Proliferating Regional Trade Arrangements: Why and Whither? [+]

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Abstract

This paper investigates why regional trade arrangements (RTAs) are proliferating extensively and how the effects of multiple RTAs, by interacting with each other, evolve over time. Our empirical analysis, based on an extended gravity model utilizing a large panel data set of 175 countries from 1948 to 1999, shows that RTAs on average increase global trade by raising intra-bloc trade without damaging extra-bloc trade. The net trade effects, however, heavily depend on the types of RTA strategic evolution over time, which we group as "expansionary" RTAs, "duplicate" RTAs or "overlapping" RTAs. We find that countries excluded from an RTA can benefit more from duplicating a separate RTA than from joining an existing RTA. This result explains why the number of bilateral trade blocs, rather than the membership size of existing RTAs, is currently exploding. We also find that the net trade creation effects of RTAs are substantially lower for countries participating in overlapping RTAs. This result suggests that it is less likely that the currently proliferating RTAs will completely merge and lead the world economy to global free trade. Our empirical results are robust to controlling for the characteristics of countries that may influence the impact of RTAs.

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I. Introduction

Regional trade arrangements (RTAs) have been proliferating in recent years. As of December 2002, some 250 RTAs have been notified to GATT/WTO, of which 130 were notified after January 1995.[1] Even after the launch of the WTO multilateral trading system, there seems to be a clear shift of preference away from multilateralism to regionalism.

Will proliferation of RTAs be a "building block" or a "stumbling block", in Bhagwati's (1993) phrase, to global free trade? There are at least two important issues concerning this question. The first issue is whether RTAs raise trade and welfare among the trade bloc members, without damaging the welfare of nonmembers, i.e. whether 'trade creation' occurs without associated 'trade diversion'. If RTAs incurred damaging effects on nonmembers, they would not necessarily lead to an increase in global trade and welfare. The second issue concerns the effect of the proliferation of RTAs on global trade over time. If the net trade creation effects of RTAs are positive, excluded countries can be impelled to seek membership of existing RTAs or negotiate new RTAs, thereby influencing global trade over time. The long-term effects on global trade hinge critically on whether the impetus triggers expansion of existing RTAs or duplication of separate RTAs. At the same time, the existence of many overlapping RTAs may encounter the problem of discriminatory trade blocs that could be harmful to global free trade.

It is an on-going debate among economists and policy makers whether the proliferation of RTAs encourages or discourages global free trade. Although numerous

[1] See WTO web site—http://www.wto.org/english/tratop_e/region_e/region_e.htm.

studies have addressed this issue, there is still a lack of consensus.[2] Many studies have investigated whether regional trade blocs raise the economic welfare of the integrating partners and the excluded countries. However, the existing empirical studies have mostly focused on assessing the static and aggregate effects of RTAs on intra- and extra-bloc trade. To date, no empirical paper has systematically assessed how the effects of multiple RTAs, by interacting with each other, evolve over time. This paper attempts to fill this gap. We analyze empirically the trade creation or diversion effects of various types of RTA proliferation such as expansion of existing RTAs, duplication of separate RTAs or establishment of overlapping RTAs.

Our empirical analysis, based on a standard gravity model utilizing a large panel data set of 175 countries from 1948 to 1999, shows that countries excluded from an RTA can obtain more benefit from duplicating a separate RTA than from joining an existing RTA. This result may explain why the number of bilateral trade blocs is currently exploding, whereas the membership size of existing RTAs tends to stall. We also find that the trade creation effects become to decline, eventually to zero, as more and more members join multiple RTAs. The significant decline in the trade creation effect of overlapping RTAs suggests that proliferating RTAs may not lead to an increase in global trade. Our empirical results are robust to controlling for the characteristics of countries that may influence the impact of RTAs.

The paper is organized in five sections. In section II, we present an overview of the existing debate on the economic effects of RTAs. Section III discusses empirical methodology and introduces the bilateral gravity model for evaluating the trade-creating and trade-diverting effects of RTAs. Section IV presents and discusses the estimation

[2] See the survey in section II.

results. Concluding remarks follow in Section V.

II. Economic Effects of Regional Trade Arrangements

In this section, we briefly summarize the existing debate on the economic effects of RTAs on global trade. The first question is whether the effects of RTAs on intra- and extra-bloc trade are positive. The second question is whether proliferating RTAs can lead to global free trade over time.

1. Trade Creation and Trade Diversion

Since Viner (1950) introduced the trade creation and diversion effects of the Customs Union (CU) and Kemp and Wan (1976) further clarified the positive net trade creation effect possible for CUs, there have been numerous studies analyzing the welfare effects of RTAs from both theoretical and empirical bases.[3] However, it remains an open question whether RTAs create more trade than they divert.

Krugman (1993) presents a model in which regional integration creates trade diversion because members raise the external tariff. However, as long as external trade barriers are not very high, trade diversion can be smaller. Clearly trade diversion can occur with discriminatory, but not most favored nation (MFN), tariff reductions.

Aside from the immediate impact of RTAs on trade, there is an evolution of trade creation and diversion effects. For instance, an RTA influences long-run growth of

[3] See the discussions in Baldwin and Venables (1995), Winters (1996) and Bhagwati, Greenaway and Panagariya (1998).

member countries and then may have spillover effects on outsiders. Some empirical studies, by estimating the static effects of RTAs, suggest that RTAs expand intra-bloc trade but contract trade with nonmember countries. However, as an increased trade between member countries expands market size, creates more investment, and results in income growth over time, RTAs can provide nonmember countries with increased opportunities to exploit the larger market, thereby reducing the problem of trade diversion. This growth effect turns RTAs into "building blocs" toward global free trade as emphasized in Baldwin (1995) and Laird (1999). Lawrence (1996) indicates that the growth effects of RTAs offset the initial trade diversion effect because import demand from nonmembers can be stimulated by growth or economies of scale over time. Wonnacott and Lutz (1989) and Wonnacott (1996) also highlight the importance of economies of scale that increase the efficiency of inefficient members by lowering their cost of production enough to reduce the likelihood of trade diversion. In addition, Wonnacott (1996) argues that trade diversion may force import-competing industries in a member country to reduce their trade barriers against nonmembers because of increased competition from RTAs.

On the other hand, a number of studies address the issues of RTA membership to examine if some characteristics of the members are important in raising the net gains from an RTA. Wonnacott and Lutz (1989), Summers (1991), Krugman (1993), and Frankel et al. (1995) introduce the concept of "natural trading partner" by arguing that some characteristics of RTA members can maximize the positive welfare gains from RTAs. They find that with larger pre-RTA trade volumes and lower transportation costs between members, RTAs are more likely to be welfare-improving. It is natural to form an RTA between geographically close neighbors for which transportation costs are comparably

cheap. Trade diversion occurs when discriminatory tariff liberalization leads member countries to import from the suppliers who are not the lowest-cost suppliers. Thus, trade diversion is likely to be small if the RTA partners are initially low-cost producers.

