries could exploit nontariff barriers to neutralize the diminution of tariff impediments. Thus, policymakers in developing countries must focus more on the enhancements of productivity and of capacity to export of domestic and exporting firms. Other types of policy priority could include the reduction of exporting fixed costs (i.e., by simplifying customs procedures and providing insights on market access in export destinations). Negotiations on the scope of forming RTAs between developed and developing countries must also revolve around the acceleration of the process of trade and tariff liberalization among Northern and Southern partners. These reforms are necessary for North-South RTAs to increase more trade among developed and developing member countries during a shorter implementation period.

Our findings in terms of the effect of South-South RTAs are consistent with the arguments related to a great openness to international trade of developing countries. However, we

find evidence that the average long-term impacts of South-South RTAs on members' trade show a propensity to fade away 15 years after coming into effect. Thus, to maintain the trade-creating effects in the long term of South-South RTAs, developing states may need to continue to facilitate trade in goods not only by persistently keeping their commitments to reduce trade barriers but also by modernizing trade infrastructures. The opportunities of South-South RTAs have been one of the major subjects of the United Nations' 2030 Agenda for Sustainable Development to encourage the involvement of developing countries in global trade, since the Doha Round talks are stalled (United Nations, 2015).

Based on this analysis, further research may be motivated. One drawback of our study is that it solely emphasizes the tariff barriers and transition period of RTAs in terms of tariff reduction. In contrast, it does not focus on the question of nontariff barriers and other behind-the-border regulations that currently contribute an important component to the trade policy scope of the new generation of RTAs, as suggested by Disdier et al. (2015). Thus, future research could pursue this particular direction. Moreover, since our analysis considers the aggregated trade flows, further analyses could investigate how the implementation period of RTAs and members' development characteristics affect the impacts of an RTA on disaggregated trade data that cover several specific goods (i.e., from agricultural products to manufactured products), as proposed by Dahi and Demir (2013), Baier et al. (2018). Future work could also put more emphasis on the detailed schedule of tariff reduction on specific products in each phase of RTA implementation periods.

Chapter 3

Financial Development, Trade Agreements and International Trade[1]

3.1 Introduction

After several decades of trade openness and financial liberalization, the great trade collapse observed subsequent to the 2008 financial crisis appeared as a major opportunity to consider the links between finance and trade (Auboin, 2009, 2011; Auboin and Engemann, 2014).

The key theoretical rationale for the impact of finance on trade is the existence of upfront export costs that firms face when they sell abroad. These costs, which are related to advertising, gathering information on foreign customers, translation, and organizing foreign distribution networks as well as administrative procedures and compliance with the regulatory environment, must be externally financed.[2] For this reason, exports crucially depend on the strength of firms' financial constraint (Manova, 2013; Chaney, 2016) and the level of financial development (Beck, 2002, 2003). The favorable effect of financial development on exports is also shown to be particularly strong in more financially vulnerable sectors (Manova, 2008, 2013), during financial crisis (Berman et al., 2012; Chor and Manova, 2012; Iacovone et al., 2019) and when export fixed costs are high, i.e., when

[1] Joint work with Anne-Gaël Vaubourg (CRIEF, University of Poitiers). This chapter is based on the paper that has been revised and resubmitted for publication in *The World Economy*.

[2] It is noteworthy that, in contrast to Anderson and van Wincoop (2004, p. 691), who provide a broad definition of trade costs ("costs incurred in getting a good to a final user other than the marginal cost of producing that good itself: transportation costs (freight cost and time cost), policy barriers (tariffs and nontariff measures), information costs, contract enforcement costs, costs associated with the use of different currencies, legal and regulatory costs, and local distribution costs"), the literature on trade and finance focuses on the costs incurred by *the exporting firm*.

the exporting country is weakly opened to trade (Manova, 2008).

However, the literature on trade and finance does not consider an element of trade policies that crucially determines the level of export costs, i.e., the signature of regional trade agreements. Since the early 1990s, the number of RTAs concluded among countries has steadily increased. These agreements have increasingly gone beyond regional boundaries over time and turned into more and more cross-regional ones.

RTAs help to substantially reduce traditional tariff and nontariff measures (for example, quotas) among member countries. RTAs also reduce "cross-border", such as customs procedures and paperwork, and "behind-the-border" barriers, such as technical standards, sanitary and phytosanitary conditions, environment regulation or employment law (Pomfret and Sourdin, 2009; Chauffour and Maur, 2010). Because these barriers represent significant costs for exporting firms, RTAs contribute to mitigating firms' need for external funds to finance export costs. This argument suggests that the positive impact of financial development on exports should be lower when the exporting and the importing countries are involved in an RTA. The first contribution of this chapter is to check for the existence of such an interaction between trade agreements and financial development.

Second, in contrast with Manova (2008, 2013), who does not distinguish between different types of financing sources, we check whether the impact of financial development is stronger when measured through intermediated finance ratios, compared to stock market indicators. In doing so, we are in line with the literature on trade finance, which emphasizes the key role of banks and other financial institutions (for example, insurance companies) in the provision of trade finance tools (Egger and Url, 2006; Moser, Nestmann, and Wedow, 2008; Amiti and Weinstein, 2011; Felbermayr and Yalcin, 2013; Schmidt-Eisenlohr, 2013; Auboin and Engemann, 2014; van der Veer, 2015; Niepmann and Schmidt-Eisenlohr, 2017).

In line with Rajan and Zingales (1998), Manova (2008) and Manova et al. (2015), the third contribution of this chapter is to show that the intensity of interactions between RTAs and financial development also has a sectoral dimension. Our results indicate that the existence of an RTA between two trading partners mitigates the export-promoting effect of financial development in the exporting country but to a weaker extent for the most financially constrained sectors.

Finally, our chapter also indicates that RTAs interact with financial development not only in the exporting country but also in the importing one. Indeed, it is noteworthy that our measure of trade openness, i.e., the existence of an RTA between two countries, is a country-pair-specific variable that captures the *bilateral* dimension of trade liberalization.

Hence, following the idea that the cost of external finance in the importing country also matters for trade (Schmidt-Eisenlohr, 2013; Niepmann and Schmidt-Eisenlohr, 2017), we show that RTAs mitigate the favorable effect of financial development not only in the source but also *in the destination country*.

To conduct our empirical investigation, we estimate a gravity model on a dataset of 69 developed and developing countries over the period 1986–2006. To our knowledge, this study is one of the first to identify the impacts of the interaction term between a financial development indicator (a time-varying country-specific variable) with regional trade agreements (a bilateral determinant of trade) on international trade within a panel data gravity model with structural fixed effects. Because country-time fixed effects control for all time-varying country-specific factors, they do not allow one to identify the impact of financial development indicators, which are perfectly collinear with fixed effects. To address this identification issue, we use the approach proposed by Heid et al. (2017) and Beverelli et al. (2018), which introduces intranational manufacturing trade flows in gravity estimations and yields proper estimates for country-specific determinants of trade.

The remainder of this chapter is organized as follows. Section 3.2 presents the literature and the hypotheses of our study. Our econometric investigation is presented in Section 3.3. Section 3.4 presents our results, and Section 3.5 addresses extensions. Section 3.6 offers some concluding remarks.

3.2 Literature and Hypotheses

Our research lies at the intersection of two strands of literature. We first present the literature on the links between finance and trade. We then address the effect of RTAs on trade flows.

3.2.1 Finance and Trade

First, some studies have shown that financial variables are not neutral with respect to trade. Some papers introduce the notion of finance dependence in the Heckscher-Ohlin-Samuelson international trade model. Using a two-country two-sector approach, they show that differences in financial development give rise to comparative advantages and mutual gains from specialization and trade (Kletzer and Bardhan, 1987; Baldwin, 1989; Beck, 2002). This theoretical result is corroborated at a macro level by Beck (2002, 2003), who shows that proxies for financial development in the exporting country have a significant and positive effect on exports.

Using a firm-level approach, Manova (2013) and Chaney (2016) demonstrate that the intensity of firm financial constraint is also a key driver of export decisions. In line with Melitz's (2003) theoretical model, they find that low-productivity firms, which cannot obtain external funds to cover fixed costs, do not sell abroad, while high-productivity firms, which face no financial constraints, will export. The adverse impact of financial constraint on export involvement is corroborated by a bulk of firm-level empirical papers that rely on financial and accounting ratios to proxy for the degree of firms' financial vulnerability (Greenaway, Guariglia, and Kneller, 2007; Bellone et al., 2010; Berman and Héricourt, 2010; Minetti and Zhu, 2011; Caggese and Cuñat, 2013; Engel et al., 2013; Feenstra, Li, and Yu, 2014; Askenazy et al., 2015; Manova et al., 2015; Muûls, 2015; Paravisini et al., 2015). Based on the idea that the level of financial constraint strongly varies across industries (Rajan and Zingales, 1998), Manova (2008, 2013) also establishes that financial liberalization and financial development are particularly favorable to exports in financially vulnerable sectors.

The literature also notes the key role of export costs in the relationship between trade and finance. In Manova (2008), export costs are proxied by the degree of trade openness. In Becker et al. (2013), fixed export costs are successively captured by the degree of standardization of the exported product, the distance between the exporting and importing countries, the existence of a common border and the existence of a common language between two countries. Both papers suggest that the favorable effect of financial development on exports is stronger when export costs are large.

Finally, several papers show that banks and financial intermediaries play a crucial role in financing trade compared to financial markets. Indeed, exporting firms massively resort to letters of credit, which involves a third party (i.e., a bank or an insurance company) between the importer and exporter. As described by Amiti and Weinstein (2011), the importer's bank issues a letter of credit, which guarantees the payment for the import. Using the letter of credit as collateral, the exporter then obtains a credit from its bank to cover the production costs of the goods that will be exported. Once the good transferred to the importer, the exporter is paid through the importer's bank. Moreover, an export credit guarantee, provided by public export credit agencies or private insurers, is another type of intermediated trade finance device that reduces the risk for trading partners and promotes exports (Egger and Url, 2006; Moser et al., 2008; Felbermayr and Yalcin, 2013; Auboin and Engemann, 2014; van der Veer, 2015).

3.2.2 RTAs and Trade

For more than a half century, economists have sought to examine the economic reasons that help to explain why countries have decided to enter RTAs. A vital question following the formation of an RTA is whether it enhances participating countries' welfare. As first stated in the traditional Vinerian analysis (Viner, 1950), trade agreements can either trigger the replacement of inefficient domestic production by imports from more efficient firms from member countries (trade creation) or more efficient imports from nonmember countries being substituted for higher-cost imports from member countries (trade diversion). Many empirical studies in the literature then focus on the impacts of RTAs on members' trade. Comparing their results is challenging, as they use different methodologies (i.e., cross-section data or panel data), datasets, control variables, and country coverage.

However, most studies provide evidence for intrabloc trade creation following the formation of RTAs by means of both generalist and specialist approaches. Generalizing trade agreements from aggregation of a great number of RTAs, Baier and Bergstrand (2007) found that, on average, a free trade agreement (FTA) could double bilateral trade between two member countries after ten years. The long-run trade-promoting effect of RTAs on members' trade is also found in Magee (2008), as trade flows continue to grow over 11 years after RTAs take effect, on average. In addition, Kohl (2014) shows that RTAs could increase trade by 50% overall.

Referring to the specialist analyses that address the impacts of individual trade agreements, Cernat (2003) examines several RTAs formed exclusively by developing countries around the world and provides evidence of a significant increase in intrabloc trade between member countries following their RTAs' formation, i.e., the Common Market for Eastern and Southern Africa (COMESA), the Economic Community of West African States (ECOWAS), the Association of Southeast Asian Nations (ASEAN) Free Trade Area and the Southern Common Market (MERCOSUR).

Lee and Park (2005) establish that the trade creation effect from East Asian RTAs is significant enough to overwhelm the trade diversion effect. Frankel (1997), Cheng and Wall (2005) and Bussière et al. (2005) also find that the North American Free Trade Agreement (NAFTA) has a positive and significant impact on their intrabloc trade. Regarding the European Union (EU) and the European Free Trade Association (EFTA), most studies reach the conclusion that these RTAs had a positive impact on trade flows between participating countries (see Aitken, 1973; Brada and Méndez, 1985; Frankel, 1997; Baier et al., 2008). Carrère (2006) also shows a significant rise in trade flows among members of numerous RTAs including the EU, NAFTA, and MERCOSUR, which is detrimental to

nonmember countries.

Taken together, the theoretical and empirical works presented above suggest that 1) the trade-promoting effect of financial development is stronger when export costs are large, 2) intermediated finance is particularly effective in boosting trade compared to market-based finance, and 3) export costs are reduced and trade flows are increased when the importing and the exporting countries are involved in an RTA. This allows us to state the following hypothesis:

H1: The export-promoting role of financial development in the exporting country should be mitigated by the existence of an RTA between trading partners. This effect should be particularly strong when financial development is measured through intermediated finance.

3.3 Econometric Investigation

In this section, we present our empirical investigation. We start with a short review of the theoretical foundations of the structural gravity model. We then present our methodology to identify and estimate the impacts of financial development and regional trade agreements on international trade. Finally, we describe our data and present its sources.

3.3.1 Theoretical Foundations of the Structural Gravity Model

Tinbergen (1962) introduced the basic gravity model in the form of Newton's law of gravity. Despite a lack of solid underpinnings in economic theory, its analysis has become the workhorse framework for both partial and general equilibrium studies to examine the impact of various determinants of bilateral trade flows. We established the following comprehensive structural form of gravity model, inspired by the prominent work of Anderson and van Wincoop (2003):[3]

$$X_{ijt} = \frac{Y_{it}E_{jt}}{Y_{wt}}\left(\frac{C_{ijt}}{P_{it}P_{jt}}\right)^{1-\sigma} \tag{3.1}$$

In equation (3.1), X_{ijt} denotes the value of exports from exporting country i to importing country j at date t. Y_{it} is the total value of production in exporter i at t, E_{jt} the value of total expenditure in importer j at t and Y_{wt} is the value of world output at t. C_{ijt}

[3]The gravity system of trade in Anderson and van Wincoop (2003) was derived in a cross-section framework. Here, we include a time dimension t in equation (3.1) in order to adapt to the panel data method.

represents the bilateral trade cost or any trade barriers between exporting country i and its importing partner j at t, i.e., bilateral geographic distance, regional trade agreements and other determinants of international trade. σ denotes the elasticity of substitution between all goods from different exporting and importing countries.[4] Finally, P_{it} and P_{jt} represent structural outward and inward multilateral resistance terms as originated by Anderson and van Wincoop (2003), respectively. These multilateral resistance terms are generated as follows:

$$\begin{cases} P_{it}^{1-\sigma} = \sum_{j} \left(\dfrac{C_{ijt}}{P_{jt}} \right)^{1-\sigma} \dfrac{E_{jt}}{Y_{wt}}, \\ \\ P_{jt}^{1-\sigma} = \sum_{i} \left(\dfrac{C_{ijt}}{P_{it}} \right)^{1-\sigma} \dfrac{Y_{it}}{Y_{wt}}. \end{cases} \tag{3.2}$$

The multilateral resistance terms of Anderson and van Wincoop described in equation (3.2) highlight the importance of the remoteness of a country on its trade flows with other partners. On the one hand, bilateral trade flows between an exporting and an importing country depend on their respective economic size and on bilateral trade frictions between them. On the other hand, their bilateral trade also relies on how distant or remote they are from the rest of the world.

Anderson and van Wincoop (2003) found that in more multilaterally isolated countries, producers and consumers tend to sell and/or buy goods more with each other, all else being equal. By construction, the structural outward and inward multilateral resistance terms note the fact that any changes in trade barriers between a pair of exporting and importing countries would have an impact on all other countries in the world. Thus, the estimates of the impacts of the determinants of trade flows can be severely biased due to the omission of these multilateral resistances.[5]

To take account of these multilateral resistance terms with cross-section data, the standard procedure suggested by Feenstra (2004) is to include specific fixed effects for exporting and importing countries in an econometric estimation based on a cross-sectional gravity equation. However, as highlighted by Baldwin and Taglioni (2006), in a setting with panel data, inward and outward multilateral resistances, P_{jt} and P_{it}, respectively, are expected to vary over time. Hence, an appropriate specification of the gravity equation with panel

[4] The elasticity of substitution between all goods σ should be greater than 1.

[5] See Costinot and Rodríguez-Clare (2014), Head and Mayer (2014) and Yotov et al. (2016) for an insightful survey of the structural gravity model and for a more detailed discussion about the multilateral resistance terms' properties.

data needs to take into account country-time fixed effects as in Baier and Bergstrand (2007), Olivero and Yotov (2012) and Anderson and Yotov (2016).

3.3.2 Identification and Econometric Methodology

We start our identification strategy by employing the following standard gravity model in a panel framework:

$$\ln X_{ijt} = \beta_0 CONTROL_{ij} + \beta_1 RTA_{ijt} + \beta_2 FD_{it-1} + \beta_3 (FD_{it-1} \times RTA_{ijt}) + \pi_{it} + \mu_{jt} + \gamma_{ij} + \epsilon_{ijt} \tag{3.3}$$

Equation (3.3) is achieved by log-linearizing equation (3.1) and adding our variables of interest: RTA_{ijt}, which denotes the existence of a regional trade agreement between a pair of countries, FD_{it-1}, which is the financial development indicator of the exporting country, and the interaction term between these two variables. Note that because international trade also drives financial development (Svaleryd and Vlachos, 2002; Herger, Hodler, and Lobsiger, 2008; Baltagi, Demetriades, and Law, 2009), we account for the potential endogeneity of financial development by introducing the lagged value of this variable. As we will see below, FD_{it-1} focuses on two aspects of financial development: intermediated finance and market-based finance. $CONTROL_{ij}$ is a vector of trade friction factors that replace the bilateral trade costs variables in equation (3.1). This set of variables captures multiple determinants of bilateral trade flows such as bilateral distance, common cultural, common historical relationships, and colonial ties.

We also insert exporter-time fixed effects (π_{it}), which account for the outward multilateral resistances in the exporting country i at date t, a set of importer-time fixed effects (μ_{jt}), which controls for the inward multilateral resistances in the importing country j at t, and a set of country-pair fixed effects (γ_{ijt}). Finally, the gravity equation (3.3) expands equation (3.1) with an error term (ϵ_{ijt}).

As highlighted by Baldwin and Taglioni (2006), the motivation for the introduction of country-pair fixed effects in a panel gravity estimation is twofold. First, a full set of country-pair fixed effects effectively accounts for the issue of potential endogeneity of any time-varying bilateral trade policy determinants, such as regional trade agreements.[6] Indeed, this type of fixed effect can absorb any time-invariant bilateral factors that are unobservable and may be correlated with the trade policy variables (Baier and Bergstrand,

[6] A regional trade agreement may be concluded between two countries that would achieve possibly higher trade volumes in the aftermath of their RTA taking effect. Consequently, there is a potential reverse causality between RTAs and bilateral trade flows between a pair of countries (Baier and Bergstrand, 2007).

2007). Thus, country-pair fixed effects alleviate potential endogeneity in the gravity equation. Second, this set of fixed effects also controls more rigorously for bilateral trade costs after controlling for both observable and unobservable time-invariant bilateral drivers of trade flows (Yotov et al., 2016). As Ghosh and Yamarik (2004) note, the results from gravity equations are quite sensitive to the determinants introduced in the model and to the beliefs of a study's author. By using the country-pair fixed effects, one no longer needs to decide which bilateral determinants to include as controls in the gravity equation.

However, the estimates of the impact of time-invariant bilateral variables such as distance or international borders cannot be achieved because they are completely absorbed by the set of country-pair fixed effects. Hence, when the country-pair fixed effect γ_{ij} is introduced in the model, we will not assess the impacts of bilateral control variables $CONTROL_{ij}$ and vice versa.

To secure proper econometric estimates of our variables of interest, we must also address two other challenges that are commonly present in international trade data: zero trade flows and heteroskedasticity. We resort to the PPML estimator proposed by Santos Silva and Tenreyro (2006). These authors note that the PPML estimator leads to more robust and consistent coefficient estimates than the standard log-linear ordinary least squares (OLS) method in the presence of heteroskedasticity.

Moreover, as constructed with a multiplicative form,[7] the PPML estimator allows us to capture useful insights contained in the zero trade flows. In particular, according to Santos Silva and Tenreyro (2006), the performance of the PPML estimator is consistent regardless of whether the ratio of zero trade flows is low or high in the dataset. A series of recent empirical studies on gravity model and international trade have employed the PPML estimator as the main econometric method and praised the estimator as one of the new workhorses to analyze international trade (Fally, 2015; Anderson and Yotov, 2016; Beverelli et al., 2018).

To summarize, in line with Piermartini and Yotov (2016) and Anderson and Yotov (2016), our analysis seeks to overcome some prominent issues in the gravity model with the help of the abovementioned econometric techniques. Unobserved multilateral resistance terms are taken into account by the exporter-year and importer-year fixed effects; the possible endogeneity of regional trade agreements is addressed by country-pair fixed effects; finally, zero trade flows and the issue of heteroskedasticity are handled by the use of the PPML

[7] The dependent variable is measured in levels, instead of log-linearizing the gravity model after the standard practice.

technique. We thus use the PPML estimator to estimate the following gravity equation:

$$X_{ijt} = \exp\left[\beta_0 CONTROL_{ij} + \beta_1 RTA_{ijt} + \beta_2 FD_{it-1} + \beta_3 (FD_{it-1} \times RTA_{ijt})\right] \times \exp\left[\pi_{it} + \mu_{jt} + \gamma_{ij}\right] \times \epsilon_{ijt} \tag{3.4}$$

Instead of employing the standard approach of log-linearizing the gravity equation as described in equation (3.3), the PPML technique estimates equation (3.4), which is in the multiplicative form. All variables and series of fixed effects remain the same from equation (3.3) to equation (3.4). The term ϵ_{ijt} has turned into an exogenous Poisson error term since our complete and powerful set of fixed effects takes into account all observable and unobservable time-invariant bilateral trade costs determinants, as well as any time-varying country-specific factors in the exporting country and the importing country (Anderson and Yotov, 2016).