Bhagwati and Panagariya (1996), Krueger (1999), and Panagariya (1999) argue that neighbors are not necessarily natural trading partners. They emphasize the importance of pre-RTA bilateral trade volume instead of geographical proximity between trading partners. For NAFTA, they argue that the United States is Mexico's natural trading partner but the reverse is not true. The United States is a natural trading partner of both Canada and Mexico, but Canada and Mexico are not natural trading partners of each other (Panagariya, 1999). Lawrence (1996) concludes that there is no clear evidence that supposedly 'natural' trading partners based on geographical proximity are better to produce a net trade creation effect from RTAs.

In addition, Krueger (1999) and Lawrence (1996) argue that natural trading partners may not create a net trade creation effect when neighbors have similar endowments. Grimwade (1996) also emphasizes the importance of complementary economic structure between potential RTA members to guarantee the net trade creation effect.

2. Proliferation of RTAs and Global Trade

The longer-term impacts of RTAs also depend on the interactions of countries that do not belong to the same regional blocs. Depending on this force, RTAs can

follow either an ‘expansionary path’ or a ‘stagnant path’ to global free trade.[4]

Baldwin (1995) introduces the “domino effect” to explain the proliferation of regional trade blocs. Regional trading blocs produce gains from freer trade for members. Thus, exporters in nonmember countries will push their governments to seek membership of existing RTAs or negotiate new RTAs in order to counteract the potential damage caused by the preferential trade liberalization. This enlargement triggers the domino effect, which can increase either the number of regional blocs or the membership size of existing RTAs. Bergsten (2001) also observes that the demonstration effect of significant payoffs coming from RTAs makes broader membership possible. Bergsten (2001) and Lamy (2002) also argue that RTAs promote "best practice," and thus improve multilateral outcomes. Furthermore, Summers (1991) and Laird (1999) argue that the smaller number of participants and more simplified management process under regional arrangements tend to reduce negotiation costs and therefore increase efficiency gains.

On the other hand, some skeptics of regionalism emphasize the significant trade diversion effect of RTAs caused by the discriminatory nature of trade barriers between members and nonmembers. They consider RTAs primarily as a protectionist strategy to impede further multilateral liberalization. In this regard, Winters (1996) asserts that RTAs can be a false insurance distracting a country's movement toward bigger free trade blocs. Freund (2000) also emphasizes first-mover advantages, which may act against expansion of the existing RTAs. If sunk costs such as distribution network costs of trade are incurred at the entrance, incumbent members pay lower marginal costs than new entrants because the former pay only the production cost. While the first-mover

[4] See Bhagwati (1993) and Bhagwati and Panagariya (1996).

advantages initially provide incentives to join the membership as quickly as possible, eventually nonmembers will have lower incentives to follow.

Bhagwati et al. (1998) and Panagariya (1999) introduce the concept of the "spaghetti bowl phenomenon" to explain the harmful effect caused by the multiple and complicated rules of origin in RTAs, particularly from overlapping RTAs among members of different RTAs. The rules of origin are often used as a direct or indirect instrument of protection (Falvey and Reed, 2002). Several recent papers including Cadot et al. (2002) and Augier et al. (2004) provide evidence that restrictive rules of origin do indeed curtail the trade creation from RTAs. In addition, severe non-tariff barriers and very high tariff barriers remaining in specific industries such as agriculture are other sources of trade diversion. Panagariya (1999) also suggests that members of existing RTAs have an incentive to block new entrants if the size of the RTA reaches a certain level. These entry barriers render the "domino effect" less likely and more ineffective. However, it is still a debatable question whether overlapping RTAs have mitigating effects on global trade or not. RTAs can internalize negative externalities such as the "spaghetti bowl phenomenon" by limiting the number of players and providing more opportunities for learning processes than multilateral trade negotiations can.

III. Empirical Methodology and Data

1. Review of Empirical Methodology

Empirical analysis on the effects of RTAs is mainly based on two distinct

methodologies. One relies on a simulation approach based on global general equilibrium models to analyze the economic effects of policy changes due to the formation of RTAs. The second method applies econometric approaches to historical trade data and assesses the impacts of the formation of RTAs on bilateral trade flows. [5]

The simulation approach uses a static computable general equilibrium (CGE) model or a dynamic intertemporal general equilibrium model. The simulation approach is useful in specifying the mechanism by which the formation of RTAs translates into improvements of the economy. Robinson and Thierfelder (1999) survey the empirical literature on multi-country CGE models that analyze the economic effects of RTAs. According to their survey, simulations based on the general equilibrium models usually find substantial *ex ante* gains from trade liberalization between RTA members. However, Panagariya and Dutta-Gupta (2001) criticize that the 'few robust conclusions' in Robinson and Thierfelder (1999) are drawn by internally inconsistent assumptions and questionable values of key parameters. By carefully considering the caveats about CGE models, Lloyd and MacLaren (2003) suggest that RTAs have positive welfare and net trade creating effects on members, while the effects on nonmembers are negative and tend to increase with RTA size. Scollay and Gilbert (2001) and McKibbin, Lee and Cheong (2004) also show that RTAs involving a sub-bloc of East Asian countries could have a negative impact on excluded countries.

The second approach uses a gravity model of bilateral trade flows. The model is based on the idea that trade between two countries, like the gravitational force between two masses, is a function of the countries' size as well as the distance between

[5] Burfisher, Robinson and Thierfelder (2004) review the empirical findings on trade effects of RTAs focusing on the two methodologies adopted. They indicate that the empirical evidence found from the global general equilibrium analysis is relatively more supportive for the net trade creation and positive

them.[6] Thus, the model estimates "normal" trade flows, and then assesses whether the formation of an RTA will change the trade flows.

A number of variants of the gravity model have been used in previous studies to assess the effects of RTAs. Aitken (1973), Frankel (1993), and Braga et al. (1994) introduce a variable that takes the value of one if the two trading countries are both members of the same RTA and zero otherwise. A positive coefficient of the RTA variable indicates that RTAs tend to generate more trade to their members. Bayoumi and Eichengreen (1997), Frankel (1997), and Frankel and Wei (1998) add another dummy variable, representing extra-bloc trade, which takes the value of one for the bilateral trade between an RTA member and a nonmember country. Hence, the coefficient of this "extra-bloc trade" indicates the degree of the RTA's trade-diverting effects. Most studies find that RTAs tend to increase trade between members and the rest of the world, and thereby foster greater trade worldwide. However, some RTAs are estimated to have negative effects on extra-bloc trade. Frankel and Wei (1998), for example, show that the European Free Trade Association (EFTA) has a significant trade-diversion effect. Dee and Gali (2003) present evidence that a number of recent RTAs have diverted more trade from nonmembers than they have created among members.

2. Empirical Specification and Data

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welfare effects of RTAs on member economies compared to the studies utilizing econometric analysis.

[6] See Anderson (1979), Bergstrand (1985), and Evenett and Keller (2002) for the theoretical background of the gravity equation.

This research adopts the gravity model analysis to evaluate the trade effects of RTAs. We set up a conventional gravity model of international trade with a number of extra variables.[7] The extended gravity model of international trade takes the following form:

$$\begin{aligned}\ln(Trade_{ijt}) = {} & \beta_0 + \beta_1 \ln(GDP_i GDP_j)_t + \beta_2 \ln(GDP_i GDP_j / Pop_i Pop_j)_t \\ & + \beta_3 \ln Dist_{ij} + \beta_4 \ln(Area_i Area_j) + \beta_5 Border_{ij} + \beta_6 Language_{ijt} \\ & + \beta_7 ExComColony_{ij} + \beta_8 ExColony_{ij} + \beta_9 CurColony_{ij} + \beta_{10} CuUnion_{ijt} \\ & + \gamma_1 RTA/Insiders_{ijt} + \gamma_2 RTA/Outsiders_{ijt} + \delta YEAR_t + \varepsilon_{ijt}\end{aligned} \quad (1)$$

where i and j denote countries, t denotes time, $Trade_{ijt}$ denotes the average value of the real bilateral trade between i and j at time t, *GDP* is real GDP, *Pop* is Population, *Dist* is the distance between i and j, *Area* is the land mass of the country, *Border* is a binary variable which is unity if i and j share a land border, *Language* is a binary variable which is unity if i and j have a common language, *ExComColony* is a binary variable which is unity if i and j were ever colonies after 1945 under the same colonizer, *ExColony* is a binary variable which is unity if i ever colonized j or *vice versa*, *CurColony* is a binary variable which is unity if i and j are colonies at time t, *CuUnion* is a binary variable which is unity if i and j join a currency union at time t, and *Year* denotes a set of binary variables which are unity in the specific year t.

RTA/Insiders is a binary variable which is unity if i and j belong to the same RTA, and *RTA/Outsiders* is a binary variable which is unity if i belongs to an RTA and j does not, or *vice versa.* Thus, the dummy *RTA/Insiders* measures the degree of trade-creation effects of the RTA between members, while the dummy *RTA/Outsiders* captures the degree of trade-diverting effects between members and nonmembers, compared to

[7] We extend Rose (2004) for the empirical specification.

the "normal" bilateral trade flows.

The data come from Rose (2004), which covers 175 countries from 1948 to 1999. The original Rose data set has a measure for RTAs, but this consists of only eleven RTAs. We expand this data set by adding more observations comprising 19 multilateral RTAs and 49 bilateral RTAs over the sample period, based on data from the WTO. The multilateral RTAs include the ASEAN Free Trade Area (AFTA), Baltic Free Trade Area (BAFTA), Central American Common Market (CACM), Andean Community (CAN), Central America Common Market (CACM), Caribbean Community and Common Market (CARICOM), Central European FTA (CEFTA), Closer Economic Relations Trade Agreement between Australia and New Zealand (CER), Commonwealth of Independent States (CIS), Eurasian Economic Community (EAEC), European Communities/European Union (EC/EU), European Free Trade Association (EFTA), Gulf Cooperation Council (GCC), Southern Common Market (MERCOSUR), Melanesian Spearhead Group (MSG), North American Free Trade Agreement (NAFTA), Papua New Guinea - Australia Trade and Commercial Relations Agreement (PATCRA), SAARC Preferential Trading Arrangement (SAPTA), South Pacific Regional Trade and Economic Cooperation Agreement (SPARTECA). The bilateral RTAs include US-Israel FTA and others. We also count the accession of new parties to an agreement that already exists (for example, Portugal and Spain's entry into the EC in 1986) as well as a new agreement between the existing RTA and new parties (for example, EC-Switzerland FTA since 1972). We construct two RTA dummy variables: one for all intra-bloc country pairs ("insiders") and the other for all member-nonmember country pairs ("outsiders").

The data set has a feature of panel structure consisting of 234,597 annual observations clustered by 12,150 country pair groups from 1948 to 1999. The number of observations varies per year. Summary statistics for the whole data used in the estimation are presented in column (1) in Table 1. Of all observations, 8,469 country-pairs (about 3.6 %) belong to RTAs ("insiders") and 116,166 country pairs (about 49.5 %) belong to the member-nonmember ("outsiders") relationship. Summary statistics for each case are reported in columns (2) and (3), respectively. In Table 1, we observe at least three notable findings. First, the logarithmic mean of trade in column (2) is much higher than that in column (1), indicating that the bilateral trade between RTA members is much higher than the average bilateral trade in the whole sample. On the other hand, the logarithmic mean of trade in column (3) is comparable to that in column (1), indicating that the bilateral trade between members and nonmembers is not smaller than the average volume of bilateral trade in the whole sample. From these figures, we may expect that RTAs create more trade among members without diverting trade from nonmembers. However, this is a very casual observation because other important variables such as year and the size of countries are not controlled.

Second, RTAs have been formed among relatively smaller countries, in terms of both economic and geographical size. The logarithmic mean of GDP in the pairs in column (2) is slightly smaller than that in column (1). Taking into considerations that the mean year in column (2) is much higher, this implies that RTAs tend to be formed among economically smaller countries. This is also confirmed by the fact that the logarithmic mean of GDP in the pairs in column (3) is much higher. In addition, the logarithmic mean of area in the pairs in column (2) is smaller than that in column (1),

indicating that RTAs tend to be formed among geographically smaller countries as well. Considering that small countries tend to more open, more active RTA membership among small countries is quite reasonable. Interestingly, however, the logarithmic mean of per capita GDP in the pairs in column (2) is much higher than that in either column (1) or (3), suggesting that RTAs have been formed among relatively richer countries.

Third, RTA membership seems to be chosen after taking account of some specific, possibly exogenous, country characteristics. Aside from the geographical size noted before, the logarithmic mean of distance is shorter in column (2) than that in column (1). Further, RTA/Insider countries in column (2) are more likely to share a common land border, common language and common colonizer. These all suggest that there should be some preferable country characteristics that naturally lead to regional integration among themselves. Countries that may be close to being "natural trading partners" may tend to form an RTA together.

While the above interpretations are suggestive, they are subject to serious limitations in that when each variable is discussed the other variables are not appropriately controlled. A more systematic approach will follow in the next section. In particular, we will investigate quantitatively, (i) how much trade creation and diversion have occurred in general, (ii) whether the membership issues have been related to the net trade creation effects, that is, whether there is any evidence of natural trading partners, and (iii) how the recent proliferation of RTAs creates trade creation and diversion over time. By doing so, we evaluate whether the proliferating RTAs will lead the world economy to global free trade.