Nevertheless, our set of fixed effects is characterized by a certain degree of inconvenience. Because the financial development indicator FD_{it-1} is a time-variant country-specific characteristic, it is perfectly collinear with country-time fixed effects. To address this issue regarding our identification strategy, different practices have been employed in the empirical literature. For example, Dutt and Traca (2010) and de Jong and Bogmans (2011) estimate the impact of national corruption (a country-time determinant) on bilateral trade flows. However, because they neglect to properly account for the multilateral resistance terms, their specification potentially results in biased estimates.

An alternative method consists of complying with the structure of the gravity model by using country-time dummies as proxies for the multilateral resistances and indirectly assessing the effects of national institutions on trade flows by employing bilateral (rather than national) institution determinants (Anderson and Marcouiller, 2002; Yu, Beugelsdijk, and de Haan, 2015). However, this approach does not allow for a direct assessment of the effects of an exporter's and importer's national institutions on bilateral trade flows.

To address the downside of the two abovementioned methods, Heid et al. (2017) and Beverelli et al. (2018) suggest identifying the impact of time-varying country-specific variables by including intranational manufacturing trade flows in the gravity model with both exporter-time and importer-time fixed effects. Using this approach, Heid et al. (2017) assess the effect of nondiscriminatory unilateral trade policies on trading partners. Beverelli et al. (2018) carry out a similar method and find strong evidence of positive impacts of an exporter's and importer's institutional quality on international trade.

We follow the proposition of Heid et al. (2017) and Beverelli et al. (2018) to make use of

both international trade and intranational trade flows within a structural gravity framework. Thus, besides observations on international trade, we add observations that represent domestic trade in our dataset. We construct a dummy variable $INTL_{ij}$, which equals 1 for international trade between country i and country j and takes a value of 0 for intranational trade, i.e., for domestic sales in country i. This dummy variable for international trade $INTL_{ij}$ is a time-invariant bilateral variable.

Next, we adjust our financial development variable by multiplying it by the international trade dummy. We thus obtain the variable $(FD_{it-1} \times INTL_{ij})$. As a result, our new financial development indicator $(FD_{it-1} \times INTL_{ij})$ is no longer collinear with any fixed effects.[8] In addition, this variable identifies the impacts of financial development on international trade flows compared to domestic trade. We finally include this variable in our structural gravity equation to test for the assumption H1 as previously mentioned in Section 3.2:[9]

$$\begin{aligned} X_{ijt} = \ & \exp\left[\beta_0 CONTROL_{ij} + \beta_1 RTA_{ijt} + \beta_2 (FD_{it-1} \times INTL_{ij})\right] \times \\ & \exp\left[\beta_3 (FD_{it-1} \times INTL_{ij}) \times RTA_{ijt} + \pi_{it} + \mu_{jt} + \gamma_{ij}\right] \times \epsilon_{ijt} \end{aligned} \tag{3.5}$$

According to the existing literature on RTAs, the estimated coefficient β_1 should also be positive (Frankel, 1997; Carrère, 2006; Baier and Bergstrand, 2007). Moreover, in accordance with the literature on finance and trade, the expected sign of β_2 is also positive (Kletzer and Bardhan, 1987; Baldwin, 1989; Beck, 2002, 2003). Finally, in line with H1, the trade-promoting role of financial development (especially intermediated finance) in a country should be exacerbated when this country is not involved in an RTA. Hence, the existence of an RTA between exporter i and importer j should reduce the favorable impact of financial development in the exporting country i on its exports to country j. Thus, the expected sign of β_3 is negative. Moreover, the absolute value of the coefficient should be stronger when financial development is measured through an intermediated finance variable than by a financial market indicator.

After estimating equation (3.5), we investigate the effects of financial development variable for different levels of the RTA indicator by determining the marginal effects of $(FD_{it-1} \times$

[8] See Heid et al. (2017) and Beverelli et al. (2018) for a detailed discussion on this approach and the challenges of collinearity that it confronted.

[9] As argued by Beverelli et al. (2018), this international trade dummy is not correlated with the country-specific variables as well as the potentially unobservable variables. By construction, $INTL_{ij}$ is exogenous as it takes the value of one for all international trade flows and zero otherwise, regardless of any selection of countries; thus, it should not fluctuate with any country-specific variables. Furthermore, the use of country-pair fixed effects allows one to mitigate the issue of omitted or unobservable variables mentioned above.

$INTL_{ij}$). The overall impact of the financial development on exports equals the marginal effect conditional on specific values of the RTA indicator. From gravity model (3.5), we have:

$$\begin{aligned}\frac{\partial X_{ijt}}{(\partial FD_{it-1} \times INTL_{ij})} = \beta_2 \exp\left[\beta_2(FD_{it-1} \times INTL_{ij})\right] \\ + \beta_3 \widetilde{RTA_{ijt}} \exp\left[\beta_3(FD_{it-1} \times INTL_{ij})\widetilde{RTA_{ijt}}\right]\end{aligned} \tag{3.6}$$

where $\widetilde{RTA_{ijt}}$ corresponds to two specific levels of RTA_{ijt}: 0 and 1. The latter indicates the existence of a regional trade agreement between a country pair.

3.3.3 Data Description

To carry out our analysis, we use four main types of data: data on trade flows in terms of both international and intranational trade, data on financial development, data on RTAs and data on conventional gravity variables. As mentioned, an important characteristic of our dataset is that it takes into account not only bilateral trade flows but also intranational trade flows, i.e., domestic sales in each country. Based on the availability of the abovementioned types of data, we were able to compile data for 69 developed and developing countries over the period 1986–2006 (Appendix C.1 lists the countries in our dataset). Due to a lack of publicly available data on recent intranational trade flows, our chapter only covers the period until the year 2006. We now specify the construction of our data as well as our variables and discuss our data sources as follows.

Data on international and intranational trade. To construct a dataset combining values for international trade flows and intranational trade flows, we primarily use the CEPII's Trade, Production and Bilateral Protection (TradeProd) database.[10] The principal source for bilateral trade flows in the CEPII TradeProd database is the United Nations' Commodity Trade Statistics Database (COMTRADE).[11] Moreover, production values in TradeProd are largely collected from the United Nations' UNIDO Industrial Statistics (IndStat) database and further complemented by using the World Bank Trade, Production and Protection dataset compiled by Nicita and Olarreaga (2007).[12] Following Baier, Yotov, and Zylkin (2016), we measure intranational trade flows observations by calculating the dif-

[10]The CEPII TradeProd data are described in the International Standard Industrial Classification (ISIC) Revision 2 and cover manufacturing trade in terms of 26 industrial sectors for the period 1980–2006. The database can be accessed at http://www.cepii.fr/CEPII/en/bdd_modele/presentation.asp?id=5.

[11]The UN COMTRADE database can be found at https://comtrade.un.org/.

[12]The World Bank Trade, Production and Protection database can be found at https://datacatalog.worldbank.org/dataset/trade-production-and-protection-database.

ference between a country's total manufacturing production and its total manufacturing exports to other partner countries. The data from Baier et al. (2016) were searched and cross-checked to fill gaps in terms of missing international and intranational trade values during our period of study.[13]

Data on regional trade agreements. RTA_{ijt} is defined as a dummy that takes a value of one if there exists an RTA between exporting country i and importing country j from year t, and zero otherwise. Our main data on RTAs are composed from the collection of regional trade agreements used in Baier and Bergstrand (2007). Then, we improve this dataset by cross-checking it against the World Trade Organization (WTO) Regional Trade Agreements Information System (RTA-IS) database as well as the NSF-Kellogg Database on Economic Integration Agreements.[14] Appendix C.2 provides a complete summary of the RTAs included in our study. Overall, our data on RTAs cover 65 different trade agreements with a total of 942 distinct country pairs that participate in RTAs, including 9 plurilateral trading blocs, 32 bilateral FTAs, and 25 agreements concluded between plurilateral blocs and outside partners.

Data on financial development. We focus on indicators for financial development of countries around the world, which are taken from the Beck, Demirgüç-Kunt, and Levine (2000) dataset built from the International Monetary Fund (IMF) statistics and now available on the World Bank's Global Financial Development database.[15] FD_{it-1} actually denotes a collection of four financial indicators, which account for the level of financial development in each country of the dataset.

First, $BCREDIT$ measures the financial resources provided to the private sector by deposit money banks (i.e., financial institutions that have liabilities under the shape of transferable deposits) as a share of GDP. Second, $BFICREDIT$ relates to a broader definition of intermediated finance. It is measured as the amount of financial resources provided to the private sector not only by deposit money banks but also by other financial institutions (i.e., bank-like institutions that accept deposits without providing transferable deposit facilities such as savings banks, cooperative banks, mortgage banks, building societies and finance companies) and non-bank financial institutions (i.e., intermediaries

[13]These data were kindly provided to us by Thomas Zylkin and can be accessed at https://vi.unctad.org/tpa/web/vol2/vol2home.html.

[14]The WTO RTA-IS database can be found at http://rtais.wto.org/UI/PublicMaintainRTAHome.aspx. For more detailed information on the NSF-Kellogg Database on Economic Integration Agreements, we refer readers to https://kellogg.nd.edu/nsf-kellogg-institute-data-base-economic-integration-agreements.

[15]The World Bank's Global Financial Development database can be accessed at https://databank.worldbank.org/data/source/global-financial-development.

that raise funds on financial markets, such as insurance companies, pension funds, real estate investment schemes, mutual funds and development banks) over GDP. $BCREDIT$ and $BFICREDIT$ control for the role of financial intermediaries in trade finance.

Third, $VALUE$ is the total value of all traded shares in the stock market exchange in an economy as a percentage of GDP. Finally, $CAPI$ denotes the ratio of the total value of all listed shares in the stock market of a country over GDP. $VALUE$ and $CAPI$ measure the importance of market-based finance in each country. As suggested by H1, we aim to show that their role in the financing of international trade is weaker than that of intermediated finance indicators.

Our dataset mainly covers the period from 1986 to 2006 since trade data are available during this period. However, financial development indicators, such as $VALUE$ and $CAPI$ are only available from 1989. Hence, our regressions including these financial development indicators will only cover the period 1989–2006.[16]

By construction, these financial development indicators are highly correlated with each other.[17] In particular, a serious correlation is observed between $BCREDIT$ and $BFICREDIT$, since they both measure the role of financial intermediaries in trade finance. Similarly, two market-based finance factors, $VALUE$ and $CAPI$, are also correlated between them. Therefore, we avoid combining all financial development variables in a unique estimation. We choose to separately run the estimation with each variable for financial development to deliver consistent and unbiased estimates.

Data on standard gravity variables. We include a very complete set of fixed effects included in our structural gravity model to account for various observable and unobservable drivers of bilateral trade flows. However, we resort to the conventional proxies for bilateral trade frictions that are traditionally employed in the gravity literature. In fact, we make use of data on bilateral distance, contiguity (whether or not two partner countries share a common border), common language, common religion, common legal origin (whether or not a country pair speaks the same official language, share a common religion, has the same origin of legal system), and colonial ties (whether trading partners share any colonial relationships in their history). We collect all of these gravity control variables from the CEPII GeoDist database.[18] Appendix C.4 provides summary statistics for the dependent and explanatory variables.

[16] While there are no missing values for trade data in the entire period of study, there are nevertheless some missing values for financial development indicators.

[17] Appendix C.3 details the level of correlation among these variables.

[18] The GeoDist database can be found at http://www.cepii.fr/CEPII/en/bdd_modele/presentation.asp?id=6.

3.4 Results

In this section, we present the baseline estimation results when testing for H1, which states that the export-promoting role of financial development (especially intermediated finance) is mitigated when the exporting and the importing countries participate in an RTA.

The results of the regression of equation (3.5) are reported in Table 3.1. Columns [1]–[4] present estimation results with standard gravity variables. It is noteworthy that in order to deliver estimates of gravity variables, we must drop the set of country-pair fixed effects described in the gravity equation (3.5). Columns [5]–[8] report the results obtained when including country-pair fixed effects and no gravity variables. As noted in the previous section, each specification in Table 3.1 only includes one financial development variable ($BCREDIT$, $BFICREDIT$, $VALUE$ and $CAPI$, successively).

Variants [1]–[4] in Table 3.1 indicate that standard gravity regressors' coefficients have the expected sign. In line with the literature, the coefficients for bilateral distance and international frontier are negative, indicating that they are both significant obstacles to international trade. By contrast, sharing a common official language, common religion and having a contiguous border foster bilateral trade flows. The impacts of common legal origin and colonial relationships on international trade are small and not statistically significant throughout all variants.

In addition, we observe that, as expected, the coefficient for RTA is highly significant and positive. The estimated coefficient for financial development in the exporting country is positive, statistically significant and high in magnitude, as compared with the estimates of other gravity variables. This result indicates that a larger level of financial development in the exporting country increases international trade flows. Comparing the results obtained in variants [1]–[2] to those obtained in variants [3]–[4], one observes that the impact of financial markets is smaller than that of financial intermediation. Turning to our interaction term of interest, in line with H1, the coefficient for $[(FD_{it-1} \times INTL_{ij}) \times RTA_{ijt}]$ is negative and statistically significant across variants [1]–[4]. However, as mentioned in Section 3.3, considering only exporter-time and importer-time fixed effects delivers estimates that are less sound, since they are unable to capture unobservable variables and potential endogeneity of RTAs.

We then turn to the estimation results in columns [5]–[8] in Table 3.1, which are obtained with country-pair fixed effects in addition to country-time fixed effects. Four main findings stand out from these specifications. First, the coefficient for RTA throughout variants

Table 3.1 – PPML baseline estimation results

	Panel A: Gravity regressors				Panel B: Country-pair fixed effects			
	Intermediated finance		Market-based finance		Intermediated finance		Market-based finance	
Specifications	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]
FD_{it-1} =	BCREDIT	BFICREDIT	VALUE	CAPI	BCREDIT	BFICREDIT	VALUE	CAPI
RTA_{ijt}	1.301***	1.463***	0.775***	0.782***	0.665***	0.796***	0.303***	0.345***
	(0.17)	(0.12)	(0.10)	(0.11)	(0.10)	(0.08)	(0.07)	(0.08)
$FD_{it-1} \times INTL_{ij}$	1.249***	1.722***	0.901***	1.008***	0.839***	1.160***	0.299***	0.433***
	(0.13)	(0.07)	(0.08)	(0.10)	(0.14)	(0.09)	(0.03)	(0.08)
$(FD_{it-1} \times INTL_{ij}) \times RTA_{ijt}$	–0.920***	–0.673***	–0.338***	–0.419***	–0.268**	–0.450***	–0.010	–0.070
	(0.23)	(0.13)	(0.10)	(0.10)	(0.13)	(0.07)	(0.03)	(0.07)
$DISTANCE_{ij}$	–0.535***	–0.443***	–0.492***	–0.575***				
	(0.05)	(0.05)	(0.06)	(0.05)				
$CONTIGUITY_{ij}$	0.544***	0.658***	0.593***	0.588***				
	(0.12)	(0.12)	(0.11)	(0.11)				
$LANGUAGE_{ij}$	0.346***	0.170*	0.181*	0.065				
	(0.10)	(0.09)	(0.09)	(0.09)				
$COLONY_{ij}$	0.097	0.098	0.024	0.024				
	(0.11)	(0.09)	(0.09)	(0.10)				
$RELIGION_{ij}$	1.029***	0.773***	1.147***	1.091***				
	(0.14)	(0.14)	(0.14)	(0.14)				
$LEGAL_{ij}$	–0.034	0.048	0.019	0.020				
	(0.07)	(0.07)	(0.07)	(0.07)				
$INTL_{ij}$	–4.315***	–5.279***	–3.748***	–3.743***				
	(0.17)	(0.17)	(0.18)	(0.18)				
Observations	91,908	92,253	68,793	67,413	91,660	92,005	68,690	67,296
Exporter-time FEs	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Importer-time FEs	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Exporter-importer FEs	No	No	No	No	Yes	Yes	Yes	Yes

Notes: All specifications are performed in a panel data framework including exporter-time and importer-time fixed effects. All estimates are obtained by employing the PPML estimation. The dependent variable is the international trade or domestic trade flows in levels. Each estimate only takes into account one type of exporter's financial development indicator. Estimates of the constant term, as well as estimates of all fixed effects dummies, are omitted for brevity. Columns [1]–[4] report estimates with standard gravity regressors. Columns [5]–[8] report results obtained by including country-pair fixed effects. Standard errors are reported in parentheses and clustered by country-pair level. *, **, *** denote significance at the 10%, 5% and 1% level, respectively.

[5]–[8] is positive and significant, which is consistent with the previous results in variants [1]–[4]. Hence, being involved in an RTA increases trade flows between two countries (Carrère, 2006; Baier and Bergstrand, 2007; Kohl, 2014).

Second, the results reported in Table 3.1 also indicate that the coefficient for FD_{it-1} is significant and positive. This result is consistent with the view that financial conditions in the exporting country favors export performance (Kletzer and Bardhan, 1987; Baldwin, 1989; Beck, 2002, 2003). Moreover, the value of the estimated coefficient is larger when specifications include an intermediated finance indicator ([5]–[6]) compared to those that include a market-based financial development indicator ([7]–[8]). This finding is in line with the literature, which emphasizes the key role of financial intermediaries in the financing of international trade (Egger and Url, 2006; Moser et al., 2008; Felbermayr and Yalcin, 2013; Auboin and Engemann, 2014; van der Veer, 2015).

We also note that the coefficient for FD_{it-1} is larger when considering a broad definition of intermediated finance ($BCREDIT$), compared to a narrow one ($BFICREDIT$). Indeed, trade finance (letters of credit, export credit guarantee, etc.) is provided not only by money banks but also by other financial intermediaries, which include other bank-like institutions and insurance companies (Egger and Url, 2006; Amiti and Weinstein, 2011; van der Veer, 2015).

Third, in line with H1, we observe that the coefficient for the interaction term is statistically significant and negative in variants [5]–[6] but not in variants [7]–[8]. This observation reinforces the results obtained in Panel A, Table 3.1 with gravity regressors. The finding is in line with the view that the export-promoting role of financial development in a country, especially intermediated finance, is amplified when upfront export costs are high, i.e., when the exporting and the importing countries are not involved in an RTA.

Finally, it is noteworthy that the estimated coefficients on our variables of interest in Panel B, Table 3.1 are significantly smaller relative to the corresponding estimates that are achieved with the standard gravity regressors across columns [1]–[4]. A plausible interpretation of the smaller magnitude of coefficients is that we better capture the issues of unobservable determinants of trade and reverse causality by using the set of country-pair fixed effects. Since these fixed effects are added in our estimations, the impact of exporter's financial development is mostly determined from the variation in this variable over the time span. As a result, we find that the estimations in Panel B with a complete structure of fixed effects lead to more proper impacts of our variables of interest and should be favored over the specifications in Panel A with only country-time fixed effects.

Let us finally turn to the marginal effects of the financial development indicator according

Table 3.2 – Marginal effects of financial development variables

	Intermediated finance		Market-based finance	
Specifications	[1]	[2]	[3]	[4]
FD_{it-1}=	BCREDIT	BFICREDIT	VALUE	CAPI
$RTA_{ijt}(=0)$	1.941***	3.703***	0.404***	0.668***
	(0.58)	(0.65)	(0.05)	(0.17)
$RTA_{ijt}(=1)$	1.736***	3.416***	0.394***	0.603***
	(0.54)	(0.63)	(0.04)	(0.13)

Notes: All specifications are performed in a panel data framework with PPML estimation including exporter-time and importer-time fixed effects and country-pair fixed effects. The dependent variable is the international trade or domestic trade flows in levels. Standard errors are reported in parentheses and clustered by country-pair level. *, **, *** denote significance at the 10%, 5% and 1% level, respectively.

to the levels of RTA. The results obtained when estimating equation (3.6) are presented in Table 3.2. Specifications [1]–[4] in Table 3.2 reproduce the exact estimates from variants [5]–[8] in Table 3.1. Then, each variant provides marginal coefficients for each corresponding financial development indicator relative to two specific levels of the interacted RTA variable (0 and 1). All marginal coefficients are estimated using STATA.

In all variants of Table 3.2, marginal coefficients are strongly significant. First, these results indicate that financial development has a smaller impact on international trade when the level of RTA is at its maximum level, i.e., when it equals 1. Second, the variation of this impact (i.e., the difference between the estimated coefficient when RTA equals 0 and the coefficient when RTA equals 1) appears much more important when one considers intermediated finance indicators ($BCREDIT$ and $BFICREDIT$, in variants [1]–[2]) than when one uses market-based indicators ($VALUE$ and $CAPI$, in variants [3]–[4]). This result is in line with the idea that finance affects trade flows more strongly through intermediated finance than through financial markets.

In conclusion, our findings provide strong support to H1, according to which the export-promoting role of financial development in the exporting country, especially intermediated finance, is mitigated when trading partners have engaged in an RTA.[19]

[19]It is noteworthy that we also disaggregated the regional trade agreement variable to estimate the effect of being involved in *a particular RTA* on exports. For example, we built a variable that equals one if both countries participate in the Association of Southeast Asian Nations Free Trade Area (ASEAN), zero otherwise, and so on for other RTAs. Our results suggest that despite the great heterogeneity of RTAs included in our dataset (in terms of type, size and geographical location), most of them have a positive effect on trade and interact with financial development in the way suggested by H1. This analysis is available in Appendix C.6.

3.5 Extensions

In this section, we consider some extensions to our work. We first investigate the impact of RTAs according to the level of sectors' financial vulnerability. We then consider the level of financial development in the importing country.[20]

3.5.1 The Effect of RTAs According to the Degree of Sectors' Financial Constraint

In this section, we enrich our analysis by focusing on sector-level financial constraint. Indeed, Rajan and Zingales (1998) consider that sector-level technological peculiarities induce differences in financial constraints across industries. As a consequence, an increase in financial development does not affect all sectors in the same way: it improves firms' access to external finance more strongly in financially vulnerable sectors. Hence, financial liberalization is particularly favorable to exports in financially vulnerable sectors (Manova, 2008, 2013). According to this literature, the existence of an RTA between trading partners should mitigate the favorable impact of financial development on exports to a smaller extent in most financially constrained sectors for which access to external funds remains crucial. Hence, in this section, we check for the following hypothesis:

H2: The export-promoting role of financial development in the exporting country (especially intermediated finance) should be mitigated by the existence of an RTA between trading partners, but to a weaker extent in most financially constrained sectors.

The main difficulty in checking for H2 lies in assessing the intensity of sectors' financial constraint. Based on the 3-digit ISIC sector classification, Manova (2008) and Manova et al. (2015) propose two proxies of financial constraint. The first proxy corresponds to sectors' reliance on outside finance, measured as the ratio of capital expenditures minus cash flow from operations to capital expenditures for the median firm in each sector. The second proxy relates to the level of asset tangibility, measured as the share of net property, plant and equipment in total book-value assets for the median firm in a sector. Indeed, because tangible assets are more collateralizable and pledgeable to external funders, firms belonging to sectors with a high degree of asset tangibility are less financially constrained.

Although our dataset includes information about trade flows by the 3-digit ISIC manufacturing industries, it does not provide any data concerning their reliance on outside

[20] While Section 3.4 focuses on the intensive margin of trade, we also tried to check for H1 in the case of the extensive margin. However, the sign of the coefficients for our variables of interest are not robust to specifications.

finance or their ratio of asset tangibility. However, based on the Rajan and Zingales' (1998) idea that the ranking of industries in terms of financial constraint is stable across periods and countries, we can use the classification defined by Manova (2008) and Manova et al. (2015). According to the reliance on external finance criterion, the most financially constrained sectors are professional and scientific equipment (385) and electric machinery (383). According to the asset tangibility criterion, the most financially constrained sectors are leather products (323), apparels (322) and pottery, china and earthenware (361). We thus define a dummy variable, denoted by $MOST_k$, which equals one if the exporting sector k belongs to the most constrained industries (according to the dependence on external finance indicator and the asset intangibility indicator, successively) and zero, elsewhere.

We then estimate the following model:

$$\begin{aligned} X_{kijt} = \exp\Big[\beta_1 RTA_{ijt} + \beta_2(FD_{it-1} \times INTL_{ij}) + \beta_3(FD_{it-1} \times INTL_{ij}) \times RTA_{ijt}\Big] \times \\ \exp\Big[\beta_4(FD_{it-1} \times INTL_{ij}) \times RTA_{ijt} \times MOST_k + \pi_{kit} + \mu_{kjt} + \gamma_{kij}\Big] \times \epsilon_{kijt} \end{aligned} \tag{3.7}$$

where X_{kijt} denotes the trade flows from the exporting country i in industry k to importing country j, π_{kit} is a set of exporter-time-industry fixed effects, μ_{kjt} a set of importer-time-industry fixed effects and γ_{kij} a set of exporter-importer-industry fixed effects.

As explained in the previous section, β_1 and β_2 should be positive and β_3 should be negative. Moreover, in line with H2, the expected sign of β_4 is positive.

The results of estimations of equation (3.7) are reported in Table 3.3. As expected, in all specifications, the coefficients for RTA and $(FD_{it-1} \times INTL_{ij})$ are positive. Similarly, in variants [1], [2], [4], [5], [6] and [8], the coefficient for the interaction term $[(FD_{it-1} \times INTL_{ij}) \times RTA_{ijt}]$ is significant and negative. This finding indicates that the existence of an RTA between exporting and importing countries mitigates the favorable effect of financial development on trade flows. The results in Table 3.3 also indicate that the magnitude of this impact is larger when one considers intermediated finance (variants [1]–[2] and [5]–[6]) rather than market-based indicators (variants [3]–[4] and [7]–[8]). These findings are in line with those obtained in the previous section.

Turning to the coefficient for the interaction term $[(FD_{it-1} \times INTL_{ij}) \times RTA_{ijt} \times MOST_k]$, it is significant and positive only in specifications [5] and [6], i.e., only when $MOST_k$ is defined using the asset tangibility indicator and when financial development is measured through intermediated finance. In contrast with Manova (2008) and Manova et al. (2015), we find that the external finance dependence does not affect the relationship between

Table 3.3 – PPML estimation results according to the degree of sectors' financial constraint

Criteria for $MOST_k$	External dependance				Asset tangibility			
	Intermediated finance		Market-based finance		Intermediated finance		Market-based finance	
Specifications	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]
FD_{it-1} =	BCREDIT	BFICREDIT	VALUE	CAPI	BCREDIT	BFICREDIT	VALUE	CAPI
RTA_{ijt}	0.604***	0.689***	0.268***	0.345***	0.603***	0.688***	0.269***	0.346***
	(0.10)	(0.08)	(0.06)	(0.07)	(0.10)	(0.08)	(0.06)	(0.07)
$(FD_{it-1} \times INTL_{ij})$	1.172***	1.637***	0.440***	0.791***	1.173***	1.635***	0.439***	0.790***
	(0.21)	(0.13)	(0.04)	(0.05)	(0.21)	(0.13)	(0.04)	(0.05)
$(FD_{it-1} \times INTL_{ij}) \times RTA_{ijt}$	–0.219*	–0.366***	0.022	–0.127**	–0.227*	–0.360***	0.024	–0.122**
	(0.12)	(0.07)	(0.05)	(0.05)	(0.12)	(0.07)	(0.05)	(0.05)
$(FD_{it-1} \times INTL_{ij}) \times RTA_{ijt} \times MOST_k$	–0.026	0.033	0.017	0.025	0.232***	0.147**	0.083	–0.044
	(0.08)	(0.06)	(0.04)	(0.05)	(0.08)	(0.07)	(0.06)	(0.06)
Observations	1,754,458	1,757,777	1,495,421	1,465,327	1,754,458	1,757,777	1,495,421	1,465,327
Exporter-time-industry FEs	yes	yes	yes	yes	yes	yes	yes	yes
Importer-time-industry FEs	yes	yes	yes	yes	yes	yes	yes	yes
Exporter-importer-industry FEs	yes	yes	yes	yes	yes	yes	yes	yes

Notes: All specifications are performed in a panel data framework with PPML estimation including exporter-time-industry, importer-time-industry and exporter-importer-industry fixed effects. The dependent variable is the international trade or domestic trade flows in levels. Standard errors are reported in parentheses and clustered by country-pair level. *, **, *** denote significance at the 10%, 5% and 1% level, respectively.

finance and exports.[21] However, the results obtained when using the asset tangibility indicator validate H2. They provide some support to the view that the export-promoting role of financial development (especially intermediated finance) is reduced when trading partners are involved in an RTA, but to a weaker extent in the most vulnerable constrained sectors.[22]

3.5.2 Accounting for the Impact of Financial Development in the Importing Country

Up to now, we have focused on the interaction between RTAs and financial development in the exporting country. However, Schmidt-Eisenlohr (2013) and Niepmann and Schmidt-Eisenlohr (2017) establish that the cost of external finance in the importing country also matters for trade. More especially, at least two arguments suggest that financial development in the importing country could increase exports to this country. First, a high level of financial development raises demand for goods and services, which encourages imports (Fauceglia, 2015). Second, as emphasized in Section 3.2, trade flows crucially depend on trade finance tools, such as letters of credit and export credit insurance. On the one hand, let us recall that letters of credit require two banks: the exporter's bank and the importer's bank. For this reason, the existence of a well-developed financial system in the importing country also favors exports to this country. This idea is well illustrated by Caballero, Candelaria, and Hale (2018). Using a gravity model, the authors show that when two countries are linked through cross-border syndicated bank lending, one observes an increase in trade flows between them. On the other hand, insurance companies implanted in the destination country are likely to have better information about importers. Finally, these arguments suggest that a high level of financial development in the importing country reduces export costs incurred by the exporting one. However, when there exists an RTA between both trading partners, these costs are reduced, and the favorable effect of financial development is likely to be mitigated. This leads us to state the following hypothesis:

[21] We adopt here the external finance dependence based on a binary variable, while Manova (2008) and Manova et al. (2015) use the level of external finance dependence measured by a continuous variable.

[22] Based on the reliance on external finance criterion, the least financially constrained sectors are beverages (313), apparel (322) and nonferrous metals (372) while according to the asset tangibility indicator, they are paper and paper products (341), industrial chemicals (351), petroleum (353) and iron-steel (371). When one reduces the sample to only include the most and *the least* constrained sectors, i.e., when $MOST_k$ is used to distinguish the most constrained sectors from the *least constrained ones* (rather than from all other sectors), the estimated coefficient for $[(FD_{it-1} \times INTL_{ij}) \times RTA_{ijt} \times MOST_k]$ has a larger value, indicating a stronger impact of the dummy variable $MOST_k$. This finding is provided in Appendix C.6 (Table C.7). Appendix C.5 lists the ISIC manufacturing categories in our dataset.

H3: The export-promoting role of financial development in the importing country should be mitigated by the existence of an RTA between trading partners. This effect should be particularly strong when financial development is measured through intermediated finance.

To check for H3, we take equation (3.5) and replace FD_{it-1} with FD_{jt-1}, which denotes the level of financial development in the importing country j at date t. Thus, we estimate the following model:

$$\begin{aligned} X_{ijt} = \ & \exp\left[\beta_1 RTA_{ijt} + \beta_2(FD_{jt-1} \times INTL_{ij})\right] \times \\ & \exp\left[\beta_3(FD_{jt-1} \times INTL_{ij}) \times RTA_{ijt} + \pi_{it} + \mu_{jt} + \gamma_{ij}\right] \times \epsilon_{ijt} \end{aligned} \tag{3.8}$$

$BCREDIT_{jt-1}$, $BFICREDIT_{jt-1}$, $VALUE_{jt-1}$ and $CAPI_{jt-1}$ are defined in the same way as for the exporter side.

Estimates of equation (3.8) are reported in specifications [1], [3], [5] and [7] in Table 3.4. First, one observes that in all these variants, RTA has a positive effect on exports. As expected, the coefficient for $(FD_{jt-1} \times INTL_{ij})$ is significant and positive. Moreover, the coefficient is larger in variants [1] and [3], which include intermediated finance indicators, compared to specifications [5] and [7], which include market-based finance variables. Hence, financial intermediation in the importing country (especially in its broader definition $BFICREDIT_{jt-1}$) has a stronger impact on trade than does market-based finance. Finally, the coefficient for the interaction term $[(FD_{jt-1} \times INTL_{ij}) \times RTA_{ijt}]$ is significant and negative, but only in variants [1] and [3], i.e., when the level of financial development is measured using an intermediated finance variable. These results corroborate H3 and provide strong support to the view that the trade-boosting effect of financial intermediation in the importing country is mitigated when both trading partners participate in a trade agreement.

To conduct a sensitivity analysis, we introduce financial development indicators for both the exporter and the importer sides in the same gravity equation. Due to perfect collinearity issues, we are unable to simultaneously include the same type of financial indicator for the importing and the exporting country (for example $BCREDIT_{it-1}$ and $BCREDIT_{jt-1}$). However, we can include simultaneously $BCREDIT_{it-1}$ for the exporting country and $BFICREDIT_{jt-1}$ for the importing country in the same equation, and vice versa. Similarly, we introduce simultaneously $CAPI_{it-1}$ and $VALUE_{jt-1}$, and vice versa. The results of this sensitive analysis are reported in specifications [2], [4], [6] and [8] in Table 3.4. They indicate that, except in variant [4], the coefficient for financial development in the exporting country has a significant and positive sign.

Table 3.4 – PPML estimation results with financial development in the importing country

	Intermediated finance				Market-based finance			
Specifications	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]
FD_{jt-1} =	BCREDIT		BFICREDIT		VALUE		CAPI	
FD_{it-1} =	∅	BFICREDIT	∅	BCREDIT	∅	CAPI	∅	VALUE
RTA_{ijt}	0.627***	0.871***	0.745***	0.857***	0.301***	0.336***	0.333***	0.311***
	(0.10)	(0.09)	(0.08)	(0.08)	(0.07)	(0.08)	(0.08)	(0.08)
$FD_{it-1} \times INTL_{ij}$		1.141***		0.130		0.310***		0.156***
		(0.13)		(0.13)		(0.08)		(0.04)
$FD_{jt-1} \times INTL_{ij}$	0.815***	0.106	1.132***	1.112***	0.300***	0.136***	0.432***	0.282***
	(0.13)	(0.13)	(0.10)	(0.13)	(0.03)	(0.04)	(0.07)	(0.08)
$(FD_{it-1} \times INTL_{ij}) \times RTA_{ijt}$		–0.390***		–0.289***		–0.102		0.003
		(0.07)		(0.10)		(0.07)		(0.04)
$(FD_{jt-1} \times INTL_{ij}) \times RTA_{ijt}$	–0.213*	–0.208**	–0.401***	–0.317***	–0.004	0.047	–0.052	–0.040
	(0.13)	(0.10)	(0.09)	(0.09)	(0.04)	(0.05)	(0.07)	(0.07)
Observations	91,648	88,868	91,993	88,868	68,671	55,766	67,296	55,777
Exporter-time FEs	yes	yes	yes	yes	yes	yes	yes	yes
Importer-time FEs	yes	yes	yes	yes	yes	yes	yes	yes
Exporter-importer FEs	yes	yes	yes	yes	yes	yes	yes	yes

All specifications are performed in a panel data framework including exporter-time, importer-time and country-pair fixed effects. All estimates are obtained by employing the PPML estimation. The dependent variable is the international trade or domestic trade flows in levels. Estimates of the constant term, as well as estimates of all fixed effects dummies are omitted for brevity. Columns [1], [3], [5] and [7] report estimates with only importing country's financial development indicators. Columns [2], [4], [6] and [8] report results obtained with both the exporter's and importer's financial development variables. Standard errors are reported in parentheses and clustered by country-pair level. *, **, *** denote significance at the 10%, 5% and 1% level, respectively.

It is also noteworthy that the coefficient for the interaction term $[(FD_{it-1} \times INTL_{ij}) \times RTA_{ijt}]$ is significant and negative but only in specifications [2] and [4], i.e., when the financial development indicator of the exporting country is measured through an intermediated finance indicator ($BCREDIT_{it}$ or $BFICREDIT_{it}$). These findings corroborate the results we obtained in Section 3.4.

Turning to the impact of financial development in the importing country, variants [2], [4], [6] and [8] exhibit the same findings as variants [1], [3], [5] and [7]. Hence, the boosting effect of intermediated finance in the importing country and its interaction with the RTA variable is robust to introducing the level of financial intermediation in the exporting country in the estimation. Finally, in line with Schmidt-Eisenlohr (2013), Fauceglia (2015), Niepmann and Schmidt-Eisenlohr (2017), and Caballero et al. (2018), these results suggest that financial development in the importing country matters for international trade. They also corroborate H3, which states that the existence of an RTA between two trading partners mitigates the favorable impact of financial development, especially intermediated finance, in the destination country.

3.6 Conclusion

The aim of this chapter was to determine whether the favorable impact of financial development on exports is weakened when export costs are low, i.e., when there exists an RTA between the exporting and importing countries. Estimating a gravity model on a dataset of 69 developed and developing countries over the period 1986–2006, we show that financial development in the exporting country increases exports all the weaker when the exporting and the importing countries are involved in an RTA. This effect is particularly strong when financial development is measured through intermediated finance rather than market-based finance indicators. We also establish that the mitigating effect described above is weaker for financially constrained sectors, for which the role of financial development is crucial. Finally, we obtain evidence that the level of financial development in the importing country also matters for trade and that the existence of an RTA between trading partners mitigates its trade-promoting effect.

Our chapter thus contributes to the literature showing that interactions between financial regulation and trade openness significantly affect trade flows (Manova, 2008), productivity (Taylor, 2010; Topalova and Khandelwal, 2011; Peters and Schnitzer, 2015) and growth (Chang, Kaltani, and Loayza, 2009). Our results suggest that promoting financial development and having a trading partner with a well developed financial system are crucial for exporting, especially when partners are not involved in an RTA. Our findings also provide

additional support to the view that intermediated finance and arm's length finance do not have the same characteristics with regard to the financing of the real economy. While this debate on "banks versus financial markets" usually focuses on the financing of investment (Allen and Gale, 2000), our chapter shows that such an opposition is also relevant for the financing of trade. More specifically, we provide additional support to the view that developing financial intermediation is more effective than relying on market-based finance to boost trade.

Our work could be enriched in several ways. First, when disaggregating the regional agreement variable to estimate the impact of being involved in a particular RTA on export flows, we observed that some of the RTAs included in our dataset amplify (rather than mitigate) the export-promoting effect of financial development. Hence, it would be interesting to explore the theoretical rationale for such interactions. Second, while our chapter addresses the *level* of financial development, it would be interesting to focus on financial stability and to address the way its interactions with RTAs can also affect export performance.

General Conclusion

The subject of this dissertation revolves around the examination of the relationship between regional trade agreements and the global trading system. We aim to present fresh understandings and views on topics consisting of three aspects of trade policy associated with trade agreements. First, we investigate the trade-promoting role of several RTAs located in various geographic regions in international trade flows to revisit the performance of regional integration processes among nearby countries since the 1960s. We explore how RTAs result in varied effects on trade among participating countries as well as on trade with countries outside of trading blocs based on a Vinerian framework relating to the trade creation and trade diversion effects of RTAs. Second, we focused on how the implementation period of trade liberalization and member countries' level of economic development exert influence on the RTA dynamic effects on trade flows over time. We provide an analysis of the trade impacts of RTAs that differ from each other according to the level of economic development of member countries—as developing or developed economies—and how long the implementation period of RTA trade liberalization lasts. Third, we investigate the mechanism through which trade agreements impact the effect of financial development on manufacturing trade flows from the exporting country to the importing country. In this joint study with Anne-Gaël Vaubourg, we focus on the links between RTAs and financial development and the variation in the trade-promoting role of financial development indicators based on both the aggregate bilateral trade data and sectoral bilateral trade data that comprise the most and least financially constrained sectors.

All of the chapters in this dissertation unite in adopting an empirical approach that is developed to some extent on the basis of the most recent advancement in the structural gravity model in the literature on international trade. The results and contributions stemming from the present work are of both academic and public interest.

In the first chapter, we analyze the *ex post* effects of a number of plurilateral RTAs around the world that contribute the most to world trade on member countries' trade as well as on bloc exports and imports. By adopting the PPML estimator and a theoretically mo-

tivated fixed effects gravity model, we show that most of these plurilateral RTAs lead to intrabloc trade creation, such as the EU, Andean, NAFTA, and Mercosur. Due to low-paced tariff reduction and trade liberalization procedures, the Asian RTAs, such as ASEAN and SAFTA, do not generate significant beneficial effects on their intrabloc trade immediately upon their entry into force. The other important result is that the effects of RTAs on extrabloc trade are heterogeneous. Nonetheless, we found evidence that a majority of the plurilateral RTAs, mostly those located in America and Africa, lead to significant trade diversion effects in terms of export and import diversion. In contrast, export and import creation are achieved by European RTAs and Asian RTAs. Our empirical findings, providing evidence of an increase in intrabloc trade coupled with trade diversion with respect to extrabloc trade for most RTAs, are consistent with previous works by Soloaga and Winters (2001) and Carrère (2006). This finding suggests that the regional integration process around the world has enhanced intrabloc trade among participating countries for many plurilateral RTAs; however, it is harmful to the rest of the world. It is conceivable that this result emerged from the upsurge in the number of RTAs since the 1990s and the failure of the Doha Round of the WTO, which did not succeed in finalizing a multilateral trade arrangement among WTO members. Nevertheless, the WTO could improve the coordination between RTAs to narrow down the differences in the sets of rules and margins of preference across trading blocs, as proposed by Baldwin and Thornton (2008). Moreover, states involved in trade agreements may not systematically seek homogeneous effects for all participating partners. Policymakers should not employ RTAs as an indisputable policy-related tool to boost trade liberalization and spur economic benefits for the multilateral trading system.

Chapter two exploits the development aspects of the impacts of trade agreements on trade flows. We aim to show that, aside from dissimilarities in members' level of economic development, the trade-promoting effect of RTAs is also affected by the differences in the length of implementation periods among North-North RTAs, North-South RTAs and South-South RTAs. Building on a structural gravity model, this empirical analysis demonstrates that RTAs formed by participating countries with similar economic development characteristics (i.e., RTAs formed by exclusively developed economies or by exclusively developing economies) lead to a greater intrabloc trade increase among members during a shorter implementation period than do RTAs concluded between developed and developing countries. Interestingly, we underline that North-North and South-South economic integration agreements, which feature a deeper integration between member countries, also achieve an intrabloc trade increase more rapidly than do North-South agreements. Our findings in chapter two are in line with the *ex ante* study by Baier and Bergstrand (2004), which suggests that RTAs tend to promote trade flows among the most homogeneous member countries in terms of economic development. Additionally, our results

are consistent with the predictions of several theoretical works supporting South-South trade (Perroni and Whalley, 2000; Regolo, 2013; Baier et al., 2018) and the results from a number of empirical analyses validating a larger effect on trade for RTAs formed by developing economies than for RTAs formed by developing and developed economies (Behar and Cirera-i Crivillé, 2013; Dahi and Demir, 2013; Cheong et al., 2015). This analysis gives new insight into the insignificant effects of North-South RTAs upon their entry into force because these agreements tend to undergo longer phase-in periods and slower-paced tariff eliminations, especially in the case of developing countries. One could also argue that the pre-RTA tariff rates (prior to North-South RTAs) imposed by developed economies are already close to the MFN tariff rates. It would be interesting for policymakers in developing countries to focus more on the acceleration of the phase-in period for trade and tariff liberalization. For South-South RTAs, in any case, developing countries involved in these RTAs should continue to enhance their trade infrastructure network to facilitate trade links and preserve the long-term trade-promoting effects among participating countries.