IV. Estimation of the Effects of RTAs on Trade

1. Overall Trade Creation and Diversion Effects

Table 2 presents the estimation results of specification (1) to investigate the impact of RTAs on intra- and extra-bloc memberships. We apply two different estimation techniques: random effects and fixed effects. Column (1) of Table 2 presents the random effect estimates. The gravity model fits the data well, explaining a major part of the variation in bilateral trade flows. The conventional variables behave very much the same way as the model predicts, and the estimated coefficients are statistically significant. To summarize briefly, the estimated coefficients for the bilateral distance and log of area in pair are significantly negative. The estimated coefficient for the log of bilateral distance (-1.219, s.e.=0.025) in column (1) by the random effects estimation implies that a decline in the log of bilateral distance by 0.809 (its standard deviation) leads to an increase of the bilateral trade by 169.1 %. The estimated coefficients for the log of GDP in pair, log of per capita GDP in pair, common land border dummy, common language dummy, ex-common colonizer dummy, ex-colony-colonizer dummy, and current colony dummy are significantly positive. Thus, larger GDP and per capita GDP lead countries to trade more. In our estimates in column (1), a 10% increase in GDP increases trade by 8.7%. A 10% increase in per capita GDP raises trade by 0.2%. A common land border or common language connection increases trade by about 96.4% or 46.5%, respectively. [8]

Our primary interest is in the impact of RTAs on intra- and extra-bloc trade. In

[8] For example, since $e^{0.675}=1.964$, an increase from 0 (no common border) to 1 (common border) in the

column (1) of Table 2, the estimated coefficient on the RTA membership dummy variable is positive and statistically significant. The estimate on the intra-bloc membership (0.515, s.e.=0.023) implies that a pair of countries that join an RTA experiences an increase in bilateral trade of 67.4%, with other variables held constant.[9] The estimate on the extra-bloc dummy variable (0.085, s.e.=0.010) is also positive and statistically significant. The estimate implies that the RTA members' trade with the nonmembers is estimated to rise by 8.9% on average. Hence, RTAs do not divert trade from other countries that do not belong to the bloc.

Column (2) of Table 2 presents the fixed effect "within" estimates. This method can provide more consistent estimates by controlling for the influences from omitted country-specific factors. For example, Anderson and van Wincoop (2003) show that the typical gravity model does not incorporate the 'relative distance effect', i.e., the likelihood that a country pair that is located more distantly from the world market will trade more than otherwise. The fixed-effect estimation can provide consistent-estimates by controlling for the unobserved (time-invariant) relative distance term. In addition, this estimate from time-series variation is useful in answering the question of "what would happen to a country's intra- and extra-bloc trade after joining an RTA?". One drawback of this fixed-effect approach is that since the fixed effect

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common border dummy variable raises bilateral trade by 96.4%.

[9] Note that we treat RTAs as exogenous. However, countries may have joined RTAs when they expect to increase trade. Then, the large effect of RTAs may reflect reverse causality. This endogeneity issue can in principle be handled with instruments. The problem, however, is that good instrumental variables have not been available to evaluate the effects from RTAs. A recent study by Baier and Bergstrand (2003) attempts to use three sets of instrumental variables: (i) remoteness of RTA partners from the rest of the world, (ii) relative-factor-endowment differences between RTA partners, and (iii) relative-factor-endowment differences between an RTA country pair and the rest of the world. They have also used "political-economy" variables such as differences in labor shares of two countries in agriculture, and an income inequality measure. The results show much larger effects of RTAs on trade flows than the ordinary least squares (OLS) results. Hence, the positive effects of RTAs on trade in OLS estimation do not seem to reflect the reverse causality that runs from trade to the choice of joining an RTA.

estimator exploits variation over time, we cannot obtain the estimates for time-invariant factors such as distance, area, land border, and ex-colonial relationship.[10]

The fixed-effect estimate on the intra-bloc trade (0.416, s.e.=0.024) shows that joining an RTA raises intra-bloc trade by 51.6%, which is slightly smaller than the random effect estimate. The estimated coefficient on extra-bloc trade (0.063, s.e.=0.010) is also slightly smaller than that for the random effects, but is statistically very significant. Overall, however, the fixed effects estimate is very consistent with the random effects estimate. Both estimates show that after a country joins an RTA its intra-bloc trade increases considerably, without having any harmful impact on its extra-bloc trade. This seems to indicate RTAs can lead to an increase in global trade. Nevertheless, the following sections will further scrutinize this issue.

2. Effects of RTAs on Natural Trading Partners

As emphasized by Wonnacott and Lutz (1989), Summers (1991), Krugman (1993) and Frankel et al. (1995), RTAs are more likely to be welfare improving if natural trading partners are members of RTAs. In order to investigate this possibility, we test if the trade creation from RTAs occurs more heavily from a subset of countries that could be considered as natural trading partners. There are at least two dimensions of trade creation we need to consider in association with natural trading partners. First,

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[10] Another estimation technique, the "between-effects" model, uses only cross-country variation (in essence, using data averaged by country-pair). Hence, this estimate explains how much an RTA affects a country's intra- and extra-bloc trade compared to others which do not join the RTA. Since this method relies on less variation, particularly for a regional bloc with a small number of members, it makes the estimate of intra-bloc dummy variable very imprecise by increasing its standard error.

how much more trade creation takes place between natural trading partners if they become members of the same RTA? Second, if a natural trading partner is excluded from the RTA membership, does the excluded country still benefit from the other natural trading partners that form RTAs with other countries?

In practice, it is hard to classify countries as natural trading partners or not. One element characterizing natural trading partners that is worthy of special attention is low transaction costs involved with trade. Based on this idea we adopt two criteria to select natural trading partners: geographical distance and language. That is, we assume that transaction costs will be lower if two countries are located geographically close or if two countries use a common language. According to our classification, natural trading partners are defined as closely located countries or those using a common language.

More specifically we have defined natural trading partners in the following three ways. First, we use a common land border as an indication of geographical closeness. Then we examine the possibility of more trade creation (or diversion) of RTAs comprising (or excluding) bordering countries. We implement this idea by introducing interaction terms between the intra- and extra-bloc RTA dummies and the common border dummy: $RTAs / InBorder$ and $RTAs / OutBorder$. For example, $RTAs / InBorder$ indicates that the members of an RTA share a common land border as well. Second, we can extend the idea to see if geometric distance matters in a continuous fashion. Namely we introduce interaction terms between the intra- and extra-bloc RTA dummies and distance, $RTA / InDist$ and $RTA / OutDist$, to express an alternative measure of geographical closeness. Finally we examine the second possibility of classifying natural trading partners based on the usage of a common

language by analogously defining two new interaction terms for a common language, i.e., $RTA/InLang$ and $RTA/OutLang$.

The modified equation to be estimated becomes:

$$\begin{aligned}\ln(Trade_{ijt}) = \text{Other control variables} &+ \gamma_1 RTA/Insiders_{ijt} + \gamma_2 RTA/InBorder_{ijt} \\ &+ \gamma_3 RTA/InDist_{ijt} + \gamma_4 RTA/InLang_{ijt} + \gamma_5 RTA/Outsiders_{ijt} + \gamma_6 RTA/OutBorder_{ijt} \\ &+ \gamma_7 RTA/OutDist_{ijt} + \gamma_8 RTA/OutLang_{ijt} + \varepsilon_{ijt}\end{aligned} \quad (2)$$

In this setting of the estimation, for example, total additional trade creation by forming an RTA between bordering members compared to a random match is estimated by summing up the coefficients of the two dummy variables, $RTA/Insiders$ and $RTAs/InBorder$, where the coefficient of $RTA/Insiders$ represents the trade creation of an RTA for members in general (for trade between non-bordering members) and that of $RTAs/InBorder$ represents the additional trade creation of an RTA for bordering members. On the other hand, additional trade diversion from a bordering country that is excluded from an RTA compared to a random match is estimated by summing up the coefficients of two dummy variables, $RTA/Outsiders$ and $RTA/OutBorder$, where the coefficient of $RTA/Outsiders$ represents the trade diversion from an excluded country in general (for trade between members and non-bordering nonmembers) and $RTA/OutBorder$ represents the additional trade diversion of an RTA from a bordering country that is excluded from the membership.