In chapter three, we investigate another feature of the RTA effects on international trade. We determine whether the conventional favorable effect of financial development on an exporting country's trade flows is reduced when an RTA comes into effect between the exporting and importing countries by testing the interaction of trade agreements with the member countries' levels of financial development. The chapter is distinguished from the existing literature on the links between trade and finance because we empirically identify such interaction and the effects of RTAs relating to the level of financial development in exporting and importing countries. Past studies did not make use of RTAs as proxies for the degree of trade openness or for trade costs. To the extent of our knowledge, we are one of the first to do so. Additionally, the analysis in chapter three is able to determine the impacts of both variables (RTAs—bilateral determinant of trade—and financial development indicators—time-varying country-specific determinant of trade) and the impact of their interaction on trade flows within a panel data gravity model framework with structural fixed effects by incorporating intranational trade flows in the estimation, as advocated by Heid et al. (2017) and Beverelli et al. (2018). By using this novel estimation technique, we indicate that financial development in the exporting country is likely to have a mitigating effect on exports when the exporting country and the destination country participate in a trade agreement. More specifically, this effect is stronger when financial development is depicted by intermediated finance than when financial development is measured by market-based finance indicators. Focusing on the sectoral dimension of exports, our results suggest that the mitigating effect of financial development is weaker for the most financially constrained sectors than for the least financially constrained sectors because the former heavily rely upon the level of financial development to be exported to other destinations. Another interesting finding provides evidence that the level of financial de-

velopment in the importing country is also crucial for trade; nonetheless, the existence of an RTA between trading partners will mitigate this favorable impact of financial development in the destination country. We contribute to various strands of literature on the effect of the interactions of financial regulation with trade openness on trade flows (Manova, 2008), productivity (Taylor, 2010; Topalova and Khandelwal, 2011; Peters and Schnitzer, 2015), and growth (Chang et al., 2009). Our findings also support the view that it is more effective to develop intermediated finance than to rely on market-based finance to promote trade (Allen and Gale, 2000).

Taken together, the three chapters of this doctoral thesis aim to contribute to the understanding of how regional trade agreements affect international trade through different mechanisms and features. As mentioned above, each chapter has interesting policy implications that bring into focus the topic that each of them revolves around. Overall, the intuitive interpretation of the results in this dissertation encourages the acceleration of RTA phase-in periods for trade and tariff liberalization, especially in the case of developing countries. A critical step to achieve this advancement also depends on the development of trade infrastructure and trade finance, particularly intermediated finance to boost trade.

Our present work could be enriched by several extensions. While our present studies employ the mainstream dataset on regional trade agreements from the WTO, Baier and Bergstrand (2007), and Head et al. (2010), future studies should more closely consider other comprehensive datasets on RTAs, such as the World Trade Institute Design of Trade Agreements (DESTA) dataset from Dür et al. (2014) and the Trade Agreement Heterogeneity database from Kohl, Brakman, and Garretsen (2016). The principal advantage of these datasets is that they cover information on how trade agreements are designed in terms of several dimensions: policy area coverage (tariff and nontariff provisions), depth of agreement, sector coverage, type of agreement, regional composition of agreement, etc. Indeed, these insights will allow one to more precisely assess the impact of RTAs on international trade at both aggregate and disaggregated data levels.

Since our analyses in chapter one and chapter two only focus on aggregate trade flows, further analyses could investigate how the RTA implementation period and members' level of economic development influence the effect of an RTA on disaggregated trade data. This is because the significant impact of trade agreements may only be achieved for a limited range of goods, as proposed by Dahi and Demir (2013) and Baier et al. (2018). Another dimension we would like to further explore is associated with the detailed schedule of tariff reductions for specific products in each phase of RTA implementation periods.

Furthermore, apart from focusing solely on the matter of tariff barriers, future research

could also place more emphasis on the question of nontariff barriers, other "behind-the-border" measures, rules of origin and other hidden protections, and trade in services, which currently play a major role in the design of the new generation of RTAs, as proposed by Krishna and Krueger (1995), Estevadeordal and Suominen (2005), Disdier et al. (2015), and Anderson, Borchert, et al. (2018).

For the analysis on the links between trade agreements and financial development, we would like to explore the theoretical rationale for the interaction of financial development with RTAs because when disaggregating RTAs on several specific agreements, we determined that some RTAs increase the export-enhancing effect of financial development rather than weaken it. By means of appropriate data, it would also be possible to estimate the mechanism through which financial stability interacts with RTAs and affects the performance of trade.

Résumé en Français

« Le régionalisme balaie le système commercial mondial comme une traînée de poudre tandis que les négociations de l'OMC avancent à un rythme glacial » (Baldwin et Jaimovich, 2012, p. 1). La croissance des accords commerciaux régionaux (ACR) "est la source la plus importante de la réforme de la politique commerciale au cours des 20 dernières années pour la plupart des pays" (Limão, 2016).

Depuis les années 1990, le système commercial mondial a été marqué par une prolifération du nombre d'accords commerciaux. La participation aux ACR est très forte : tous les pays membres de l'Organisation mondiale du commerce (OMC) font actuellement partie d'au moins un ACR. En outre, depuis 1990, les échanges effectués dans le cadre d'accords commerciaux régionaux ont augmenté plus vite que le commerce mondial, de sorte qu'en 2008, plus de la moitié du commerce mondial se faisait dans le cadre d'accords commerciaux régionaux, contre seulement 28% en 1990 (OMC, 2011).

Pour certains spécialistes du commerce international, l'expansion mondiale des arrangements commerciaux régionaux est incompatible avec le processus de libéralisation commerciale multilatérale et risque de ralentir les négociations du Cycle de Doha (Bhagwati, 1991 ; Bhagwati et Panagariya, 1996 ; Bhagwati, 2008). L'analyse en termes de « partenaires commerciaux naturels » développée par Summers (1991), Wonnacott et Lutz (1989) et Krugman (1991) propose toutefois une approche plus optimiste des accords commerciaux. Selon cette théorie, les ACR peuvent améliorer le bien-être s'ils sont conclus par des pays géographiquement proches et qui, en raison d'un faible niveau des coûts commerciaux naturels, commercent intensivement entre eux.

L'évolution des ACR a été marquée par des changements importants au cours des dernières décennies à la fois en termes géographiques et de domaines couverts. Premièrement, on observe une augmentation du nombre d'ACR entre pays géographiquement éloignés ainsi que du nombre d'accords commerciaux interrégionaux (Acharya, 2016 ; OMC, 2011, 2013). Deuxièmement, l'accent est mis, désormais, sur la négociation et la conclusion d'ACR entre pays développés et pays en voie de développement (Schiff et Winters, 2003 ; Acharya,

2016). Le troisième élément marquant dans l'évolution des ACR concerne l'élargissement et l'approfondissement des questions couvertes par les accords commerciaux. Depuis les années 2000, les ACR sont allés au-delà de la libéralisation des droits de douane sur le commerce des marchandises pour se concentrer sur les dispositions non tarifaires (par exemple, les obstacles techniques au commerce, les mesures sanitaires et phytosanitaires, ainsi que d'autres normes dites « behind-the-border »), notamment dans le secteur des services.

Les questions liées aux accords commerciaux régionaux continuent de susciter un grand intérêt pour la recherche académique (Limão, 2016) et le débat public. D'ailleurs, les recherches sur ce sujet ont souvent abouti à des conclusions mitigées. Par exemple, selon Feenstra (2004, p. 197), « il existe des unions douanières et des accords de libre-échange qui améliorent le bien-être, mais [...] nous ne devrions pas en déduire que les accords commerciaux régionaux sont nécessairement positifs dans la pratique. » En revanche, Baier et Bergstrand (2007) ont montré que les partenaires commerciaux ont beaucoup à gagner à la libéralisation du commerce dans le cadre d'ACR. Les auteurs estiment en effet qu'en dix ans, un accord de libre-échange (ALE) multiplie par deux le commerce entre deux pays membres. Enfin, les trois dernières années ont été marquées par l'émergence de politiques commerciales protectionnistes. Ces mesures hostiles sont surtout le fait de pays développés, comme le Royaume-Uni, qui a opté pour le retrait du marché unique de l'Union européenne (UE), ou les États-Unis, qui ont mis fin à leur soutien au Partenariat transatlantique de commerce et d'investissement (PTCI), menacé de se lancer dans une guerre commerciale avec le Mexique et le Canada dans le cadre de l'Accord de libre-échange nord-américain (ALENA) et se sont engagés dans une véritable guerre commerciale avec la Chine. Néanmoins, dans d'autre régions, le processus de formation d'ACR est encore très dynamique. Par exemple, en Europe, l'UE, l'Association européenne de libre-échange (AELE) et la Turquie affichent la plus forte activité en matière de signature d'ACR ; en Asie, Singapour, la Chine, le Japon et la Corée du Sud sont en tête pour le nombre d'ACR en vigueur ; en Amérique du Sud, c'est le Chili qui est devenu le plus actif dans ce domaine.

C'est dans ce contexte de prolifération des ACR que s'inscrit cette thèse, qui traite des effets des ACR sur le commerce international. Notre travail vise à mieux comprendre et à apporter des points de vue nouveaux sur le rôle des ACR et du régionalisme en général. Pour cela nous mettons l'accent sur l'hétérogénéité des effets des ACR sur le commerce. Cette hétérogénéité provient des différentes caractéristiques des accords commerciaux. Dans **le premier chapitre** de cette thèse, nous revisitons les effets *ex post* des ACR sur le commerce des pays membres et le commerce extrabloc en adoptant une approche empirique. Nous cherchons à déterminer la manière dont les blocs commerciaux

régionaux affectent le commerce non seulement entre pays membres mais aussi entre pays membres et pays extérieurs à l'accord. Notre analyse confirme que les ACR augmentent de manière significative le commerce intra-bloc ; néanmoins, dans de nombreux cas, les ACR impliquent des effets de détournement d'échanges qui sont préjudiciables au reste du monde.

Le chapitre deux examine de quelle manière la période de mise en œuvre de l'accord et les niveaux de développement des pays membres déterminent, en dynamique, l'effet des ACR sur le commerce international. Nous examinons les effets des ACR sur le commerce, en tenant compte du type d'accord considéré, de sa durée de mise en oeuvre et du niveau de développement des partenaires commerciaux. Nous obtenons des tendances distinctes des effets *ex post* de l'ACR sur le commerce entre les accords Nord-Nord, Sud-Sud et Nord-Sud. Nous vérifions empiriquement que les ACR conclus par des partenaires commerciaux ayant un statut de développement économique analogue (les accords Nord-Nord ou Sud-Sud) sont susceptibles d'engendrer une augmentation plus forte du commerce des membres pendant une période de mise en œuvre plus courte. **Le chapitre trois** porte sur la manière dont les interactions entre accords régionaux et développement financier influencent les flux d'échanges entre partenaires commerciaux. Dans ce travail conjoint avec Anne-Gaël Vaubourg, nous montrons que le développement financier (particulièrement sous sa forme intermédiée) encourage les échanges commerciaux mais que cet effet est atténué dès lors que les partenaires commerciaux ont signé un accord régional.

Objectifs de la thèse : Effets des ACR sur le commerce

De nombreuses études se sont intéressées aux effets de divers ACR sur le commerce international (voir Balassa, 1961 ; Baier et Bergstrand, 2007 ; Magee, 2008 ; Vicard, 2009). D'autres analyses ont cherché à montrer que les effets des ACR sur le commerce de ses membres dépendaient de l'adhésion de ces derniers à l'OMC (voir Subramanian et Wei, 2007 ; Eicher et Henn, 2011). Dans cette thèse, nous montrons que les ACR ont (i) des effets différentiés sur le bien-être des pays et que leur impacts sur les flux de commerce dépendent (ii) de leur durée de mise en oeuvre, (iii) du niveau de développement économique des pays membres et (iv) de leurs interactions avec le développement financier des pays partenaires.

Viner (1950) a été le premier auteur à réexaminer les effets des ACR. En se fondant sur l'idée qu'un ACR implique non seulement des effets de création de commerce mais aussi des effets de détournement des échanges, l'auteur fait valoir qu'un ACR n'améliore pas nécessairement le bien-être de ses pays membres. Viner constate que les ACR peuvent conduire à la création d'échanges si les produits nationaux à coût élevé sont

susceptibles d'être remplacés par des importations à coût plus faible en provenance des pays partenaires. Dans ce cas, les ACR augmentent le bien-être des pays membres. En revanche, tout accord commercial préférentiel peut entraîner un détournement d'échanges lorsque les pays membres renoncent à importer des produits à faible coût provenant du reste du monde pour les remplacer par des produits plus chers, achetés à des producteurs moins efficaces mais membres de l'accord. Une telle situation, qui introduit des distorsions supplémentaires liées à un traitement différencié des partenaires commerciaux, est donc préjudiciable pour les consommateurs et les producteurs des pays extérieurs à l'accord et au surplus des consommateurs dans la région de l'ACR. Finalement, l'effet net de la libéralisation des échanges résultant de la conclusion d'un ACR est ambigu et dépend de la plus grande importance des effets de création par rapport aux effets de détournement d'échanges.

Du point de vue empirique, les effets de création et de détournement d'échanges découlant de la formation d'ACR font également l'objet d'études approfondies. La plupart d'entre elles évaluent ces effets au moyen de modèles de gravité du commerce. Dans l'ensemble, les résultats découlant de cette littérature sont assez peu concluants (Freund et Ornelas, 2010). Toutefois, la plupart des analyses montrent que les ACR augmentent le commerce intra-bloc tout en ayant des effets contrastés en termes de création et de détournement de commerce sur les échanges entre pays membres et pays non-membres (Frankel, 1997 ; Soloaga et Winters, 2001 ; Carrère, 2006 ; Magee, 2008 ; Trotignon, 2010). **Notre objectif dans le premier chapitre de cette thèse est d'adopter une estimation appropriée des modèles de gravité et d'évaluer les effets de création et de détournement d'échanges de divers ACR particuliers qui sont conformes au sens simple du régionalisme, dans la mesure où ce dernier englobe les arrangements commerciaux établis par des partenaires commerciaux qui se trouvent à proximité dans une même région géographique.**

La majorité des études empiriques portant sur les effets des ACR sur le commerce ne tiennent pas compte de l'hétérogénéité de ces effets au fil du temps. Comme le souligne Goldstein et Khan (1985, p. 1066), « l'existence de coûts d'ajustement et d'information incomplète signifie que l'ajustement des variables dépendantes relatif aux variables explicatives ne sera pas instantané ». D'une part, les importateurs et les exportateurs ne peuvent pas s'adapter immédiatement aux variations de coût et de prix relatif des produits importés sur les produits nationaux qu'implique la signature d'un ACR. C'est la raison pour laquelle il est important de tenir compte de la dimension temporelle du commerce international. D'autre part, si certains ACR stipulent une libéralisation immédiate des droits de douane et des échanges commerciaux, bon nombre d'entre eux prévoient une application progressive et graduelle des concessions tarifaires. Baier et Bergstrand (2007),

Kohl (2014), Bergstrand et al. (2015), Anderson et Yotov (2016) montrent que l'effet des ACR sur les flux de commerce est non monotone au cours du temps. **Dans le deuxième chapitre de cette thèse, nous adoptons une approche empirique et montrons que l'effet d'un ACR sur le commerce des pays membres dépend fortement de son délai de mise en œuvre.**

Par ailleurs, les conséquences des ACR en matière de commerce international dépendent également du niveau de développement économique des pays participant aux accords. L'analyse de Baier et al. (2018) démontre que les économies en développement, caractérisées par des coûts fixes au commerce élevés, tirent des bénéfices particulièrement élevés des accords commerciaux. Ce résultat confirme l'idée de Greenaway et Milner (1990) et Regolo (2013) selon laquelle il existe des gains à l'échange significatifs pour les pays du Sud. Venables (2003) montre toutefois que les accords commerciaux conclus entre pays en développement ont un effet mitigé sur leur commerce en raison de la similarité de leurs dotations factorielles et de leur manque de complémentarités en termes d'exportations.

Baier et Bergstrand (2004) s'intéressent aux motifs pour lesquels les pays participent à des accords commerciaux. Ils démontrent que plus la taille de l'économie des pays membres est importante et similaire en termes des facteurs d'échanges intrasectoriels, plus les ACR peuvent procurer d'échanges. En plus, toujours selon ces mêmes auteurs, plus les pays membres sont dissimilaires au niveau de leur dotation en facteurs sur la base de l'avantage comparatif de Heckscher-Ohlin, plus ces accords engendrent le commerce entre leurs membres. Behar et Cirera-i Crivillé (2013) et Cheong et al. (2015) constatent que les ACR affectent les flux commerciaux de manière différente selon le niveau de développement économique des pays participants. Ces travaux montrent empiriquement que l'effet produit par les accords Sud-Sud est plus de deux fois plus grand que celui induit par des accords Nord-Sud. **Dans un contexte de croissance des accords Sud-Sud (OMC, 2011), le deuxième chapitre s'intéresse également à la manière dont le niveau de développement détermine l'effet des ACR sur les échanges commerciaux entre pays membres. Ce chapitre est donc, à notre connaissance, l'une des premières études empiriques qui étudient conjointement la question du délai de mise en oeuvre des ACR et celle du niveau de développement de ses membres.** Plus précisément, nous montrons que les accords Nord-Nord, Nord-Sud et Sud-Sud se caractérisent par des délais de libéralisation des échanges et des droits de douane particulièrement distincts les uns des autres.

Une autre dimension des effets qu'un ACR peut avoir sur le commerce international est celle de ses interactions avec le développement financier. Par exemple, en 1997–1998, certaines préoccupations avaient été exprimées au sujet des conséquences néfastes de la

crise financière asiatique en matière d'échanges commerciaux. Mais ces effets ne se sont finalement fait sentir qu'à l'échelle régionale. Ce n'est qu'à partir de la crise financière mondiale de 2007–2008 et du « Great Trade Collapse » de 2008–2009, caractérisé par un effondrement du volume du commerce mondial de 12%, que l'importance du développement financier pour les échanges commerciaux a été identifiée (Baldwin, 2009 ; Chauffour et Malouche, 2011 ; Auboin 2009, 2011).

En effet, comme le souligne la littérature, le commerce international est largement tributaire des variables financières. Kletzer et Bardhan (1987), Baldwin (1989) et Beck (2002) ont montré que des différences en termes de développement financier confèrent aux économies des avantage comparatifs, qui justifient l'existence de gains à l'échange et une spécialisation des partenaires commerciaux. Les études empiriques de Beck (2002, 2003), réalisées sur données macroéconomiques, ont permis de confirmer ce résultat théorique. Les auteurs constatent que le développement financier crée des effets positifs sur les exportations, en particulier dans les secteurs fortement dépendants du financement externe.

Manova (2013) et Chaney (2016), utilisant des données microéconomiques d'entreprises, soulignent que les firmes à forte productivité sont susceptibles d'exporter, alors que celles dont la productivité est intermédiaire mais qui n'obtiennent pas suffisamment de financement externe pour couvrir les coûts fixes initiaux, n'exportent pas. En s'appuyant sur des données microéconomiques, Bellone et al. (2010) et Engel et al. (2013) démontrent également que seules les entreprises en bonne santé financière peuvent commencer à exporter et que leur niveau des contraintes financières, caractérisé par exemple par des ratios d'endettement élevés ou par des faibles niveaux de liquidité, influence leur décision de cesser d'exporter des produits. Manova (2008) et Becker et al. (2013) montrent par ailleurs que l'effet bénéfique du développement financier d'un pays sur ses exportations est d'autant plus fort que ses coûts fixes d'exportation, caractérisés par le degré d'ouverture commerciale, le niveau de normalisation des produits exportés, la distance ou la présence d'une frontière commune entre partenaires commerciaux, sont élevés.

Cependant, la littérature consacrée aux liens entre commerce et finance ne s'intéresse pas aux ACR, comme outil de politique commerciale susceptible de jouer sur le niveau des coûts d'exportation. Pourtant, les ACR permettent aux pays participants d'éliminer les droits de douane classiques, les obstacles non tarifaires, les obstacles dits « cross-border » et les mesures « behind-the-border » dans le cadre des échanges intra-blocs (Chauffour et Maur, 2011 ; Pomfret et Sourdin, 2009). On s'attend donc à ce que l'effet favorable du développement financier d'un pays sur ces exportations soit atténué lorsque ce pays a signé un accord régional avec son partenaire commercial. **Notre objectif dans le troisième chapitre est précisément d'examiner l'incidence des interactions**

entre le développement financier et les ACR sur le commerce international.

Outil empirique : Fondements théoriques du modèle de gravité

Le point commun des chapitres de cette thèse consiste en l'utilisation des équations de gravité dans l'estimation des flux commerciaux bilatéraux.

Tinbergen (1962) a été le premier à appliquer l'équation de gravité aux échanges commerciaux, en référence à l'équation utilisée en physique pour décrire la loi de la gravitation de Newton. Le modèle de gravité de Tinbergen (1962) suggère en effet que la valeur des échanges entre deux partenaires commerciaux est positivement liée au produit de la taille de leur économie et inversement liée à la distance qui les sépare ainsi qu'à leurs coûts commerciaux.

Les travaux précurseurs d'Eaton et Kortum (2002) et d'Anderson et van Wincoop (2003) ont permis de nombreux développements autour de la théorie du modèle de gravité. D'une part, Eaton et Kortum (2002) ont dérivé une équation de gravité découlant du modèle ricardien avec des produits intermédiaires, en supposant que chaque pays produit des biens homogènes. D'autre part, Anderson et van Wincoop (2003) ont popularisé la conclusion d'Anderson (1979) à propos du modèle d'Armington-CES et ont mis en évidence la nécessité de tenir compte, dans le cadre d'un modèle d'équilibre général, des effets des coûts du commerce.

Comme l'ont indiqué Anderson et van Wincoop (2003), outre les éléments newtoniens du modèle de gravité tels que les masses économiques des pays partenaires, la distance qui les sépare ou leurs coûts commerciaux, le modèle de gravité structurelle doit contrôler pour les résistances au commerce multilatérales qui reflètent tous les obstacles au commerce auxquels ces pays doivent faire face lorsqu'ils échangent. Plus important encore, Hummels (1999), Feenstra (2004) et Baier et Bergstrand (2007) ont montré que les termes de résistance multilatérale pouvaient être pris en compte empiriquement de manière simple et rapide, au moyen d'un ensemble d'effets fixes par pays importateur-année et par pays exportateur-année.

Dans cette thèse, nous recourons principalement au modèle de gravité proposé par Anderson et van Wincoop (2003) et qui constitue l'une des approches les plus influentes de la littérature consacrée au modèle de gravité structurelle.

Résumé de principales conclusions et contributions de la thèse

Dans **le premier chapitre** de cette thèse, nous revisitons la question des effets de l'intégration régionale sur le commerce international. Cette analyse s'inscrit principalement dans le contexte récent d'accroissement du nombre d'accords commerciaux interrégionaux et de l'importance donnée par les partenaires commerciaux à la conclusion d'accords bilatéraux plutôt qu'à des accords plurilatéraux. Bhagwati (2008) a fait valoir qu'il serait probablement plus difficile de conclure un accord commercial entre plusieurs partenaires commerciaux dont les intérêts économiques et politiques sont divergents.