The estimation results with the newly-defined dummy variables are reported in Table 3. Since the estimation results with random effects are very similar, and in order to save space, we report the estimation results with fixed effects only. In columns (1), (2) and (3), a pair of interaction terms for each case is added separately. Then we

include all the three pairs of interaction terms together in column (4).

In every column, the first four estimated coefficients for the time-varying control variables are remarkably similar to those estimated for equation (1). For example, the estimated coefficient for the log of GDP in pair in columns (1)~(4) is 0.394~0.404, which is very close to 0.404, the estimate in column (2) in Table 2. This indicates that the newly added dummy variables do not complicate the other essential parts of the gravity equation.

In column (1), unlike the coefficients of the time varying control variables, the estimated coefficient of $RTA/Insiders$ (0.333, s.e.=.0.025) is significantly reduced. In contrast, the estimated coefficient of $RTA/InBorder$ (0.662, s.e.=0.070) is highly significant, positive and large. If we just take the figures in column (1), they suggest that trade between bordering RTA members is four times as large as between non-bordering members. The coefficient of $RTA/Outsiders$ (0.058, s.e.=0.010) is also slightly reduced, whereas the coefficient of $RTA/OutBorder$ (0.281, s.e.=0.060) is positive, large and highly significant. This suggests that even if a bordering country is excluded from RTA membership, trade is actually created between the RTA member and the bordering nonmember and that the degree of the trade creation is much larger than that between the RTA member and the non-bordering nonmember.

The estimated results in column (2) also confirm that the impact of RTA varies depending on the distance between member countries. The estimated coefficient of $RTA/InDist$, which is negative and highly significant, implies that an increase in the log of bilateral distance by 0.809 (its standard deviation) leads to a 26.5% decline in the bilateral trade creation for the intra-membership. The estimated coefficient of $RTA/OutDist$ is also negative and significant, suggesting that the closer two countries

are, the greater is the trade diversion from the extra-bloc membership.

In column (3), we also find that a common language plays a role in determining the impact of RTAs on trade. The estimated coefficient for *RTA / Insiders* is again significantly lower than the estimate in Table 2 and the coefficient of *RTA / InLang* is positive, large and highly significant. The estimate is, however, smaller than the estimate for the trade creation made by bordering members. An interesting observation is that while the estimated coefficient of *RTA / Outsiders* is a little bit higher than the estimates in Table 2, the estimated coefficient of *RTA / OutLang* is *negative* and highly significant. Furthermore, the sum of the coefficients of *RTA / Outsiders* and *RTA / OutLang* is even negative. This implies that despite the general trade creation from extra-bloc membership countries, trade diversion actually takes place from nonmember countries that use a common language.

Overall, our results consistently show that the impact of RTAs can be greater for a subset of countries that satisfy some desirable characteristics. In column (4), when we put the three pairs of dummies together, we also reach the same conclusion. While the estimates of the three interaction terms for the intra-membership and the three interaction terms for the extra-bloc membership are both lowered in absolute value, they are all significant and of the same sign as before.[11]

So far we have considered the possibility of different impacts of RTAs based on the idea of natural trading partners that heavily relies on low transaction costs for trade. However, it is believed that there are potentially other dimensions of country characteristics that may act as determinants of the impact of RTAs on trade. For example, the fact that the two countries had a common colonizer may have affected the

[11] The only exception is the coefficient of *RTAs/OutLang* that is slightly higher in absolute value than

quality of institutions, which in turn influences how effectively RTAs are maintained.[12] The trading partners' GDP, per capita GDP and country size factors can be considered as critical determinants of pre-RTA trade volume, which characterize "natural trading partners". Instead of conducting a more detailed investigation, we simply report the estimation results in column (5) of Table 3, when we include all the interaction terms of the control variables and the intra- and extra-membership dummies.[13] In the next section, these results will be used to see if these other characteristics also have important implications for the dynamics of RTAs. Before we move on, however, we note two important findings from the regression results. First, while the estimates change, the coefficients of the six interaction terms of the intra- and extra-memberships used to test natural trading partners are still significant and hold the same sign as before. This implies that despite the possibility of other characteristics influencing the impact of RTAs, the argument of natural trading partners based on low transaction costs remains valid. Second, the interaction terms of other control variables and the intra- and extra-membership dummies are also highly significant, suggesting that there are other characteristics of countries that may influence the impact of RTAs. Unlike border, distance and common language, the criteria we used for natural trading partners, however, some of the other control variables such as real GDP are endogenous and hence lead to difficulties in interpreting the results.

3. Trade Effects of the Proliferation of RTAs— Expansionary, Duplicate, or

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before.

[12] There is a recent, but rapidly growing, body of literature that emphasizes different types of institutions inherited from different colonizers. See, for example, Acemoglu et al. (2002).

[13] Among the dummies associated with colony, we include only the ex-common colonizer dummy. The other colony dummies, when included, are not significant.

Overlapping RTAs

An important question regarding RTAs is whether or not their proliferation gives impetus to the worldwide nondiscriminatory free trade.[14] As reviewed in section II, however, the various models invented to answer this question reach conflicting conclusions. Thus, we believe the answer to this question lies in an empirical investigation. In this section, by analyzing empirically the incentive of members and nonmembers to expand the membership of existing RTAs, duplicate separate RTAs or establish overlapping RTAs, we seek an answer to this question. Especially the incentive is assessed by evaluating how trade creation or diversion occurs as various types of RTAs are formulated.

A. Expansion or Duplication of RTAs

In order to determine if an RTA eventually leads to an expansionary path, a globally free market or coexisting multiple RTAs, one important consideration is the following incentive for nonmembers: are they more inclined to join an existing RTA or duplicate a separate RTA with other extra-bloc members? By investigating how trade creation or diversion takes place in each case, we seek an answer to this question. First, we assess whether trade creation from the newly expanded membership is significantly different from that from the original membership. Suppose that countries A and B establish an RTA first and later expand the membership to county C. Is the degree of trade creation made from the expanded membership between C and A (or B) lower than that from the original membership between countries A and B? If this is the

[14] This is "the dynamic time path question" coined by Bhagwati (1993).

case, then it is less advantageous for the existing RTA to expand its scope to encompass nonmembers, thereby advancing toward globally freer trade.

While the above question is essentially a dynamic one, we implement it in a simple way. For the RTA that expands its membership over time, we introduce two new dummy variables to distinguish original and new members, i.e., $RTAs/Original$ and $RTAs/Expansion$, that are defined as follows[15]:

- $RTAs/Original_{ijt}$ is a binary variable which is unity if i and j are the original members of an RTA that expands its membership.
- $RTAs/Expansion_{ijt}$ is a binary variable which is unity if i or j newly join an existing RTA that includes the other as an original member.

The modified equation to be estimated becomes:

$$\ln(Trade_{ijt}) = \text{Other control variables} + \gamma_1 RTA/Insiders_{ijt} + \gamma_3 RTA/Original_{ijt} + \gamma_3 RTA/Expansion_{ijt} + \gamma_4 RTA/Outsiders_{ijt} + \delta YEAR_t + \varepsilon_{ijt} \quad (3)$$

In this setting of the estimation, $RTAs/Insiders$ captures the trade creation made for members of all RTAs. On the other hand, $RTAs/Original$ captures the additional trade creation taking place for the members that originally established the RTA that expands its membership later. Furthermore, $RTAs/Expansion$ captures the additional trade creation taking place between the original member and the newly joined member or between the newly joined members of the expanded RTA.

[15] These dummy variables are defined only when the RTA expands its membership. For the case where there is no new entrant, the membership of the RTA is still the same as before, i.e., RTA/Insiders.

The estimation results for equation (3) with both random and fixed effects are reported in Table 4. Since the estimation results with random effects in column (1) are very similar, and to be consistent with previous interpretations in Table 3, we focus on those with fixed effects. In column (2), the estimation results with fixed-effects show that the estimated coefficient for *RTA / Insiders* (0.899, s.e.=0.054) is significantly higher than the estimate in Table 2. The estimated coefficient for *RTAs / Original* is negative, but statistically insignificant, indicating that the trade creation for original members is not significantly different from that for the intra-membership for the RTA that never expands. However, the estimated coefficient of *RTAs / Expansion* (-0.635, s.e.=0.060) is negative, large in absolute value, and highly significant. This implies that the trade creation for new members is much lower than that for the original members. According to the estimate, the trade creation made for new members is 30.2%, which is much lower than the 145.7% estimate for the members of the RTA that never expands or the 133.3 % estimate for the original members.

Table 4 can be interpreted as showing evidence that new members are disadvantaged or discriminated against by the original members. Freund (2000) introduces a theoretical model in which, by strategically committing high bilateral exports at the entrance, the original members can trade permanently more than the new members. He also adds empirical evidence to support the model based on the trade data for the European Union.[16] However, there is one caveat in interpreting our results in this way. If the decision to form the RTA is endogenously made, it is more likely that the RTA will be initially established among countries that maximize the benefit, which

[16] The European Union expanded from six members in 1958, to nine in 1973, and reached twelve by 1986. Freund focused solely on the European Union because, until recently, it was the only RTA to expand its membership significantly. However, in our data set, besides the European Union, we include other

in our case is trade creation between pairs of original member countries. As the RTA expands its membership over time, countries that are less desirable for trade creation will be added, generating less trade creation from new members. By taking the RTA decision exogenously, we do not explicitly consider this possibility.[17] Freund also notes this possibility and shows that even after controlling for preunion trade flows, as a result of comparative advantage, tastes and technology, the original members still trade more with each other.

By using the results of the natural trading partners in the previous section, we can also investigate if country characteristics, such as those of natural trading partners, account for the trade creation gap between original and new members, or if there are other factors that disadvantage new members. Table 5 reports the mean values of country characteristics for various subgroups. In column (1), we illustrate the mean values of country characteristics for the original members and the new members. Indeed we find that the original members are more likely share a common land border and a common language, and that the distance between a pair of countries among them is on average shorter. To what extent do these different characteristics between original and new members explain the trade creation gap between them? The fixed effect estimates for the interaction terms between the three characteristics of natural trading partners and the intra-bloc membership dummy in column (4) in Table 3 suggest that these different characteristics explain about 0.250 in the metric of log trade.[18]

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expansionary RTAs such as CARICOM, CEFTA, EFTA and MERCOSUR.

[17] It is an intriguing question why some countries join an RTA from the beginning, others participate in it later, and some never join , but a formal investigation for the determination of the timing of joining an RTA is beyond the scope of our paper.

[18] This figure is obtained by adding up the differences of the mean values of the three natural trading partners characteristics between the original and new member groups, in column 1 of Table 5, multiplying with the coefficients of the corresponding interaction terms between each characteristic and the intra-bloc

Since the trade creation gap between the original members and the new members is estimated to be 0.583 in the metric of log trade in Table 4[19], the fact that original members consist of more natural trading partners explains much less than 50 % of the trade creation gap. When we extend the same exercise to capture all the other characteristics as well, namely by using the estimates in column (5) in Table 3, all other characteristics in the sum actually contribute to more trade creation for new members, thereby providing no additional explanation for the trade creation gap between original and new members.

Overall our results suggest that new members are likely to be disadvantaged in creating trade by joining existing RTAs late. This may reflect 'first-mover advantage', that is, the discriminatory nature of RTAs against late-comers. Anyhow, the relatively lower benefit obtained by new members from joining an existing RTA can make it difficult for RTAs to expand.

An alternative option, instead of joining the existing RTA, is for nonmembers to duplicate separate RTAs among themselves. For example, country C, instead of joining the existing RTA of countries A and B, establishes another RTA with country D. This must create trade between countries C and D as original members of a new RTA and will thus provide a strong incentive for a country excluded from an existing RTA to form a new RTA. However, forming a duplicate RTA may have an additional diversion effect on bilateral trade of country C with the existing RTA members (A and B). Thus, an important question is whether and to what degree the duplication of RTAs diverts trade more from members of the existing RTA (that is, trade diversion of

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membership dummy, in column (4) in Table 3.

[19] This figure is calculated by subtracting the estimate of RTAs/Expansion from the estimate of RTAs/Original in the fixed effect estimation.

C from A or B) than from other nonmember countries that have never formed any RTA. Insofar as this diversion effect is not strong, it is more likely that duplication of RTAs, rather than expansion of the existing RTAs, proliferates.

We implement this idea in a similar way by using another new dummy variable representing a nonmember country that duplicates a separate RTA with other countries, i.e., $RTAs/Duplicate$, that is defined as follows:

- $RTAs/Duplicate_{ijt}$ is a binary variable which is unity if i and j belong to different RTAs .

The modified equation to be estimated becomes:

$$\ln(Trade_{ijt}) = \text{Other control variables} + \gamma_1 RTA/Insiders_{ijt} + \gamma_2 RTA/Outsiders_{ijt} + \gamma_3 RTA/Duplicate_{ijt} + \delta YEAR_t + \varepsilon_{ijt} \quad (4)$$

The estimation results for equation (4) are reported in Table 6. In column (2), the estimation results with fixed-effects show that the estimated coefficient for $RTA/Outsiders$ (0.058, s.e.=0.010) is slightly lower than the estimate in Table 2, but that the estimated coefficient for $RTAs/Duplicate$ (0.166, s.e.=0.013) is positive and highly significant.[20] This indicates that trade is actually created more from the subset of the nonmembers that belong to some other RTA(s). According to the estimates, the trade creation made by members and nonmembers that belong to a duplicate RTA(s) is

[20] Since the random effects estimation in column two also generates similar results, we interpret our results based on the fixed effects estimation only.

25.1% greater than the trade made by a random match and 18.1% greater than the trade made by members and nonmembers that do not belong to any other RTA. This increase in trade amounts to about 43.1% of the estimated trade creation made between RTA members (58.2% trade creation: estimate =0.459, s.e.=0.024).