Pour cela, nous prenons en compte la plupart des ACR plurilatéraux en vigueur dans le monde sur une période allant de 1960 à 2014, ce qui représente un total de 18 ACR. Ces ACR plurilatéraux renvoient à la conception « pure » du régionalisme, qui fait elle-même référence à des blocs commerciaux formés par des pays proches géographiquement. Nous cherchons à examiner les effets de ces ACR plurilatéraux sur les échanges intra-blocs et la propension des pays participants à commercer avec les pays tiers. Plus précisément, nous visons également à déterminer si les blocs commerciaux régionaux ont encouragé à la fois le commerce entre pays signataires et celui réalisé avec les pays non-membres ou bien s'ils n'ont favorisé que le commerce des membres au détriment de celui des pays tiers.

Nous évaluons les effets *ex post* des ACR sur le commerce international en nous appuyant sur le modèle de gravité incluant des termes de résistance multilatérale. Notre étude comprend des données agrégées sur le commerce de 160 pays, représentant en moyenne plus de 95% de la valeur du commerce mondial total sur une période de 55 ans. De plus, nous adoptons des techniques d'estimation appropriées afin de remédier au problème de flux commerciaux nuls en appliquant l'estimateur du pseudo-maximum de vraisemblance avec loi de Poisson (PPML) développé par Santos Silva et Tenreyro (2006). Notre analyse confirme que les ACR augmentent de manière significative le commerce intra-bloc. Nous constatons également que, les effets des ACR sur les échanges commerciaux entre pays membres et pays non-membres dépendent de la zone géographique considérée. Dans de nombreux cas, les ACR impliquent des effets de détournement d'échanges qui sont préjudiciables au reste du monde. C'est le cas principalement des blocs commerciaux américains et africains. En revanche, les ACR en Europe et en Asie donnent lieu à des effets de création d'exportations et d'importations plus importants.

Le premier chapitre vise à contribuer à la littérature consacrée aux effets des ACR en matière de création et de détournement de commerce. Alors que la littérature existante se concentre le plus souvent sur un ou quelques accords particuliers, nous proposons une

étude plus complète et plus systématique en mobilisant un échantillon beaucoup plus large en termes de nombre de pays et d'ACR et de période d'étude. Nous utilisons également une méthode d'estimation plus appropriée que la plupart des travaux menés sur ce sujet.

Nos résultats suggèrent que, pour de nombreux ACR plurilatéraux, le processus d'intégration régionale a favorisé les échanges intra-blocs entre pays participants mais a eu des effets préjudiciables pour le reste du monde. Ce constat n'est sans doute pas sans lien avec l'accroissement du nombre d'ACR depuis les années 1990 et l'échec du Cycle de Doha à produire un accord commercial multilatéral au sein de l'OMC. Néanmoins, comme le proposent Baldwin et Thornton (2008), l'OMC pourrait contribuer à améliorer la coordination entre les ACR en vue de réduire leurs divergences en matière de règles et de politiques commerciales. Quant aux responsables politiques, ils ne devraient sans doute pas concevoir les ACR comme un instrument de politique commerciale indiscutable permettant de libéraliser davantage le commerce, y compris au niveau multilatéral.

Le deuxième chapitre cherche à répondre à la question suivante : *« La durée de mise en œuvre des concessions tarifaires et le niveau de développement des pays membres influencent-ils l'effet d'un ACR sur les échanges des membres ? »*

Depuis la création de l'OMC, les pays en développement participent activement à la conclusion d'accords commerciaux Nord-Sud et d'accords commerciaux Sud-Sud. En outre, la durée de libéralisation progressive des droits de douane et des échanges commerciaux varie fortement selon que l'ACR consiste en un accord Nord-Nord, Nord-Sud ou Sud-Sud. C'est la raison pour laquelle la question de la mise en oeuvre d'un ACR et de ses effets dynamiques sur les échanges commerciaux ne peut être traitée indépendemment de celle du niveau de développement des pays signataires.

Réalisées à partir d'un échantillon contenant la quasi-totalité des ACR actuellement en vigueur (soit un total de 245 accords commerciaux sur la période 1960–2015), nos estimations reposent sur des équations de gravité structurelle tout en tenant compte des principaux défis associés à l'utilisation de ce type de modèles, tels que les termes de résistance au commerce multilatérale, l'endogénéité des ACR, le problème des flux nuls et l'hétéroscédasticité dans les données commerciales. Le chapitre deux aboutit à plusieurs résultats intéressants. Nous montrons tout d'abord qu'un ACR ne produit pas les mêmes effets sur le commerce selon qu'il s'agit d'un accord Nord-Nord, Sud-Sud ou Nord-Sud. Ensuite, nos résultats indiquent que les ACR conclus par des partenaires commerciaux ayant un statut de développement économique analogue sont susceptibles d'engendrer une augmentation plus forte du commerce entre les membres de l'ACR et ce, sur une période de mise en oeuvre plus courte. Notre étude suggère enfin que les effets à long terme

des ACR conclus entre des pays en développement ont tendance à s'estomper 15 ans en moyenne après leur entrée en vigueur. Ces résultats sont robustes à la prise en compte des effets de création et de détournement d'échanges et des nouvelles tendances des ACR qui tournent autour des accords d'intégration économique et des accords interrégionaux.

Cette analyse souligne la faiblesse des effets des ACR Nord-Sud lors de leur entrée en vigueur, ces accords ayant tendance à connaître des périodes de mise en œuvre plus longues en ce qui concerne l'élimination des droits de douane, en particulier dans le cas des pays en développement. On pourrait également faire valoir qu'étant souvent imposés par les économies développées, les droits en vigueur avant la conclusion d'un ACR Nord-Sud sont souvent déjà proches des droits nation la plus favorisée (NPF). Il serait intéressant que les décideurs des pays en développement mettent davantage l'accent sur le racourcissement de la période de libéralisation du commerce et des droits de douane. En ce qui concerne les pays en développement participant à des ACR Sud-Sud, ils devraient continuer à développer leur réseau d'infrastructure commerciale afin de renforcer leurs relations commerciales et de préserver les effets à long terme des ACR.

Le chapitre trois de cette dissertation adopte un autre point de vue et porte sur l'interaction entre les accords commerciaux et le niveau de développement financier des pays membres.

Les fondements théoriques des effets de la sphère financière sur le commerce viennent du fait que les entreprises nationales ont besoin d'un financement externe pour faire face aux coûts qu'elles supportent lorsqu'elles vendent leurs produits à l'étranger. Le niveau de développement et l'intensité de la contrainte financière des firmes sont donc cruciaux pour les exportations. Néanmoins, la littérature consacrée aux liens entre finance et commerce ne tient pas compte d'un facteur déterminant pour le niveau des coûts d'exportation, à savoir la conclusion d'accords commerciaux entre le pays exportateur et son partenaire commercial.

Notre étude empirique se fait en deux temps : après avoir étudié les liens entre ACR et développement financier à partir de données de commerce bilatéral agrégées, nous adoptons ensuite une approche sectorielle. Pour estimer notre modèle de gravité structurelle, nous avons recours à une base de données comprenant 69 pays sur la période 1986–2006. Les effets fixes « pays-année » incorporés dans ce modèle de gravité contrôlent pour toutes les variables spécifiques aux pays et variant dans le temps (comme c'est le cas pour nos indicateurs de développement financier) et posent des problèmes de colinéarité qui empêchent a priori toute estimation de l'incidence du développement financier sur le commerce. Nous adoptons par conséquent la démarche empirique suggérée par Heid et al. (2017) et Be-

verelli et al. (2018) consistant à tenir compte des flux commerciaux intranationaux dans les équations de gravité pour estimer l'effet des déterminants du commerce international spécifiques à chaque pays. Nos résultats empiriques valident l'hypothèse selon laquelle la promotion du commerce induite par le développement financier du pays exportateur, en particulier le financement intermédié, s'avère moins forte lorsque ce pays est impliqué dans un ACR avec le pays importateur. Cet effet est cependant atténué pour les secteurs les plus contraints financièrement, pour lesquels le développement reste crucial. Enfin, nos estimations corroborent l'hypothèse selon laquelle le développement financier dans le pays importateur favorise également les échanges commerciaux et ce, d'autant moins que les deux partenaires ont signé un ACR.

Le chapitre trois est, à notre connaissance, l'une des premières études portant sur les interactions entre accords commerciaux et développement financier. Notre apport dans le domaine comporte plusieurs dimensions. Premièrement, nous distinguons les effets du financement intermédié des effets du financement de marché. Deuxièmement, nous évaluons ces effets selon l'intensité de la contrainte financière des secteurs. Troisièmement, nous nous intéressons non seulement au développement financier dans le pays exportateur mais aussi dans le pays importateur. Enfin, nous introduisons un terme d'interaction entre ACR et développement financier dans un modèle de gravité avec des effets fixes structurels et des flux commerciaux intranationaux. Ce faisant, nous contribuons à la littérature sur les interactions entre finance et ouverture commerciale et la manière dont elles influencent le commerce international (Manova, 2008), la productivité des entreprises (Taylor, 2010 ; Topalova et Khandelwal, 2011 ; Peters et Schnitzer, 2015) et la croissance (Chang et al., 2009). En soulignant l'importance des intermédiaires financiers pour le financement du commerce international, nous prolongeons également les travaux menés sur le partage des systèmes financiers entre intermédiation et marché (Allen et Gale, 2000).

Extensions possibles

Notre travail actuel pourrait être enrichi de plusieurs manières. Tout d'abord, alors que nous utilisons des données fournies par l'OMC, Baier et Bergstrand (2007) et Head et al. (2010), il serait intéressant d'examiner de plus près les bases de données proposées par DESTA (Dür et al., 2014 ou Kohl et al., 2016). Le principal avantage de ces bases de données est qu'elles fournissent des informations sur la conception des ACR telles que le contenu détaillé des accords de libéralisation (par exemple, des dispositions tarifaires et non tarifaires), la profondeur de l'accord, les secteurs visés, le type d'accord, la couverture géographique, etc. De telles informations permettraient d'étudier plus finement le rôle joué par la période de mise en œuvre des ACR et le niveau de développement des pays membres à l'échelle des différents produits et secteurs économiques, comme le

proposent Dahi et Demir (2013) et Baier et al. (2018). Outre la question des obstacles tarifaires, les recherches futures pourraient également mettre davantage l'accent sur la nouvelle génération d'ACR et leur rôle dans le domaine des obstacles non tarifaires, des mesures « behind-the-border », ainsi que des règles d'origine et le commerce des services (Krishna et Krueger, 1995 ; Estevadeordal et Suominen, 2005 ; Disdier et al., 2015, et Anderson, Borchert, et al., 2018). Enfin, nous envisageons au moins deux extensions possibles à notre travail sur des interactions entre accords commerciaux et développement financier. Il s'agirait d'une part de mettre en évidence les mécanismes théoriques permettant de mieux comprendre pourquoi certains accords régionaux amplifient (au lieu de réduire) l'effet positif du développement financier sur les échanges commerciaux. D'autre part, au-delà du développement financier, il s'agirait d'étudier dans quelle mesure l'ouverture commerciale et la signature d'ACR interagissent également avec la stabilité financière.

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Appendix A

A New Examination of the Impacts of Regional Trade Agreements on International Trade Patterns

A.1 Geographic Area of RTAs

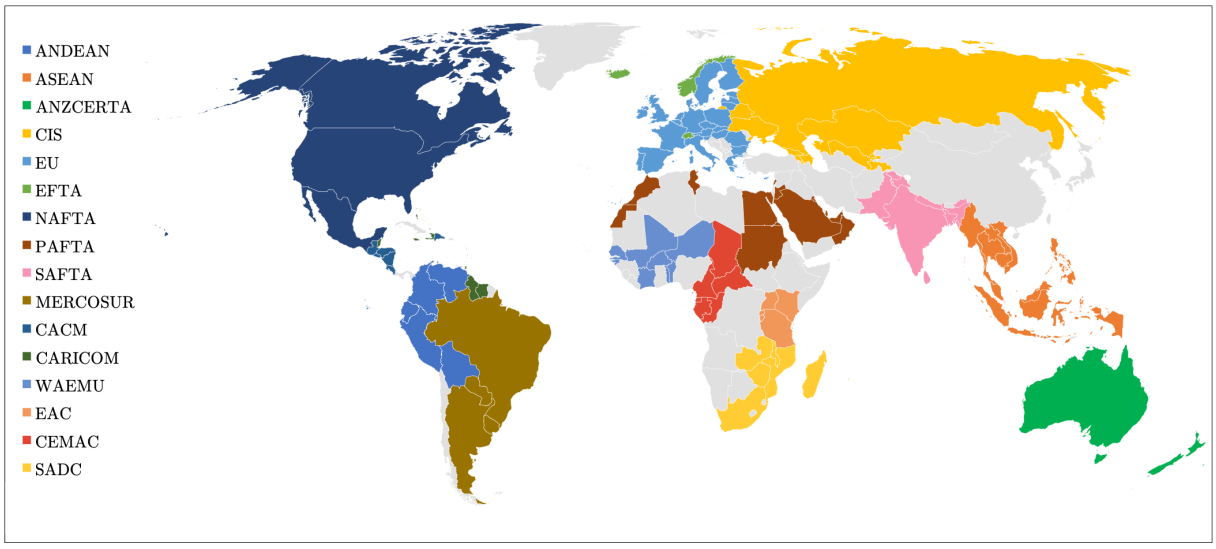

Figure A.1 – Geographic area of RTAs included in the estimation

Source: Author.

A.2 List of Countries

Table A.1 – List of countries used in analysis

Albania	Dominica	Lao	Sao Tome and Principe
Algeria	Dominican Republic	Latvia	Saudi Arabia
Angola	Ecuador	Lebanon	Senegal
Argentina	Egypt	Lithuania	Seychelles
Armenia	El Salvador	Luxembourg	Sierra Leone
Australia	Equatorial Guinea	Macao	Singapore
Austria	Estonia	Macedonia	Slovakia
Azerbaijan	Ethiopia	Madagascar	Slovenia
Bahamas	Fiji	Malawi	Somalia
Bahrain	Finland	Malaysia	South Africa
Bangladesh	France	Mali	Spain
Barbados	Gabon	Malta	Sri Lanka
Belarus	Gambia	Mauritania	St. Kitts and Nevis
Belgium	Georgia	Mauritius	St. Lucia
Belize	Germany	Mexico	St. Vincent and the Grenadines
Benin	Ghana	Mongolia	Sudan
Bolivia	Greece	Morocco	Suriname
Bosnia and Herzegovina	Grenada	Mozambique	Sweden
Brazil	Guatemala	Myanmar	Switzerland
Brunei Darussalam	Guinea	Nepal	Tajikistan
Bulgaria	Guinea-Bissau	Netherlands	Tanzania
Burkina Faso	Guyana	New Zealand	Thailand
Burundi	Haiti	Nicaragua	Togo
Cambodia	Honduras	Niger	Tonga
Cameroon	Hong Kong	Nigeria	Trinidad and Tobago
Canada	Hungary	Norway	Tunisia
Cabo Verde	Iceland	Oman	Turkey
Central African Republic	India	Pakistan	Turkmenistan
Chad	Indonesia	Panama	Uganda
Chile	Iran	Papua New Guinea	Ukraine
China	Ireland	Paraguay	United Arab Emirates
Colombia	Israel	Peru	United Kingdom
Comoros	Italy	Philippines	United States
Congo, Republic of	Jamaica	Poland	Uruguay
Costa Rica	Japan	Portugal	Uzbekistan
Côte d'Ivoire	Jordan	Qatar	Vanuatu
Cyprus	Kazakhstan	Romania	Venezuela
Czech Republic	Kenya	Russian Federation	Vietnam
Denmark	Korea, Republic of	Rwanda	Zambia
Djibouti	Kuwait	Samoa	Zimbabwe

A.3 List of RTAs

Table A.2 – List of RTAs and members included in the estimation

Trade agreement	Type	Member countries
Andean Community	CU	Bolivia (1988); Colombia (1988); Ecuador (1988); Peru (1988); Venezuela (1988)
Australia - New Zealand (ANZCERTA)	FTA	Australia (1983); New Zealand (1983)
Association of Southeast Asian Nations Free Trade Area	FTA	Brunei (1992); Cambodia (1999); Indonesia (1992); Lao (1997); Malaysia (1992); Myanmar (1997); Philippines (1992); Singapore (1992); Thailand (1992); Vietnam (1995)
Central American Common Market (CACM)	CU	Costa Rica (1964-1974 / 1993); El Salvador (1961-1974 / 1993); Guatemala (1961-1974 / 1993); Honduras (1962-1974 / 1993); Nicaragua (1961-1974 / 1993)
Dominican Republic - Central America Free Trade Agreement (CAFTA-DR)	FTA	Costa Rica (2009); Dominican Republic (2007); El Salvador (2006); Guatemala (2006); Honduras (2006); Nicaragua (2006); United States (2006)
Caribbean Community and Common Market (CARICOM)	CU	Bahamas (1983); Barbados (1973); Belize (1974); Dominica (1974); Grenada (1974); Guyana (1973); Jamaica (1973); Haiti (2006); St. Kitts and Nevis (1974); St. Lucia (1974); St. Vincent and the Grenadines (1974); Suriname (1995); Trinidad and Tobago (1973)
Economic and Monetary Community of Central Africa (CEMAC)	CU	Central African Republic (1999); Cameroon (1999); Congo Rep. (1999); Gabon (1999); Equatorial Guinea (1999); Chad (1999)
Commonwealth of Independent States (CIS)	FTA	Armenia (1995); Azerbaijan (1997); Belarus (1995); Georgia (1995); Kazakhstan (1995); Russian Federation (1995); Tajikistan (1997); Ukraine (1995); Uzbekistan (1995)
Common Market for Eastern and Southern Africa (COMESA)	CU	Burundi (1995); Comoros (1995); Djibouti (1995); Egypt (1999); Ethiopia (1995); Kenya (1995); Madagascar (1995); Malawi (1995); Mauritius (1995); Rwanda (1995); Seychelles (2009); Sudan (1995); Tanzania (1995); Uganda (1995); Zambia (1995); Zimbabwe (1995)

Table A.2 continued

Trade agreement	Type	Member countries
East African Community (EAC)	CU	Burundi (2007); Kenya (2000); Rwanda (2007); Tanzania (2000); Uganda (2000)
European Free Trade Association (EFTA)	FTA	Austria (1960-1995); Denmark (1960-1973); Finland (1986-1995); Iceland (1970); Norway (1960); Portugal (1960-1986); Sweden (1960-1995); Switzerland (1960); United Kingdom (1960-1973)
European Union	CU	Austria (1995); Belgium-Luxembourg (1958); Bulgaria (2007); Cyprus (2004); Czech Republic (2004); Denmark (1973); Estonia (2004); Finland (1995); France (1957); Germany (1957); Greece (1981); Hungary (2004); Ireland (1973); Italy (1957); Latvia (2004); Lithuania (2004); Malta (2004); Netherlands (1957); Poland (2004); Portugal (1986); Romania (2007); Slovakia (2004); Slovenia (2004); Spain (1986); Sweden (1995); United Kingdom (1973)
Southern Common Market (Mercosur)	CU	Argentina (1992); Brazil (1992); Paraguay (1992); Uruguay (1992)
North American Free Trade Agreement (NAFTA)	FTA	Canada (1994); Mexico (1994); United States (1994)
Pan-Arab Free Trade Area (PAFTA)	FTA	Bahrain (1998); Egypt (1998); Jordan (1998); Kuwait (1998); Lebanon (1998); Morocco (1998); Oman (1998); Qatar (1998); Saudi Arabia (1998); Sudan (1998); Tunisia (1998); United Arab Emirates (1998)
Southern African Development Community (SADC)	FTA	Madagascar (2001); Malawi (2001); Mauritius (2001); Mozambique (2001); South Africa (2001); Tanzania (2001); Zambia (2001); Zimbabwe (2001)
South Asian Free Trade Agreement (SAFTA)	FTA	Bangladesh (2006); India (2006); Nepal (2006); Pakistan (2006); Sri Lanka (2006)
West African Economic and Monetary Union (WAEMU)	CU	Benin (2000); Burkina Faso (2000); Côte d'Ivoire (2000); Guinea-Bissau (2000); Mali (2000); Niger (2000); Senegal (2000); Togo (2000)

Notes: CU = Customs Union; FTA = Free Trade Agreement. Year in parentheses indicates the date of entry into force of an RTA or the date when new member country joins the RTA.

A.4 Descriptive Statistics for All Variables

Table A.3 – Summary descriptive statistics for gravity controls and RTAs data

Variables	(1) N	(2) Mean	(3) Standard Deviation	(4) Min	(5) Max
X_{ijt}	1,377,473	1.950×10^{8}	2.939×10^{9}	0	4.668×10^{11}
GDP_{it}	1,262,937	1.667×10^{11}	8.225×10^{11}	11,592,048	1.742×10^{13}
GDP_{jt}	1,262,937	1.667×10^{11}	8.225×10^{11}	11,592,048	1.742×10^{13}
$CONTIG_{ij}$	1,399,200	0.018	0.132	0	1
ln GDP_{it}	1,262,937	22.931	2.497	16.266	30.489
ln GDP_{jt}	1,262,938	22.931	2.497	16.266	30.489
$LANG_{ij}$	1,399,200	0.152	0.359	0	1
$DIST_{ij}$	1,399,201	7,788.990	4,446.031	60.771	19,650.127
ln $DIST_{ij}$	1,399,202	8.736	0.766	4.107	9.886
$ANDEAN\_Intra_{ijt}$	1,399,203	0	0.02	0	1
$ANZCERTA\_Intra_{ijt}$	1,399,205	0	0.007	0	1
$ASEAN\_Intra_{ijt}$	1,399,204	0.001	0.035	0	1
$CACM\_Intra_{ijt}$	1,399,220	0	0.022	0	1
$CAFTA\text{-}DR\_Intra_{ijt}$	1,399,208	0	0.015	0	1
$CARICOM\_Intra_{ijt}$	1,399,219	0.004	0.06	0	1
$CEMAC\_Intra_{ijt}$	1,399,217	0	0.019	0	1
CIS_Intra_{ijt}	1,399,207	0.001	0.031	0	1
$COMESA\_Intra_{ijt}$	1,399,206	0.003	0.055	0	1
EAC_Intra_{ijt}	1,399,218	0	0.012	0	1
$EFTA\_Intra_{ijt}$	1,399,210	0.001	0.032	0	1
EU_Intra_{ijt}	1,399,209	0.009	0.092	0	1
$MERCOSUR\_Intra_{ijt}$	1,399,214	0	0.014	0	1
$NAFTA\_Intra_{ijt}$	1,399,211	0	0.009	0	1
$PAFTA\_Intra_{ijt}$	1,399,212	0.002	0.04	0	1
$SADC\_Intra_{ijt}$	1,399,216	0.001	0.024	0	1
$SAFTA\_Intra_{ijt}$	1,399,213	0	0.011	0	1
$WAEMU\_Intra_{ijt}$	1,399,215	0.001	0.024	0	1

Note: For the sake of brevity, we do not report here the RTA variables for extrabloc trade. Source: Author's calculations.