One might suspect that the increased trade creation in the above case is also due to different characteristics of the countries that duplicate RTAs. In column (2) in Table 5, we show different country characteristics depending on whether they duplicate RTAs or not. The differences in the mean values of the natural or economic characteristics between the duplicating and non-duplicating pairs are not very large. Nevertheless, the countries pairs that duplicate RTAs tend to be located much farther from, and are less likely to share a common land border with, the existing RTA members. Since it is a member-nonmember relationship, we have to use the estimates of the interaction terms of various characteristics and the extra-bloc membership. Based both on estimates in column (4) that rely on natural trading partners and on those in column (5) of Table 3 that rely on other characteristics as well, we find that these different characteristics essentially contribute nothing to the increased trade creation from duplicating RTAs.

Thus our estimation strongly supports that the increased trade creation takes place between members and nonmembers belonging to other RTAs, merely through the duplication of a separate RTA. This evidence can be interpreted to advocate that duplication of RTAs is not a hindrance to globally *increased* trade. At the same time, however, this evidence, in conjunction with the previous one about the low trade creation for the expansionary RTA, shows that it is difficult for an RTA to expand to a globally *freer* trade. In other words, rather than being discriminated against as new

members, nonmembers may be more inclined to duplicate another RTA that creates trade from members of the existing RTA as well as from members from the new RTA. Especially this is the case when there are relatively few countries belonging to the existing RTA and there are many nonmember countries potentially available for duplicating RTAs. In other words, the benefit of high trade creation from duplicating RTAs that encompass many member countries will be more likely to dominate the low trade creation that is obtained by joining the existing RTA of only a few countries.[21] Hence, the number of RTAs tends to increase by duplicating existing ones, and (the membership size of each existing RTA may not increase. RTAs will proliferate, but there is no tendency leading to a global free trade bloc. This finding may explain the recently proliferation of bilateral RTA negotiations between extra-bloc members, for instance in East Asia.

B. Overlapping RTAs: a Spaghetti Bowl Phenomenon?

In the previous subsection, we showed that RTAs are more likely to proliferate. Then, what will happen to trade if more and more members join multiple RTAs? This subsection investigates the trade creation effects between a member that joins multiple RTAs and another member that does not, or between members that join multiple RTAs together. Considering the recent proliferation of overlapping RTAs, the trade effect of overlapping RTAs is of interest for its own sake. In addition, this investigation will

[21] Let's consider the trade creation for a nonmember who can either join an existing RTA or alternatively duplicate a new RTA. In the metric of log trade based on fixed effects estimation, the additional trade creation is 0.364 if the nonmember joins the existing RTA. If the nonmember duplicates a separate RTA, its trade creation with the existing RTA members is 0.224. Hence the trade creation with existing RTA members is higher if the nonmember joins the existing RTA. However, the nonmember who joins the existing RTA loses a chance to create more trade with potential members of a duplicating RTA, though it gets additional trade creation (negative diversion) from the extra-bloc membership. Hence, if the existing RTA is not large enough, it is better for the nonmember to duplicate RTAs.

provide an answer to the question of whether there is any incentive for multiple RTAs to eventually merge, thereby leading to a globally free market.[22] The proliferation of RTAs will lead eventually some countries to belong to multiple RTAs in which their membership can be exclusive or overlapped. If the trade creation from overlapping RTAs is larger than that from exclusive ones, it may work as an incentive for the enlargement and eventual merging of RTAs.

We first consider the trade creation for a single country that belongs to overlapping RTAs. For example, while countries A and B are members of an RTA, country B alone forms another RTA with country C. We investigate whether the new RTA affects the trade of country B— a single country belonging to multiple RTAs— with the other original RTA member country A.[23] In this way we can assess whether the new RTA(s) conflicts with the existing RTA, thereby reducing the trade creation (between countries A and B) for the original RTA to less than that for a general RTA. Symmetrically, we can also postulate, because of the overlap with the original RTA, that the additional RTA performs less effectively so that the trade creation (between B and C) for the new RTA is lower.

We implement this idea similarly as before; namely we use another dummy variable representing a member of an RTA forming another RTA(s) with some other countries, i.e., $RTAs/SingleOverlap$, that is defined as follows:

- $RTAs/SingleOverlap_{ijt}$ is a binary variable which is unity if both i and j belong to

[22] Instead of considering collective negotiations between the RTAs as a group, however, we confine our analyses to each member country's incentive to act individually to bridge two separate RTAs. This is justified by assuming that, for example, communication costs increase to forbiddingly higher levels as more countries participate in the negotiations.

[23] This case subsumes other cases where, for example, country A also forms a new RTA with another country D, exclusive of country B.

the same RTA, and either i or j exclusively belongs to another RTA with other countries.

The modified equation to be estimated becomes:

$$\ln(Trade_{ijt}) = \text{Other control variables} + \gamma_1 RTA/Insiders_{ijt} + \gamma_2 RTA/SingleOverlap_{ijt} + \gamma_3 RTA/Outsiders_{ijt} + \delta YEAR_t + \varepsilon_{ijt} \quad (5)$$

In this setting of the estimation, the new dummy, $RTAs/SingleOverlap$, captures just the additional trade creation taking place between an overlapped country and a member country not overlapped together.

The estimation results with both random and fixed effects for equation (5) are reported in column (1) in Table 7. Again, the estimation results with random effects are similar to those with fixed effects. If we focus on the estimation results with fixed effects, the estimated coefficient for $RTAs/Insiders$ (0.616, s.e.=0.031) is significantly higher than that in Table 2, but the estimated coefficient for $RTAs/SingleOverlap$ (-0.445, s.e.=0.045) is negative and highly significant. This implies that if a member forms another RTA, by creating overlapping RTAs, its additional trade with members of existing RTA(s) or with members of new RTA(s) is less than the additional trade formed between members belonging to a single RTA. According to the estimates, an overlapped country experiences an 18.6 % increase in trade with non-overlapped member countries compared to a random match, which is much less than the 85.2% estimate for trade creation from a single RTA.

Based on the above results, one might be tempted to conclude that the

undesirable effects of overlapping RTAs are generated because some of the original members are excluded from the new RTA. Now we investigate if the same undesirable effects occur if a group of member countries join a new RTA together. For example, let's consider countries A and B that form an RTA with country C and then establish another RTA with country D. Is the trade creation between A and B lower than that for the members belonging to a single RTA?

We test this hypothesis by including another new dummy for overlapping RTAs, $RTAs/GroupOverlap$, that is defined as follows:

- $RTAs/GroupOverlap_{ijt}$ is a binary variable which is unity if both i and j belong to multiple RTAs *as a group*.

The modified equation to be estimated becomes:

$$\ln(Trade_{ijt}) = \text{Other control variables} + \gamma_1 RTA/Insiders_{ijt} + \gamma_2 RTA/GroupOverlap_{ijt} + \gamma_3 RTA/Outsiders_{ijt} + \delta YEAR_t + \varepsilon_{ijt} \quad (6)$$

Our new dummy variable captures the additional trade creation taking place between country-pairs that belong to multiple RTAs at the same time. There are quite a few countries (for example, Australia and New Zealand) that have formed overlapping RTAs (such as CER and SPARTCA).