A.5 Robustness Check: Effects of RTAs Based on Different Intervals

Table A.4 – Effects of RTAs on extrabloc trade based on different intervals panel data

Specifications	PPML		
	X_{ijt}		
Variables	Consecutive years (1)	3-year intervals (2)	4-year intervals (3)
ANDEAN_Intra	0.714***	0.771***	0.800***
	(0.133)	(0.138)	(0.179)
ANDEAN_X	–0.161	–0.063	–0.161
	(0.130)	(0.132)	(0.137)
ANDEAN_M	–0.158*	–0.187*	–0.137
	(0.095)	(0.104)	(0.099)
ANZCERTA_Intra	0.039	0.050	0.052
	(0.189)	(0.197)	(0.182)
ANZCERTA_X	–0.294***	–0.248**	–0.345***
	(0.108)	(0.114)	(0.110)
ANZCERTA_M	–0.068	–0.053	–0.034
	(0.119)	(0.121)	(0.122)
ASEAN_Intra	0.012	0.070	0.152
	(0.176)	(0.191)	(0.201)
ASEAN_X	0.137	0.172	0.175
	(0.110)	(0.116)	(0.124)
ASEAN_M	0.093	0.104	0.196**
	(0.075)	(0.078)	(0.079)
CACM_Intra	0.056	0.020	0.015
	(0.139)	(0.150)	(0.142)
CACM_X	0.216*	0.209*	0.242**
	(0.115)	(0.118)	(0.115)
CACM_M	0.372***	0.373***	0.369***
	(0.081)	(0.087)	(0.074)
CAFTADR_Intra	–0.001	0.024	0.010
	(0.109)	(0.101)	(0.124)
CAFTADR_X	–0.083	–0.031	–0.063
	(0.065)	(0.070)	(0.066)
CAFTADR_M	–0.099	–0.111*	–0.107*
	(0.066)	(0.062)	(0.062)
CARICOM_Intra	–0.711	–0.681	–0.629
	(0.438)	(0.480)	(0.401)
CARICOM_X	–1.279***	–1.290***	–1.210***
	(0.441)	(0.466)	(0.397)
CARICOM_M	–0.448**	–0.428*	–0.426*

Table A.4 continued

Specifications	PPML		
	X_{ijt}		
Variables	Consecutive years (1)	3-year intervals (2)	4-year intervals (3)
	(0.228)	(0.230)	(0.235)
CEMAC_Intra	–0.373	–0.397	–0.367
	(0.262)	(0.260)	(0.279)
CEMAC_X	–0.133	–0.140	–0.073
	(0.143)	(0.148)	(0.153)
CEMAC_M	–0.122	–0.148	–0.181
	(0.111)	(0.121)	(0.124)
CIS_Intra	1.809***	2.829***	2.220***
	(0.277)	(0.508)	(0.612)
CIS_X	1.418***	1.451***	1.628***
	(0.130)	(0.134)	(0.144)
CIS_M	0.695***	0.681***	0.872***
	(0.144)	(0.141)	(0.156)
COMESA_Intra	0.243*	0.184	0.262*
	(0.126)	(0.138)	(0.145)
COMESA_X	–0.237**	–0.253**	–0.275**
	(0.102)	(0.111)	(0.108)
COMESA_M	–0.279***	–0.294***	–0.274***
	(0.073)	(0.077)	(0.081)
EAC_Intra	–0.361**	–0.324*	–0.382**
	(0.156)	(0.168)	(0.168)
EAC_X	–0.610***	–0.558***	–0.653***
	(0.112)	(0.117)	(0.119)
EAC_M	–0.020	0.041	0.007
	(0.113)	(0.119)	(0.122)
EFTA_Intra	0.598***	0.766***	0.694***
	(0.100)	(0.111)	(0.115)
EFTA_X	0.307***	0.402***	0.358***
	(0.056)	(0.066)	(0.070)
EFTA_M	0.276***	0.376***	0.385***
	(0.056)	(0.064)	(0.067)
EU_Intra	0.567***	0.652***	0.633***
	(0.063)	(0.072)	(0.077)
EU_X	0.091*	0.126**	0.080
	(0.055)	(0.061)	(0.066)
EU_M	–0.045	–0.013	–0.007
	(0.054)	(0.060)	(0.063)
MERCOSUR_Intra	0.605***	0.595***	0.530***
	(0.145)	(0.152)	(0.123)
MERCOSUR_X	–0.134*	–0.136*	–0.196**

Table A.4 continued

Specifications	PPML		
	X_{ijt}		
Variables	Consecutive years (1)	3-year intervals (2)	4-year intervals (3)
	(0.073)	(0.077)	(0.081)
MERCOSUR_M	0.115	0.093	0.043
	(0.088)	(0.093)	(0.087)
NAFTA_Intra	0.290**	0.275**	0.281**
	(0.114)	(0.132)	(0.119)
NAFTA_X	–0.195***	–0.201***	–0.202***
	(0.042)	(0.043)	(0.042)
NAFTA_M	0.094	0.080	0.105
	(0.099)	(0.097)	(0.100)
PAFTA_Intra	–0.145	–0.141	–0.139
	(0.158)	(0.170)	(0.164)
PAFTA_X	–0.164**	–0.137*	–0.128*
	(0.075)	(0.076)	(0.075)
PAFTA_M	–0.084	–0.057	–0.073
	(0.071)	(0.075)	(0.076)
SADC_Intra	0.745***	0.764***	0.724***
	(0.135)	(0.151)	(0.167)
SADC_X	0.174	0.225*	0.212
	(0.122)	(0.124)	(0.130)
SADC_M	0.182*	0.177*	0.190**
	(0.102)	(0.103)	(0.097)
SAFTA_Intra	0.310***	0.333***	0.328***
	(0.110)	(0.116)	(0.101)
SAFTA_X	0.369***	0.397***	0.401***
	(0.074)	(0.073)	(0.075)
SAFTA_M	0.475***	0.463***	0.532***
	(0.094)	(0.094)	(0.096)
WAEMU_Intra	0.067	0.013	0.127
	(0.144)	(0.147)	(0.135)
WAEMU_X	–0.330***	–0.322***	–0.373***
	(0.084)	(0.086)	(0.084)
WAEMU_M	–0.121*	–0.094	–0.129
	(0.073)	(0.075)	(0.088)
ln GDP_{it}	0.744***	0.737***	0.737***
	(0.038)	(0.038)	(0.039)
ln GDP_{jt}	0.667***	0.651***	0.653***
	(0.062)	(0.063)	(0.061)
Observations	1,039,417	347,537	248,524
Country pairs	22,847	22,031	21,618
Country-pair FEs	Yes	Yes	Yes

Table A.4 continued

Specifications	PPML		
	X_{ijt}		
Variables	Consecutive years (1)	3-year intervals (2)	4-year intervals (3)
Year FEs	Yes	Yes	Yes

Notes: This table reports estimates of the effects of trading blocs on intrabloc trade and extrabloc trade. All estimates are obtained by using the PPML estimator with country-pair and year fixed effects. The estimates of the fixed effects are omitted for brevity. Columns (1), (2) and (3) employ the data with consecutive years, three-year intervals and four-year intervals, respectively. Standard errors are reported in parentheses and clustered by country pair. *, ** and *** denote significance at the level of 10%, 5% and 1%, respectively.

A.6 Robustness: Effects of RTAs with Phase-In Periods

Table A.5 – Effects of RTAs with phase-in periods

Specifications	PPML	
	X_{ijt}	
Variables	3-year lags (1)	3- and 6-year lags (2)
ANDEAN_Intra	0.480***	0.477***
	(0.137)	(0.137)
ANDEAN_Intra$_{it-1}$	0.299	0.505***
	(0.216)	(0.132)
ANDEAN_Intra$_{it-2}$		–0.209
		(0.254)
ANDEAN_X	0.146	0.144
	(0.132)	(0.132)
ANDEAN_X$_{it-1}$	–0.217**	–0.273***
	(0.089)	(0.035)
ANDEAN_X$_{it-2}$		0.064
		(0.086)
ANDEAN_M	–0.373***	–0.374***
	(0.073)	(0.073)
ANDEAN_M$_{it-1}$	0.199**	0.278***
	(0.092)	(0.044)
ANDEAN_M$_{it-2}$		–0.084
		(0.106)
ANZCERTA_Intra	0.288***	0.289***
	(0.063)	(0.063)
ANZCERTA_Intra$_{it-1}$	–0.244*	–0.124**
	(0.144)	(0.048)
ANZCERTA_Intra$_{it-2}$		–0.121
		(0.102)
ANZCERTA_X	–0.168***	–0.168***
	(0.049)	(0.049)
ANZCERTA_X$_{it-1}$	–0.081	0.013
	(0.104)	(0.068)
ANZCERTA_X$_{it-2}$		–0.094
		(0.106)
ANZCERTA_M	–0.083	–0.082
	(0.082)	(0.080)
ANZCERTA_M$_{it-1}$	0.032	0.020
	(0.122)	(0.068)
ANZCERTA_M$_{it-2}$		0.013

Table A.5 continued

Specifications	PPML	
	X_{ijt}	
Variables	3-year lags (1)	3- and 6-year lags (2)
		(0.075)
ASEAN_Intra	0.204**	0.204**
	(0.099)	(0.099)
$ASEAN\_Intra_{it-1}$	–0.143	0.039
	(0.152)	(0.077)
$ASEAN\_Intra_{it-2}$		–0.194
		(0.161)
ASEAN_X	0.138	0.141
	(0.092)	(0.092)
$ASEAN\_X_{it-1}$	0.035	0.036
	(0.072)	(0.026)
$ASEAN\_X_{it-2}$		–0.002
		(0.074)
ASEAN_M	0.164***	0.169***
	(0.051)	(0.051)
$ASEAN\_M_{it-1}$	–0.063	0.071**
	(0.063)	(0.029)
$ASEAN\_M_{it-2}$		–0.153***
		(0.055)
CACM_Intra	–0.036	–0.026
	(0.114)	(0.116)
$CACM\_Intra_{it-1}$	0.048	–0.014
	(0.078)	(0.054)
$CACM\_Intra_{it-2}$		0.062
		(0.070)
CACM_X	0.002	0.014
	(0.114)	(0.111)
$CACM\_X_{it-1}$	0.218*	0.114**
	(0.113)	(0.056)
$CACM\_X_{it-2}$		0.110
		(0.103)
CACM_M	0.210***	0.246***
	(0.074)	(0.075)
$CACM\_M_{it-1}$	0.201***	–0.039
	(0.053)	(0.050)
$CACM\_M_{it-2}$		0.265***
		(0.064)
CAFTADR_Intra	0.079	0.075
	(0.109)	(0.111)
$CAFTADR\_Intra_{it-1}$	–0.049	–0.022

Table A.5 continued

Specifications	PPML	
	X_{ijt}	
Variables	3-year lags (1)	3- and 6-year lags (2)
	(0.053)	(0.047)
CAFTADR_Intra$_{it-2}$		–0.042
		(0.041)
CAFTADR_X	–0.007	0.023
	(0.067)	(0.069)
CAFTADR_X$_{it-1}$	0.050**	0.048*
	(0.025)	(0.026)
CAFTADR_X$_{it-2}$		0.032
		(0.021)
CAFTADR_M	–0.040	–0.033
	(0.053)	(0.051)
CAFTADR_M$_{it-1}$	–0.084*	–0.071*
	(0.051)	(0.042)
CAFTADR_M$_{it-2}$		–0.001
		(0.038)
CARICOM_Intra	–0.281	–0.232
	(0.287)	(0.280)
CARICOM_Intra$_{it-1}$	–0.371	–0.155
	(0.277)	(0.096)
CARICOM_Intra$_{it-2}$		–0.214
		(0.302)
CARICOM_X	–0.351**	–0.356**
	(0.156)	(0.157)
CARICOM_X$_{it-1}$	–1.009***	–0.252***
	(0.350)	(0.083)
CARICOM_X$_{it-2}$		–0.797**
		(0.325)
CARICOM_M	0.115	0.097
	(0.155)	(0.150)
CARICOM_M$_{it-1}$	–0.625***	–0.133
	(0.202)	(0.125)
CARICOM_M$_{it-2}$		–0.551***
		(0.183)
CEMAC_Intra	–0.142	–0.106
	(0.174)	(0.174)
CEMAC_Intra$_{it-1}$	–0.276	–0.258
	(0.195)	(0.320)
CEMAC_Intra$_{it-2}$		–0.059
		(0.226)
CEMAC_X	–0.279**	–0.238*

Table A.5 continued

Specifications	PPML	
	X_{ijt}	
Variables	3-year lags (1)	3- and 6-year lags (2)
	(0.139)	(0.138)
CEMAC_X_{it-1}	0.136	–0.064
	(0.181)	(0.107)
CEMAC_X_{it-2}		0.171
		(0.156)
CEMAC_M	–0.165	–0.146
	(0.176)	(0.176)
CEMAC_M_{it-1}	0.018	–0.001
	(0.188)	(0.153)
CEMAC_M_{it-2}		–0.005
		(0.088)
COMESA_Intra	0.380***	0.383***
	(0.127)	(0.127)
COMESA_$Intra_{it-1}$	–0.230	–0.168
	(0.184)	(0.141)
COMESA_$Intra_{it-2}$		–0.076
		(0.214)
COMESA_X	–0.195***	–0.194***
	(0.067)	(0.067)
COMESA_X_{it-1}	–0.058	–0.077
	(0.108)	(0.058)
COMESA_X_{it-2}		0.024
		(0.110)
COMESA_M	–0.121**	–0.122**
	(0.052)	(0.053)
COMESA_M_{it-1}	–0.193***	–0.115***
	(0.063)	(0.042)
COMESA_M_{it-2}		–0.087
		(0.063)
EAC_Intra	0.241	0.256
	(0.177)	(0.228)
EAC_$Intra_{it-1}$	–0.569***	–0.208***
	(0.110)	(0.071)
EAC_$Intra_{it-2}$		–0.437***
		(0.154)
EAC_X	–0.346***	–0.360**
	(0.122)	(0.140)
EAC_X_{it-1}	–0.227**	–0.087
	(0.090)	(0.081)
EAC_X_{it-2}		–0.165**

Table A.5 continued

Specifications	PPML	
	X_{ijt}	
Variables	3-year lags (1)	3- and 6-year lags (2)
		(0.074)
EAC_M	–0.019	0.030
	(0.106)	(0.117)
EAC_M_{it-1}	0.099	–0.049
	(0.074)	(0.066)
EAC_M_{it-2}		0.129
		(0.079)
EFTA_Intra	0.489***	0.529***
	(0.088)	(0.092)
$EFTA\_Intra_{it-1}$	0.342***	–0.047
	(0.087)	(0.052)
$EFTA\_Intra_{it-2}$		0.493***
		(0.074)
EFTA_X	0.214***	0.233***
	(0.063)	(0.063)
$EFTA\_X_{it-1}$	0.233***	–0.017
	(0.040)	(0.029)
$EFTA\_X_{it-2}$		0.326***
		(0.039)
EFTA_M	0.324***	0.327***
	(0.061)	(0.060)
$EFTA\_M_{it-1}$	0.071	0.010
	(0.046)	(0.032)
$EFTA\_M_{it-2}$		0.092**
		(0.041)
EU_Intra	0.494***	0.492***
	(0.065)	(0.066)
EU_Intra_{it-1}	0.202***	0.036
	(0.040)	(0.039)
EU_Intra_{it-2}		0.256***
		(0.030)
EU_X	0.106*	0.101*
	(0.058)	(0.058)
EU_X_{it-1}	0.029	–0.056**
	(0.031)	(0.025)
EU_X_{it-2}		0.137***
		(0.027)
EU_M	0.049	0.049
	(0.057)	(0.057)
EU_M_{it-1}	–0.070**	–0.051

Table A.5 continued

Specifications	PPML	
	X_{ijt}	
Variables	3-year lags (1)	3- and 6-year lags (2)
	(0.035)	(0.033)
EU_M_{it-2}		–0.012
		(0.028)
MERCOSUR_Intra	0.586***	0.590***
	(0.110)	(0.110)
$MERCOSUR\_Intra_{it-1}$	0.011	0.012
	(0.125)	(0.149)
$MERCOSUR\_Intra_{it-2}$		0.002
		(0.101)
MERCOSUR_X	–0.204***	–0.203***
	(0.051)	(0.051)
$MERCOSUR\_X_{it-1}$	0.070	–0.231***
	(0.075)	(0.056)
$MERCOSUR\_X_{it-2}$		0.328***
		(0.064)
MERCOSUR_M	–0.056	–0.052
	(0.064)	(0.065)
$MERCOSUR\_M_{it-1}$	0.160**	0.046
	(0.078)	(0.048)
$MERCOSUR\_M_{it-2}$		0.120*
		(0.065)
NAFTA_Intra	0.459***	0.469***
	(0.094)	(0.094)
$NAFTA\_Intra_{it-1}$	–0.218***	–0.065**
	(0.056)	(0.028)
$NAFTA\_Intra_{it-2}$		–0.196***
		(0.068)
NAFTA_X	0.048	0.055*
	(0.030)	(0.029)
$NAFTA\_X_{it-1}$	–0.304***	–0.211***
	(0.053)	(0.035)
$NAFTA\_X_{it-2}$		–0.128**
		(0.052)
NAFTA_M	0.022	0.039
	(0.068)	(0.069)
$NAFTA\_M_{it-1}$	0.059	0.026
	(0.062)	(0.036)
$NAFTA\_M_{it-2}$		0.011
		(0.055)
PAFTA_Intra	–0.320**	–0.291**

Table A.5 continued

Specifications	PPML	
	X_{ijt}	
Variables	3-year lags (1)	3- and 6-year lags (2)
	(0.139)	(0.138)
$PAFTA\_Intra_{it-1}$	0.182	–0.050
	(0.136)	(0.080)
$PAFTA\_Intra_{it-2}$		0.212**
		(0.108)
PAFTA_X	–0.596***	–0.559***
	(0.067)	(0.066)
$PAFTA\_X_{it-1}$	0.476***	0.052
	(0.067)	(0.044)
$PAFTA\_X_{it-2}$		0.421***
		(0.052)
PAFTA_M	–0.205***	–0.198***
	(0.050)	(0.047)
$PAFTA\_M_{it-1}$	0.163**	–0.044
	(0.070)	(0.046)
$PAFTA\_M_{it-2}$		0.214***
		(0.055)
SADC_Intra	0.892***	0.878***
	(0.128)	(0.135)
$SADC\_Intra_{it-1}$	–0.109	–0.083
	(0.089)	(0.130)
$SADC\_Intra_{it-2}$		–0.002
		(0.161)
SADC_X	0.210***	0.189**
	(0.075)	(0.076)
$SADC\_X_{it-1}$	0.015	–0.177***
	(0.128)	(0.049)
$SADC\_X_{it-2}$		0.257*
		(0.139)
SADC_M	0.052	0.053
	(0.082)	(0.086)
$SADC\_M_{it-1}$	0.145**	–0.001
	(0.067)	(0.089)
$SADC\_M_{it-2}$		0.176**
		(0.080)
SAFTA_Intra	0.472***	0.465***
	(0.102)	(0.102)
$SAFTA\_Intra_{it-1}$	–0.176**	–0.178***
	(0.084)	(0.056)
$SAFTA\_Intra_{it-2}$		0.027

Table A.5 continued

Specifications	PPML	
	X_{ijt}	
Variables	3-year lags (1)	3- and 6-year lags (2)
		(0.107)
SAFTA_X	0.395***	0.382***
	(0.074)	(0.072)
SAFTA_X_{it-1}	0.002	0.034
	(0.056)	(0.042)
SAFTA_X_{it-2}		–0.040
		(0.058)
SAFTA_M	0.415***	0.394***
	(0.086)	(0.085)
SAFTA_M_{it-1}	0.061	0.121**
	(0.046)	(0.049)
SAFTA_M_{it-2}		–0.098**
		(0.039)
WAEMU_Intra	0.111	0.086
	(0.083)	(0.083)
WAEMU_$Intra_{it-1}$	–0.107	–0.063
	(0.131)	(0.144)
WAEMU_$Intra_{it-2}$		–0.026
		(0.109)
WAEMU_X	–0.158	–0.179
	(0.109)	(0.109)
WAEMU_X_{it-1}	–0.186	–0.084
	(0.114)	(0.118)
WAEMU_X_{it-2}		–0.103
		(0.112)
WAEMU_M	–0.052	–0.067
	(0.087)	(0.088)
WAEMU_M_{it-1}	–0.045	0.029
	(0.072)	(0.081)
WAEMU_M_{it-2}		–0.079
		(0.090)
ln GDP_{it}	0.742***	0.745***
	(0.039)	(0.040)
ln GDP_{jt}	0.653***	0.658***
	(0.065)	(0.067)
Observations	347537	347537
Country pairs	22,031	22,031
Country-pair FEs	Yes	Yes
Year FEs	Yes	Yes

Notes: This table reports estimates of the effects of trading blocs on intrabloc trade and extrabloc trade

using the data with three-year intervals. All estimates are obtained by using the PPML estimator with country-pair and year fixed effects. Column (1) provides estimates with three-year lags. Column (2) presents estimates with three-year and six-year lags. The estimates of the fixed effects are omitted for brevity. Standard errors are reported in parentheses and clustered by country pair. *, ** and *** denote significance at the level of 10%, 5% and 1%, respectively.

Appendix B

Implementation Period of Trade Liberalization and Economic Development: Do They Matter to Regional Trade Agreements?

B.1 List of RTAs

Table B.1 – RTAs included in analysis

RTA name	Type	Date of entry into force	End of implementation	North-North, North-South, South-South
Agadir Agreement	FTA	27/03/2007	2007	South-South
Andean Community (CAN)	CU	25/05/1988	2008	South-South
Armenia–Kazakhstan	FTA	25/12/2001	2001	South-South
Armenia–Turkmenistan	FTA	07/07/1996	1996	South-South
Armenia–Ukraine	FTA	18/12/1996	1996	South-South
ASEAN-Australia-New Zealand	FTA & EIA	01/01/2010	2025	North-South
ASEAN-China	FTA & EIA	01/01/2005	2020	South-South
ASEAN-India	FTA & EIA	01/01/2010	2024	South-South
ASEAN-Japan	FTA	01/12/2008	2026	North-South
ASEAN-Korea, Republic of	FTA & EIA	01/01/2010	2024	North-South
ASEAN Free Trade Area (AFTA)	FTA	01/01/1993	2018	South-South
Australia–Chile	FTA & EIA	06/03/2009	2015	North-South
Australia–China	FTA & EIA	20/12/2015	2029	North-South
Australia–New Zealand (ANZCERTA)	FTA & EIA	01/01/1983	1995	North-North
Australia–Papua New Guinea (PATCRA)	FTA	01/02/1977	1977	North-South
Brunei Darussalam–Japan	FTA & EIA	31/07/2008	2023	North-South

Table B.1 continued

RTA name	Type	Date of entry into force	End of implementation	North-North, North-South, South-South
Canada–Chile	FTA & EIA	05/07/1997	2014	North-South
Canada–Colombia	FTA & EIA	15/08/2011	2032	North-South
Canada–Costa Rica	FTA	01/11/2002	2016	North-South
Canada–Honduras	FTA & EIA	01/10/2014	2028	North-South
Canada–Israel	FTA	01/01/1997	1999	North-North
Canada–Jordan	FTA	01/10/2012	2016	North-South
Canada–Korea, Republic of	FTA & EIA	01/01/2015	2035	North-North
Canada–Panama	FTA & EIA	01/04/2013	2031	North-South
Canada–Peru	FTA & EIA	01/08/2009	2025	North-South
Caribbean Community and Common Market (CARICOM)	CU & EIA	01/08/1973	1985	South-South
Central American Common Market (CACM)	CU	04/06/1961	1965	South-South
Central American Common Market (CACM)-Accession of Panama	FTA	06/05/2013	2017	South-South
Central European Free Trade Agreement (CEFTA)	FTA	01/05/2007	2008	South-South
Chile–China	FTA & EIA	01/10/2006	2015	South-South
Chile–Colombia	FTA & EIA	08/05/2009	2012	South-South
Chile–Costa Rica (Chile-Central America)	FTA & EIA	15/02/2002	2014	South-South
Chile–El Salvador (Chile-Central America)	FTA & EIA	01/06/2002	2017	South-South
Chile–Guatemala (Chile-Central America)	FTA & EIA	23/03/2010	2029	South-South
Chile–Honduras (Chile-Central America)	FTA & EIA	19/07/2008	2017	South-South
Chile–Japan	FTA & EIA	03/09/2007	2022	North-South
Chile–Malaysia	FTA	25/02/2012	2016	South-South
Chile–Mexico	FTA & EIA	01/08/1999	2006	South-South
Chile–Nicaragua (Chile-Central America)	FTA & EIA	19/10/2012	2026	South-South
Chile–Viet Nam	FTA	01/01/2014	2029	South-South
China–Costa Rica	FTA & EIA	01/08/2011	2025	South-South
China–Hong Kong, China	FTA & EIA	29/06/2003	2014	North-South
China–Korea, Republic of	FTA & EIA	20/12/2015	2016	North-South
China–Macao, China	FTA & EIA	17/10/2003	2014	North-South
China–New Zealand	FTA & EIA	01/10/2008	2019	North-South
China–Singapore	FTA & EIA	01/01/2009	2010	North-South
Colombia–Mexico	FTA & EIA	01/01/1995	2020	South-South
Colombia-Northern Triangle (El Salvador, Guatemala, Honduras)	FTA & EIA	12/11/2009	2010	South-South
Common Economic Zone (CEZ)	FTA	20/05/2004	2004	South-South
Common Market for Eastern and Southern Africa (COMESA)	CU	08/12/1994	2000	South-South

Table B.1 continued

RTA name	Type	Date of entry into force	End of implementation	North-North, North-South, South-South
Common Market for Eastern and Southern Africa (COMESA)-Accession of Egypt	CU	17/02/1999	2017	South-South
Commonwealth of Independent States (CIS)	FTA	30/12/1994	1994	South-South
Costa Rica–Colombia	FTA & EIA	01/08/2016	2030	South-South
Costa Rica–Peru	FTA & EIA	01/06/2013	2027	South-South
Costa Rica–Singapore	FTA & EIA	01/07/2013	2022	North-South
Dominican Republic–Central America	FTA & EIA	04/10/2001	2004	South-South
Dominican Republic-Central America-United States Free Trade Agreement (CAFTA-DR)	FTA & EIA	01/03/2006	2025	North-South
East African Community (EAC)	CU & EIA	07/07/2000	2005	South-South
East African Community (EAC)-Accession of Burundi and Rwanda	CU	01/07/2007	2012	South-South
EC (10) Enlargement	CU	01/01/1981	1986	North-North
EC (12) Enlargement	CU	01/01/1986	1996	North-North
EC (15) Enlargement	CU & EIA	01/01/1995	2005	North-North
EC (25) Enlargement	CU & EIA	01/05/2004	2009	North-South
EC (27) Enlargement	CU & EIA	01/01/2007	2013	North-South
EC (9) Enlargement	CU	01/01/1973	1978	North-North
EC Treaty	CU & EIA	01/01/1958	1970	North-North
Economic and Monetary Community of Central Africa (CEMAC)	CU	24/06/1999	1999	South-South
Economic Community of West African States (ECOWAS)	CU	24/07/1993	2000	South-South
EFTA-Accession of Iceland	FTA	01/03/1970	1980	North-North
EFTA-Albania	FTA	01/11/2010	2010	North-South
EFTA-Bosnia and Herzegovina	FTA	01/01/2015	2018	North-South
EFTA-Canada	FTA	01/07/2009	2024	North-North
EFTA-Central America (Costa Rica and Panama)	FTA & EIA	19/08/2014	2028	North-South
EFTA-Chile	FTA & EIA	01/12/2004	2010	North-South
EFTA-Colombia	FTA & EIA	01/07/2011	2027	North-South
EFTA-Egypt	FTA	01/08/2007	2020	North-South
EFTA-Former Yugoslav Republic of Macedonia	FTA	01/05/2002	2011	North-South
EFTA-Hong Kong, China	FTA & EIA	01/10/2012	2012	North-North
EFTA-Israel	FTA	01/01/1993	2003	North-North
EFTA-Jordan	FTA	01/09/2002	2014	North-South
EFTA-Korea, Republic of	FTA & EIA	01/09/2006	2016	North-North
EFTA-Lebanon	FTA	01/01/2007	2015	North-South
EFTA-Mexico	FTA & EIA	01/07/2001	2011	North-South

Table B.1 continued

RTA name	Type	Date of entry into force	End of implementation	North-North, North-South, South-South
EFTA-Morocco	FTA	01/12/1999	2011	North-South
EFTA-Peru	FTA	01/07/2011	2027	North-South
EFTA-SACU	FTA	01/05/2008	2015	North-South
EFTA-Singapore	FTA & EIA	01/01/2003	2003	North-North
EFTA-Tunisia	FTA	01/06/2005	2023	North-South
EFTA-Turkey	FTA	01/04/1992	1996	North-South
EFTA-Ukraine	FTA & EIA	01/06/2012	2022	North-South
Egypt-Turkey	FTA	01/03/2007	2020	South-South
EU-Albania	FTA & EIA	01/12/2006	2011	North-South
EU-Algeria	FTA	01/09/2005	2017	North-South
EU-Bosnia and Herzegovina	FTA & EIA	01/07/2008	2013	North-South
EU-Cameroon	FTA	04/08/2014	2023	North-South
EU-CARIFORUM States EPA	FTA & EIA	01/11/2008	2033	North-South
EU-Central America	FTA & EIA	01/08/2013	2027	North-South
EU-Chile	FTA & EIA	01/02/2003	2013	North-South
EU-Colombia and Peru and Ecuador	FTA & EIA	01/03/2013	2031	North-South
EU-Eastern and Southern Africa States Interim EPA	FTA	14/05/2012	2022	North-South
EU-Egypt	FTA	01/06/2004	2019	North-South
EU-Former Yugoslav Republic of Macedonia	FTA & EIA	01/06/2001	2011	North-South
EU-Georgia	FTA & EIA	01/09/2014	2024	North-South
EU-Iceland	FTA	01/04/1973	1984	North-North
EU-Israel	FTA	01/06/2000	2000	North-North
EU-Jordan	FTA	01/05/2002	2013	North-South
EU-Korea, Republic of	FTA & EIA	01/07/2011	2031	North-North
EU-Lebanon	FTA	01/03/2003	2015	North-South
EU-Mexico	FTA & EIA	01/07/2000	2010	North-South
EU-Morocco	FTA	01/03/2000	2011	North-South
EU-Norway	FTA	01/07/1973	1984	North-North
EU-Papua New Guinea / Fiji	FTA	20/12/2009	2023	North-South
EU-South Africa	FTA	01/01/2000	2012	North-South
EU-Switzerland-Liechtenstein	FTA	01/01/1973	1984	North-North
EU-Tunisia	FTA	01/03/1998	2009	North-South
EU-Turkey	CU	01/01/1996	1996	North-South
EU-Ukraine	FTA & EIA	23/04/2014	2026	North-South
Eurasian Economic Union (EAEU)	CU & EIA	01/01/2015	2015	South-South
European Economic Area (EEA)	EIA	01/01/1994	1994	North-North
European Free Trade Association (EFTA)	FTA & EIA	03/05/1960	1966	North-North
Georgia–Armenia	FTA	11/11/1998	1998	South-South
Georgia–Azerbaijan	FTA	10/07/1996	1996	South-South

Table B.1 continued

RTA name	Type	Date of entry into force	End of implementation	North-North, North-South, South-South
Georgia–Kazakhstan	FTA	16/07/1999	1999	South-South
Georgia–Russian Federation	FTA	10/05/1994	1994	South-South
Georgia–Turkmenistan	FTA	01/01/2000	2000	South-South
Georgia–Ukraine	FTA	04/06/1996	1996	South-South
GUAM	FTA & EIA	10/12/2003	2003	South-South
Gulf Cooperation Council (GCC)	CU	01/01/2003	2007	South-South
Gulf Cooperation Council (GCC)-Singapore	FTA & EIA	01/09/2013	2017	North-South
Hong Kong, China–Chile	FTA & EIA	09/10/2014	2016	North-South
Hong Kong, China–New Zealand	FTA & EIA	01/01/2011	2016	North-North
Iceland–China	FTA & EIA	01/07/2014	2024	North-South
India–Japan	FTA & EIA	01/08/2011	2026	North-South
India–Malaysia	FTA & EIA	01/07/2011	2019	South-South
India–Singapore	FTA & EIA	01/08/2005	2009	North-South
India–Sri Lanka	FTA	15/12/2001	2008	South-South
Israel–Mexico	FTA	01/07/2000	2005	North-South
Japan–Australia	FTA & EIA	15/01/2015	2034	North-North
Japan–Indonesia	FTA & EIA	01/07/2008	2023	North-South
Japan–Malaysia	FTA & EIA	13/07/2006	2021	North-South
Japan–Mexico	FTA & EIA	01/04/2005	2015	North-South
Japan–Peru	FTA & EIA	01/03/2012	2027	North-South
Japan–Philippines	FTA & EIA	11/12/2008	2023	North-South
Japan–Singapore	FTA & EIA	30/11/2002	2022	North-North
Japan–Switzerland	FTA & EIA	01/09/2009	2024	North-North
Japan–Thailand	FTA & EIA	01/11/2007	2022	North-South
Japan–Viet Nam	FTA & EIA	01/10/2009	2026	North-South
Jordan–Singapore	FTA & EIA	22/08/2005	2014	North-South
Korea, Republic of–Colombia	FTA & EIA	15/07/2016	2034	North-South
Korea, Republic of–Australia	FTA & EIA	12/12/2014	2033	North-North
Korea, Republic of–Chile	FTA & EIA	01/04/2004	2020	North-South
Korea, Republic of–India	FTA & EIA	01/01/2010	2019	North-South
Korea, Republic of–New Zealand	FTA & EIA	20/12/2015	2034	North-North
Korea, Republic of–Singapore	FTA & EIA	02/03/2006	2016	North-North
Korea, Republic of–Turkey	FTA	01/05/2013	2023	North-South
Korea, Republic of–United States	FTA & EIA	15/03/2012	2031	North-North
Malaysia–Australia	FTA & EIA	01/01/2013	2026	North-South
Mexico-Central America	FTA & EIA	01/09/2012	2022	South-South
Mexico–Panama	FTA & EIA	01/07/2015	2015	South-South
Mexico–Uruguay	FTA & EIA	15/07/2004	2013	South-South
New Zealand–Malaysia	FTA & EIA	01/08/2010	2016	North-South
New Zealand–Singapore	FTA & EIA	01/01/2001	2001	North-North

Table B.1 continued

RTA name	Type	Date of entry into force	End of implementation	North-North, North-South, South-South
North American Free Trade Agreement (NAFTA)	FTA & EIA	01/01/1994	2008	North-South
Pacific Island Countries Trade Agreement (PICTA)	FTA	13/04/2003	2021	South-South
Pakistan–China	FTA & EIA	01/07/2007	2012	South-South
Pakistan–Malaysia	FTA & EIA	01/01/2008	2015	South-South
Pakistan–Sri Lanka	FTA	12/06/2005	2011	South-South
Panama–Chile	FTA & EIA	07/03/2008	2022	South-South
Panama–Costa Rica (Panama-Central America)	FTA & EIA	23/11/2008	2026	South-South
Panama–El Salvador (Panama-Central America)	FTA & EIA	11/04/2003	2013	South-South
Panama–Guatemala (Panama-Central America)	FTA & EIA	20/06/2009	2013	South-South
Panama–Honduras (Panama-Central America)	FTA & EIA	09/01/2009	2026	South-South
Panama–Nicaragua (Panama-Central America)	FTA & EIA	21/11/2009	2013	South-South
Panama–Peru	FTA & EIA	01/05/2012	2029	South-South
Panama–Singapore	FTA & EIA	24/07/2006	2016	North-South
Pan-Arab Free Trade Area (PAFTA)	FTA	01/01/1998	2005	South-South
Peru–Chile	FTA & EIA	01/03/2009	2016	South-South
Peru–China	FTA & EIA	01/03/2010	2026	South-South
Peru–Korea, Republic of	FTA & EIA	01/08/2011	2011	North-South
Peru–Mexico	FTA & EIA	01/02/2012	2023	South-South
Peru–Singapore	FTA & EIA	01/08/2009	2025	North-South
Russian Federation–Azerbaijan	FTA	17/02/1993	1993	South-South
Russian Federation–Belarus–Kazakhstan	CU	03/12/1997	2015	South-South
Russian Federation–Turkmenistan	FTA	06/04/1993	1993	South-South
Russian Federation–Uzbekistan	FTA	25/03/1993	1993	South-South
Singapore–Australia	FTA & EIA	28/07/2003	2003	North-North
South Asian Free Trade Agreement (SAFTA)	FTA	01/01/2006	2016	South-South
Southern African Development Community (SADC)	FTA	01/09/2000	2015	South-South
Southern African Development Community (SADC)-Accession of Seychelles	FTA	25/05/2015	2015	South-South
Southern Common Market (MERCOSUR)	CU & EIA	29/11/1991	2006	South-South
Switzerland–China	FTA & EIA	01/07/2014	2028	North-South
Thailand–Australia	FTA & EIA	01/01/2005	2025	North-South
Thailand–New Zealand	FTA & EIA	01/07/2005	2020	North-South

Table B.1 continued

RTA name	Type	Date of entry into force	End of implementation	North-North, North-South, South-South
Trans-Pacific Strategic Economic Partnership	FTA & EIA	28/05/2006	2017	North-South
Treaty on a Free Trade Area between members of the Commonwealth of Independent States (CIS)	FTA	20/09/2012	2020	South-South
Turkey–Albania	FTA	01/05/2008	2013	South-South
Turkey–Bosnia and Herzegovina	FTA	01/07/2003	2007	South-South
Turkey–Chile	FTA	01/03/2011	2017	South-South
Turkey–Former Yugoslav Republic of Macedonia	FTA	01/09/2000	2008	South-South
Turkey–Georgia	FTA	01/11/2008	2008	South-South
Turkey–Israel	FTA	01/05/1997	2000	North-South
Turkey–Jordan	FTA	01/03/2011	2022	South-South
Turkey–Malaysia	FTA	01/08/2015	2015	South-South
Turkey–Mauritius	FTA	01/06/2013	2022	South-South
Turkey–Morocco	FTA	01/01/2006	2015	South-South
Turkey–Tunisia	FTA	01/07/2005	2014	South-South
Ukraine–Azerbaijan	FTA	02/09/1996	1996	South-South
Ukraine–Belarus	FTA	11/11/2006	2006	South-South
Ukraine–Former Yugoslav Republic of Macedonia	FTA	05/07/2001	2010	South-South
Ukraine–Kazakhstan	FTA	19/10/1998	1998	South-South
Ukraine–Tajikistan	FTA	11/07/2002	2002	South-South
Ukraine–Uzbekistan	FTA	01/01/1996	1996	South-South
Ukraine –Turkmenistan	FTA	04/11/1995	1995	South-South
United States–Australia	FTA & EIA	01/01/2005	2023	North-North
United States–Bahrain	FTA & EIA	01/08/2006	2015	North-South
United States–Chile	FTA & EIA	01/01/2004	2016	North-South
United States–Colombia	FTA & EIA	15/05/2012	2030	North-South
United States–Israel	FTA	19/08/1985	1995	North-North
United States–Jordan	FTA & EIA	17/12/2001	2010	North-South
United States–Morocco	FTA & EIA	01/01/2006	2030	North-South
United States–Oman	FTA & EIA	01/01/2009	2018	North-South
United States–Panama	FTA & EIA	31/10/2012	2031	North-South
United States–Peru	FTA & EIA	01/02/2009	2025	North-South
United States–Singapore	FTA & EIA	01/01/2004	2014	North-North
West African Economic and Monetary Union (WAEMU)	CU	01/01/2000	2000	South-South
Central Europe FTA	FTA	1993		South-South
EFTA-Bulgaria	FTA	1993		North-South
EFTA-Hungaria	FTA	1993		North-South
EFTA-Poland	FTA	1993		North-South

Table B.1 continued

RTA name	Type	Date of entry into force	End of implementation	North-North, North-South, South-South
EFTA-Romania	FTA	1993		North-South
EU-Hungaria	FTA	1994		North-South
EU-Poland	FTA	1994		North-South
EU-Bulgaria	FTA	1995		North-South
EU-Romania	FTA	1995		North-South
Bolivia–Mexico	FTA	1995		South-South
Costa Rica–Mexico	FTA	1995	2009	South-South
MERCOSUR-Chile	FTA	1996		South-South
MERCOSUR-Bolivia	FTA	1996		South-South
Hungaria–Turkey	FTA	1998		South-South
Hungaria–Israel	FTA	1998		North-South
Mexico–El Salvador	FTA	2001	2012	South-South
Mexico–Guatemala	FTA	2001	2012	South-South
Mexico–Honduras	FTA	2001	2012	South-South
Mexico–Nicaragua	FTA	1998	2012	South-South
Romania–Turkey	FTA	1998		South-South
Poland–Turkey	FTA	1998		South-South
Poland–Israel	FTA	1998		South-South

Source: WTO Regional Trade Agreements Information System (RTA-IS), Baier and Bergstrand (2007), and Head et al. (2010).

B.2 List of Countries

Table B.2 – Countries used in analysis

Albania	Dominica	Lao	Sao Tome and Principe
Algeria	Dominican Republic	Latvia	Saudi Arabia
Angola	Ecuador	Lebanon	Senegal
Argentina	Egypt	Lithuania	Seychelles
Armenia	El Salvador	Luxembourg	Sierra Leone
Australia	Equatorial Guinea	Macao	Singapore
Austria	Estonia	Macedonia	Slovakia
Azerbaijan	Ethiopia	Madagascar	Slovenia
Bahamas	Fiji	Malawi	Somalia
Bahrain	Finland	Malaysia	South Africa
Bangladesh	France	Mali	Spain
Barbados	Gabon	Malta	Sri Lanka
Belarus	Gambia	Mauritania	St. Kitts and Nevis
Belgium	Georgia	Mauritius	St. Lucia
Belize	Germany	Mexico	St. Vincent and the Grenadines
Benin	Ghana	Mongolia	Sudan
Bolivia	Greece	Morocco	Suriname
Bosnia and Herzegovina	Grenada	Mozambique	Sweden
Brazil	Guatemala	Myanmar	Switzerland
Brunei Darussalam	Guinea	Nepal	Tajikistan
Bulgaria	Guinea-Bissau	Netherlands	Tanzania
Burkina Faso	Guyana	New Zealand	Thailand
Burundi	Haiti	Nicaragua	Togo
Cambodia	Honduras	Niger	Tonga
Cameroon	Hong Kong	Nigeria	Trinidad and Tobago
Canada	Hungary	Norway	Tunisia
Cabo Verde	Iceland	Oman	Turkey
Central African Republic	India	Pakistan	Turkmenistan
Chad	Indonesia	Panama	Uganda
Chile	Iran	Papua New Guinea	Ukraine
China	Ireland	Paraguay	United Arab Emirates
Colombia	Israel	Peru	United Kingdom
Comoros	Italy	Philippines	United States
Congo, Republic of	Jamaica	Poland	Uruguay
Costa Rica	Japan	Portugal	Uzbekistan
Côte d'Ivoire	Jordan	Qatar	Vanuatu
Cyprus	Kazakhstan	Romania	Venezuela
Czech Republic	Kenya	Russian Federation	Vietnam
Denmark	Korea, Republic of	Rwanda	Zambia
Djibouti	Kuwait	Samoa	Zimbabwe

B.3 Example of Tariff Elimination Commitments

Table B.3 – Example of North-North RTAs: Tariff elimination commitments applied by the United States and South-Korea under the United States–South-Korea FTA

United States			South-Korea		
Duty phase-out period	Number of tariff lines	Total lines in United States' tariff schedule (%)	Duty phase-out period	Number of tariff lines	Total lines in South-Korea's tariff schedule (%)
MFN duty-free (2012)	3,866	36.8	MFN duty-free (2012)	1,983	16.2
2012	4,854	46.2	2012	7,529	61.6
2013	12	0.1	2013	9	0.1
2014	372	3.5	2014	1,019	8.3
2016	611	5.8	2016	596	4.9
2017	1	0	2017	2	0
2018	91	0.9	2018	55	0.4
2021	619	5.9	2020	1	0
2023	20	0.2	2021	802	6.6
2026	65	0.6	2023	53	0.4
			2026	137	1.1
			2027	2	0
			2028	1	0
			2029	6	0
			2031	2	0
			Remain dutiable	35	0.3
Total	10,511	100	Total	12,232	100

Source: World Trade Organization (2014).

B.4 Sensitivity Analysis

Table B.4 – Sensitivity analysis using the World Bank classification

Variables	(1) PPML	(2) PPML	(3) PPML	(4) PPML
North-North RTAs				
$NN\_RTA^{ij}_{t+1}$	−0.033	−0.032	−0.041	−0.039
	(0.046)	(0.046)	(0.043)	(0.043)
$NN\_RTA^{ij}_{t}$	0.094**	0.097**	0.092**	0.093**
	(0.040)	(0.039)	(0.037)	(0.037)
$NN\_RTA^{ij}_{t-1}$	0.046	0.042	0.032	0.040
	(0.039)	(0.038)	(0.037)	(0.036)
$NN\_RTA^{ij}_{t-2}$	0.114***	0.088***	0.106***	0.074***
	(0.026)	(0.021)	(0.026)	(0.021)
$NN\_RTA^{ij}_{t-3}$		0.041		0.045*
		(0.026)		(0.026)
North-South RTAs				
$NS\_RTA^{ij}_{t+1}$	−0.049	−0.050	–0.043	–0.044
	(0.035)	(0.035)	(0.037)	(0.037)
$NS\_RTA^{ij}_{t}$	0.041	0.034	0.038	0.037
	(0.048)	(0.048)	(0.048)	(0.047)
$NS\_RTA^{ij}_{t-1}$	−0.058	−0.054	–0.048	–0.044
	(0.040)	(0.039)	(0.037)	(0.037)
$NS\_RTA^{ij}_{t-2}$	0.029	−0.010	0.031	0.001
	(0.035)	(0.032)	(0.036)	(0.032)
$NS\_RTA^{ij}_{t-3}$		0.108**		0.070*
		(0.042)		(0.036)
South-South RTAs				
$SS\_RTA^{ij}_{t+1}$	0.094**	0.097**	0.123**	0.127**
	(0.046)	(0.046)	(0.050)	(0.050)
$SS\_RTA^{ij}_{t}$	0.108**	0.109**	0.156***	0.156***
	(0.045)	(0.046)	(0.051)	(0.051)
$SS\_RTA^{ij}_{t-1}$	0.030	0.023	0.044	0.043
	(0.034)	(0.035)	(0.035)	(0.036)
$SS\_RTA^{ij}_{t-2}$	−0.051	0.002	–0.038	0.004
	(0.044)	(0.037)	(0.039)	(0.036)
$SS\_RTA^{ij}_{t-3}$		–0.114**		–0.109***
		(0.044)		(0.041)
Cumulative NN_RTA effect	0.220***	0.236***	0.189***	0.213***
	(0.071)	(0.070)	(0.071)	(0.069)
Cumulative NS_RTA effect	−0.037	0.028	–0.021	0.019
	(0.123)	(0.118)	(0.121)	(0.120)
Cumulative SS_RTA effect	0.182**	0.117	0.286***	0.221**
	(0.085)	(0.099)	(0.082)	(0.094)
Classification	IMF	IMF	World Bank	World Bank
Observations	202,041	202,041	202,041	202,041
Exporter-year FEs	Yes	Yes	Yes	Yes
Importer-year FEs	Yes	Yes	Yes	Yes
Country-pair FEs	Yes	Yes	Yes	Yes

Notes: All estimates are obtained by using the PPML estimator with country-pair and country-time fixed effects. Columns (1) and (2) report the results using the IMF's classification of developed and developing countries. Columns (3) and (4) report the results from the World Bank' classification. The coefficient estimates for the RTA cumulative average treatment effect are computed using the Delta method. Standard errors are reported in parentheses and clustered by country pair. Respectively, *, **, and *** denote significance at the level of 10%, 5%, and 1%.

Appendix C

Financial Development, Trade Agreements and International Trade

C.1 List of Countries

Table C.1 – List of countries in the dataset

Argentina, Australia, Austria, Belgium-Luxembourg, Bolivia, Brazil, Bulgaria, Canada, Cameroon, Chile, China, Colombia, Costa Rica, Cyprus, Denmark, Ecuador, Egypt, Finland, France, Germany, Greece, Hong Kong, Hungary, Iceland, India, Indonesia, Iran, Ireland, Israel, Italy, Japan, Kenya, Kuwait, Macau, Malawi, Malta, Malaysia, Marocco, Mauritanius, Mexico, Myanmar, Netherlands, Nepal, Niger, Nigeria, Norway, Panama, Philippines, Poland, Portugal, Qatar, Romania, Senegal, South Africa, South Korea, Spain, Sri Lanka, Sweden, Switzerland, Tanzania, Thailand, Trinidad and Tobago, Tunisia, Turkey, United Kingdom, USA, Uruguay

C.2 List of Trade Agreements

Table C.2 – List of RTAs and member countries included in the dataset

Agreement	Year	Member countries
ASEAN (Association of Southeast Asian Nations)	2000	Indonesia, Malaysia, Myanmar, Philippines, Singapore, Thailand
Agadir	2006	Egypt, Jordan, Morocco, Tunisia
Andean Community	1993	Bolivia, Colombia, Ecuador
CEFTA (Central European Free Trade Agreement)	1993	Poland (1993–2004), Hungary (1993–2004),Romania (1997–2004), Bulgaria (1998–2004)
EFTA (European Free Trade Association)	1960	Norway, Switzerland, Iceland (1970), Portugal (1960–1986), Austria (1960–1995), Sweden (1960–1995) Finland (1986–1995)
EU (European Union)	1958	Belgium–Luxembourg, France, Italy, Germany, Netherlands, Denmark (1973), Ireland (1973), United Kingdom (1973), Greece (1981), Portugal (1986), Spain (1986), Austria (1995), Finland (1995), Sweden (1995), Cyprus (2004), Malta (2004), Hungary (2004), Poland (2004)
Mercosur	1995	Argentina, Brazil, Uruguay
NAFTA (North American Free Trade Agreement)	1994	Canada, Mexico, United States
Pan Arab Free Trade Area	1998	Egypt, Kuwait, Jordan, Morocco, Qatar, Tunisia
EFTA's outside agreements		Turkey (1992), Bulgaria (1993), Hungary (1993), Israel (1993), Poland (1993), Romania (1993), Mexico (2000), Morocco (2000), Singapore (2003)
EU's outside agreements		EFTA (1973), Cyprus (1988), Hungary (1994), Poland (1994), Bulgaria (1995), Romania (1995), Turkey (1996), Tunisia (1998), Israel (2000), Mexico (2000), Morocco (2000), Chile (2003), Egypt (2004)
Other free trade agreements		Australia–Singapore (2003), Australia–Thailand (2005), Australia–United States (2005), Bulgaria–Israel (2002), Bulgaria–Turkey (1998), Canada–Chile (1997), Canada–Costa Rica (2003), Canada–Israel (1997), Canada–United States (1989), Chile–China (2006), Chile–Costa Rica (2002), Chile–Mexico (1999), Chile–Singapore (2006), Chile–South Korea (2004), Chile–United States (2004), Colombia–Mexico (1995), Costa Rica–Mexico (1995), Egypt–Turkey (2006), Hungary–Israel (1998), Hungary–Turkey (1998), Israel–Mexico (2000), Israel–Poland (1998), Israel–Romania (2001), Israel–Turkey (2001), Japan–Mexico (2005), Jordan–United States (2002), Mercosur–Andean (2005), Mercosur–Bolivia (1996), Mercosur–Chile (1996), Mexico–Uruguay (2005), Morocco–United States (2006), Poland–Turkey (2000), Romania–Turkey (1998), Singapore–United States (2004), Tunisia–Turkey (2006)

Notes: Years in parentheses indicate the date that RTAs took effect or the date when new member countries joined RTAs. Andean Community, EU, Mercosur, and EU-Turkey denote a deeper level of integration, i.e., a customs union. Source: Baier and Bergstrand (2007) and Baier et al. (2016).

C.3 Correlations Between Financial Development Variables

Table C.3 – Correlations between financial development indicators

	BCREDIT	BFICREDIT	VALUE	CAPI
BCREDIT	1			
BFICREDIT	0.934	1		
VALUE	0.503	0.580	1	
CAPI	0.528	0.576	0.730	1

C.4 Descriptive Statistics for Variables

Table C.4 – Summary descriptive statistics for dependent and explanatory variables

Variables	Observations	Mean	Std. Dev.	Min	Max
X_{ijt}	99,981	3,266	61,861	0	4,233,436
$BCREDIT_{it}$	97,014	0.582	0.423	0.013	2.625
$BFICREDIT_{it}$	96,669	0.539	0.390	0.013	2.625
$VALUE_{it}$	77,487	0.256	0.395	0	3.034
$CAPI_{it}$	75,003	0.519	0.593	0	7.147
RTA_{ijt}	99,981	0.113	0.317	0	1
$DISTANCE_{ij}$	99,981	7,491	4,503	1.881	19,658
$INTL_{ij}$	99,981	0.986	0.120	0	1
$CONTIGUITY_{ij}$	99,981	0.024	0.153	0	1
$LANGUAGE_{ij}$	99,981	0.126	0.331	0	1
$COLONY_{ij}$	99,981	0.024	0.153	0	1
$RELIGION_{ij}$	99,981	0.169	0.255	0	0.988
$LEGAL_{ij}$	99,981	0.349	0.477	0	1

C.5 List of ISIC Industries

Table C.5 – List of 26 ISIC Revision 2 3-digit manufacturing industries in the dataset

Code	3-digit ISIC manufacturing industries
31	**Food, beverages and tobacco**
311-312	Food
313	Beverage
314	Tobacco
32	**Textile, wearing apparel and leather industries**
321	Textiles
322	Wearing apparel, except footwear
323	Leather and products of leather, leather substitutes and fur
324	Footwear, except vulcanized or moulded rubber or plastic footwear
33	**Wood and wood products, including furniture**
331	Wood and cork products, except furniture
332	Furniture and fixtures, except primarily of metal
34	**Paper and paper products, printing and publishing**
341	Paper and paper products
342	Printing, publishing and allied industries
35	**Chemicals and chemical, petroleum, coal, rubber and plastic products**
351	Industrial chemicals
352	Other chemical products
353	Petroleum refineries
355	Rubber products
356	Plastic products
36	**Non-metallic mineral products, except products of petroleum and coal**
361	Pottery, china and earthenware
362	Glass and glass products
369	Other non-metallic mineral products
37	**Basic metal industries**
371	Iron and steel basic industries
372	Non-ferrous metal basic industries
38	**Fabricated metal products, machinery and equipment**
381	Fabricated metal products, except machinery and equipment
382	Machinery except electrical
383	Electrical machinery apparatus, appliances and supplies
384	Transport equipment
385	Professional and scientific equipment

Source: CEPII TradeProd database.

C.6 Sensitivity Analysis

Table C.6 – Estimation results when disaggregating the RTA variable

Specifications	Intermediated finance		Market-based finance	
	[1]	[2]	[3]	[4]
FD_{it-1} =	BCREDIT	BFICREDIT	VALUE	CAPI
$FD_{it-1} \times INTL_{ij}$	0.655***	1.071***	0.294***	0.347***
	(0.12)	(0.09)	(0.03)	(0.09)
$ASEAN_{ijt}$	0.644***	0.812***	0.114	0.249*
	(0.21)	(0.21)	(0.18)	(0.15)
$(FD_{it-1} \times INTL_{ij}) \times ASEAN_{ijt}$	–0.698***	–0.773***	–0.172	–0.174
	(0.22)	(0.23)	(0.34)	(0.16)
$AGADIR_{ijt}$	1.803***	1.581***	0.398***	0.450***
	(0.43)	(0.43)	(0.11)	(0.13)
$(FD_{it-1} \times INTL_{ij}) \times AGADIR_{ijt}$	–2.803***	–2.372***	–0.618***	–0.389***
	(0.78)	(0.75)	(0.23)	(0.14)
$ANDEAN_{ijt}$	1.665***	1.820***	1.410***	1.133***
	(0.32)	(0.31)	(0.10)	(0.13)
$(FD_{it-1} \times INTL_{ij}) \times ANDEAN_{ijt}$	–0.825	–1.340	2.577	1.019*
	(1.14)	(1.04)	(1.91)	(0.56)
$CEFTA_{ijt}$	–0.329	–0.184	–0.409***	–0.783***
	(0.31)	(0.30)	(0.09)	(0.17)
$(FD_{it-1} \times INTL_{ij}) \times CEFTA_{ijt}$	2.048*	1.741	1.246	2.984***
	(1.14)	(1.11)	(0.87)	(1.05)
$EFTA_{ijt}$	0.127	0.152	0.063	0.108
	(0.11)	(0.17)	(0.08)	(0.10)
$(FD_{it-1} \times INTL_{ij}) \times EFTA_{ijt}$	–0.188	–0.272*	–0.098	–0.020
	(0.12)	(0.15)	(0.08)	(0.13)
EU_{ijt}	0.267***	0.490***	0.246***	0.218***
	(0.10)	(0.09)	(0.04)	(0.05)
$(FD_{it-1} \times INTL_{ij}) \times EU_{ijt}$	0.052	–0.193*	–0.008	0.010
	(0.12)	(0.10)	(0.04)	(0.08)
$MERCOSUR_{ijt}$	1.974***	1.985***	1.103***	0.241
	(0.44)	(0.44)	(0.14)	(0.16)
$(FD_{it-1} \times INTL_{ij}) \times MERCOSUR_{ijt}$	–2.783***	–2.724***	–0.201	3.028***
	(1.03)	(0.94)	(0.89)	(0.66)
$NAFTA_{ijt}$	0.951***	1.248***	0.488***	0.715***
	(0.17)	(0.09)	(0.08)	(0.12)
$(FD_{it-1} \times INTL_{ij}) \times NAFTA_{ijt}$	–0.527**	–0.748***	–0.089**	–0.237***
	(0.21)	(0.08)	(0.04)	(0.09)
$PanArab_{ijt}$	0.274	0.556	0.192	0.154
	(0.46)	(0.56)	(0.14)	(0.15)
$(FD_{it-1} \times INTL_{ij}) \times PanArab_{ijt}$	–0.330	–0.875	0.122	–0.002
	(0.75)	(0.85)	(0.22)	(0.17)

Table C.6 continued

Specifications	Intermediated finance		Market-based finance	
	[1]	[2]	[3]	[4]
FD_{it-1} =	BCREDIT	BFICREDIT	VALUE	CAPI
Observations	96,412	96,757	70,966	70,125
Exporter-time FEs	Yes	Yes	Yes	Yes
Importer-time FEs	Yes	Yes	Yes	Yes
Exporter-importer FEs	Yes	Yes	Yes	Yes

Notes: All specifications are performed in a panel data framework with PPML estimation including exporter-time, importer-time and exporter-importer fixed effects. The dependent variable is the international trade or domestic trade flows in levels. Standard errors are reported in parentheses and clustered by country-pair level. *, **, *** denote significance at the 10%, 5% and 1% level, respectively.

Table C.7 – Sensitivity analysis in terms of the degree of sectors' financial constraint

Criteria for $MOST_k$	External dependance				Asset tangibility			
	Intermediated finance		Market-based finance		Intermediated finance		Market-based finance	
Specifications	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]
FD_{it-1} =	BCREDIT	BFICREDIT	VALUE	CAPI	BCREDIT	BFICREDIT	VALUE	CAPI
RTA_{ijt}	0.379***	0.641***	0.113*	0.182***	0.469***	0.534***	0.204***	0.274***
	(0.12)	(0.11)	(0.07)	(0.06)	(0.06)	(0.06)	(0.04)	(0.05)
$(FD_{it-1} \times INTL_{ij})$	1.252***	1.959***	0.456***	0.907***	0.706***	0.930***	0.259***	0.370***
	(0.29)	(0.19)	(0.05)	(0.06)	(0.12)	(0.08)	(0.03)	(0.04)
$(FD_{it-1} \times INTL_{ij}) \times RTA_{ijt}$	0.053	–0.441***	0.055	–0.100*	–0.278***	–0.351***	–0.096**	–0.184***
	(0.17)	(0.12)	(0.05)	(0.06)	(0.09)	(0.06)	(0.04)	(0.05)
$(FD_{it-1} \times INTL_{ij}) \times RTA_{ijt} \times MOST_k$	–0.117	0.103	0.017	0.029	0.522***	0.455***	0.347***	0.285***
	(0.10)	(0.09)	(0.06)	(0.06)	(0.11)	(0.08)	(0.06)	(0.07)
Observations	344,050	344,682	291,728	285,869	462,076	462,928	396,961	389,046
Exporter-time-industry FEs	yes	yes	yes	yes	yes	yes	yes	yes
Importer-time-industry FEs	yes	yes	yes	yes	yes	yes	yes	yes
Exporter-importer-industry FEs	yes	yes	yes	yes	yes	yes	yes	yes

Notes: The sample is reduced to only include the most and the least constrained sectors, i.e., when $MOST_k$ is used to distinguish the most constrained sectors from the least constrained ones (rather than from all other sectors). All specifications are performed in a panel data framework with PPML estimation including exporter-time-industry, importer-time-industry and exporter-importer-industry fixed effects. The dependent variable is the international trade or domestic trade flows in levels. Standard errors are reported in parentheses and clustered by country-pair level. *, **, *** denote significance at the 10%, 5% and 1% level, respectively.

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Essays on Regional Trade Agreements and International Trade

Abstract: The subject of this dissertation focuses on the analysis of different aspects of the relationship between regional trade agreements (RTAs) and the multilateral trading system. We aim to provide a fresh understanding and views of the role of RTAs and regionalism in general as an important feature of international trade policy today. In chapter one we revisit the ex post effects of RTAs on member countries' trade and extrabloc trade by adopting an empirical approach. We explore how regional trading blocs have influenced trade among members as well as trade with nonmembers. Our analysis confirms the widespread trade-enhancing effects of RTAs on member countries' trade; however, in many cases, they lead to trade diversion effects that are detrimental to the rest of the world. Chapter two takes a closer look at how the implementation period of trade liberalization and partners' levels of development affect the RTA dynamic effects on trade over time. We obtain distinct patterns of ex post RTA effects on trade across North-North RTAs, South-South RTAs and North-South RTAs. We empirically validate that RTAs formed by trading partners experiencing similar economic development status (North-North RTAs or South-South RTAs) are likely to lead to a larger increase in members' trade during a shorter implementation period. Chapter three studies the mechanism through which RTAs impact the effect of financial development on trade flows between exporting and importing countries. In this joint work with Anne-Gaël Vaubourg, we show that the trade-enhancing role of financial development in the exporting country—especially through intermediated finance—is mitigated when there is an RTA between this country and its trading partner.

Keywords: regional trade agreements, gravity model, international trade, trade costs, financial development, regional integration

Essais sur les accords commerciaux régionaux et le commerce international

Résumé : Cette thèse s'inscrit dans le contexte de prolifération des accords commerciaux régionaux (ACR) et traite des effets des ACR sur le commerce international. Nous visons à mieux comprendre et à apporter des points de vue nouveaux sur le rôle des ACR et du régionalisme en général en tant qu'élément important de la politique commerciale internationale aujourd'hui. Dans le premier chapitre, nous revisitons les effets ex post des ACR sur le commerce des pays membres et le commerce extrabloc en adoptant une approche empirique. Nous cherchons à déterminer la manière dont les blocs commerciaux régionaux affectent le commerce non seulement entre pays membres mais aussi entre pays membres et pays extérieurs à l'accord. Notre analyse confirme que les ACR augmentent de manière significative le commerce intra-bloc ; néanmoins, dans de nombreux cas, les ACR impliquent des effets de détournement d'échanges qui sont préjudiciables au reste du monde. Le chapitre deux examine de quelle manière la période de mise en œuvre de l'accord et les niveaux de développement des pays membres déterminent, en dynamique, l'effet des ACR sur le commerce international. Nous obtenons des tendances distinctes des effets ex post de l'ACR sur le commerce entre les accords Nord-Nord, Sud-Sud et Nord-Sud. Nous vérifions empiriquement que les ACR conclus par des partenaires commerciaux ayant un statut de développement économique analogue (les accords Nord-Nord ou Sud-Sud) sont susceptibles d'engendrer une augmentation plus forte du commerce entre les membres des ACR et ce, sur une période de mise en œuvre plus courte. Le chapitre trois porte sur la manière dont les interactions entre ACR et développement financier influencent les flux d'échanges entre partenaires commerciaux. Dans ce travail conjoint avec Anne-Gaël Vaubourg, nous montrons que le développement financier (particulièrement sous sa forme intermédiée) encourage les échanges commerciaux mais que cet effet est atténué dès lors que les partenaires commerciaux ont signé un ACR.

Mots clés : accords commerciaux régionaux, modèle de gravité, commerce international, coûts commerciaux, développement financier, intégration régionale

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