The results for equation (6) reported in column (2) in Table 7 strongly support the hypothesis that overlapping RTAs may not be as effective as a single RTA. In the fixed effects estimation, the estimated coefficient of the overlapping RTA dummy (-

0..465, s.e.=0.024) is negative and highly significant. By adding the coefficient RTAs/Insiders (0.444, s.e.=0.024), this still amounts to a negative trade creation. This estimate is much lower than the 71.3% estimate of the trade creation of a single RTA.[24] This evidence clearly suggests that overlapping RTAs are not desirable for increasing global trade.

One possible way for RTAs to expand their membership is for more and more countries to voluntarily become members of overlapping RTAs. This can lead to more overlaps of membership across RTAs, and may eventually force the RTAs to merge completely. However our results clearly indicate that this may not happen. Consider the incentive for a member who creates or joins another RTA. By becoming a member of overlapping RTAs, the country is creating trade from new members but at the same time it experiences trade loss (or no trade gain) from old members. As long as the trade creation from new members dominates the trade loss from old members, it could keep creating or joining new RTAs. However, as the RTA becomes larger, since trade loss is continuously increasing, more and more new RTAs are needed for trade creation to dominate trade loss. Multiple countries acting together and increasing the number of overlapped members do not help because, as shown in the second case, the trade creation among a group of countries overlapped by multiple RTAs is close to zero, thereby increasing the severity of the trade loss. In this sense, we anticipate that as the RTAs become larger, it is less likely that they will merge by the incentive of individual countries. Hence proliferation of RTAs is less likely to eventually lead to a globally free market.

[24] The random effects estimation generates a positive estimate of trade creation for overlapped RTAs, but it is still much smaller than the trade creation made by a single RTA.

One might suspect that trade loss from overlapping RTAs is also due to the different characteristics of countries overlapped by multiple RTAs. In column (3) in Table 5, we compare the mean values of the characteristics of the member countries by the groups of single overlapped, group overlapped, and non-overlapped countries. Based on both estimates in columns (4) and (5) in Table 3, we find that these different characteristics essentially contribute nothing to the trade loss from overlapped countries.

The above results for overlapping RTAs can be interpreted in association with the so called "spaghetti bowl phenomenon." According to this logic, the existence of overlapping RTAs could lead to the problem of discriminatory trade blocs so that the full effect of trade creation does not occur if some members are overlapping with other RTAs. Previous literature has asserted that the use of restrictive rules of origin is the most important cause of restraining trade creation. In this regard, our findings seem to be consistent with the evidence based on the EU (Augier et al., 2004) or NAFTA (Cadot et al., 2002) that restrictive and complex rules of origin constrain trade between members of multiple and overlapping RTAs.

IV. Concluding Remarks

This paper has empirically investigated the effects of proliferating regional trading blocs on global trade. We used a standard gravity model based on a large panel data set of 175 countries from 1948 to 1999. We found that RTAs on average increase global trade by raising intra-bloc trade without damaging extra-bloc trade. The net trade effect, however, differs substantially according to the types of RTA evolution over

time, which we grouped as expansionary RTAs, duplicate RTAs or overlapping RTAs.

Countries excluded from an RTA can seek membership of existing RTAs or may be impelled to negotiate new RTAs among nonmembers in order to counteract the intimidation of exclusion. We found that the net trade-creating gains for new members joining an existing trading bloc are much less than the gains for original members. On the other hand, nonmembers forming a new trading bloc with other nonmembers seem to enjoy the gains of original members without much diversion of trade from the members of existing RTAs. Hence, the trade gain is larger for duplicate RTAs than for expansionary RTAs. This explains why RTAs are currently proliferating.

We also found that the net trade creation effects of RTAs are substantially lower for countries participating in overlapping RTAs. The possibility of a "spaghetti bowl phenomenon" in overlapping RTAs suggests that the current proliferation of RTAs may not lead the world economy to global free trade.

The net trade-creating effects heavily depend on the various strategic evolutions of RTAs. Thus policy makers in RTA participating countries and multilateral institutions must carefully examine the evolutionary process of RTAs. In particular, proliferating RTAs, particularly overlapping RTAs rather than expansionary ones, will eventually hinder trade among the overlapped membership countries, as well as global trade.

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Table 1: Summary Statistics (1948-1999)

	(1) All (N=234,597)		(2) RTA/Insiders (N=8,469)		(3) RTA/Outsiders (N=116,166)	
	Mean	Std. Dev	Mean	Std. Dev	Mean	Std. Dev
Year	1981.0	12.472	1990.1	8.213	1986.8	9.907
Log of trade	10.062	3.336	12.551	3.293	10.073	3.560
Log of distance	8.165	0.809	6.764	0.804	8.254	0.733
Log of GDP in pairs	47.881	2.676	47.876	4.116	48.136	2.689
Log of per capita GDP in pairs	16.034	1.503	17.261	1.603	16.522	1.363
Log of area in pairs	24.206	3.280	22.115	3.843	23.627	3.273
Common land border dummy	0.031	0.172	0.113	0.317	0.012	0.110
Common language dummy	0.223	0.416	0.329	0.470	0.189	0.391
Ex-common colonizer dummy	0.100	0.300	0.204	0.403	0.070	0.256
Ex-colony-colonizer dummy	0.021	0.142	0.031	0.173	0.026	0.159
Current colony dummy	0.002	0.044	0	0	0.001	0.036
Currency union	0.014	0.118	0.039	0.193	0.001	0.034

Notes: See the text for an explanation of variables.

Table 2: Effects of RTAs on Trade Flows

	(1) Random Effects	(2) Fixed Effects
Distance	-1.219** (0.025)	--
GDP in pair	0.874** (0.009)	0.404** (0.018)
Per Capita GDP in pair	0.023** (0.010)	0.270** (0.017)
Area in pair	-0.078** (0.008)	--
Common land border	0.675** (0.132)	--
Common language	0.382** (0.052)	--
Ex-common colonizer	0.111 (0.065)	--
Ex-colony-colonizer	2.310** (0.171)	--
Current colony	0.237** (0.087)	0.306* (0.087)
Currency Union	0.608** (0.049)	0.644** (0.050)
RTAs/Insiders	0.515** (0.023)	0.416** (0.024)
RTAs/Outsiders	0.085** (0.010)	0.063** (0.010)
R-squared	0.60	0.51

Notes: The dependent variable is the log of real bilateral trade. All the explanatory variables except the dummy variables are taken logarithms. RTAs/Insiders indicates a binary variable which is unity if i and j belong to the same RTA. RTAs/Outsiders indicates a binary variable which is unity if i belongs to an RTA and j does not belong to the same RTA or *vice versa.* The panel data estimation techniques were applied to 234,597 country pairs in total over the period from 1948 to 1999. The summary statistics for all variables are shown in Table 1. Robust standard errors of the estimated coefficients are reported in parentheses. Intercept and year dummy variables are included (not reported). ** and * indicate that the estimated coefficients are statistically significant at 1 % and 5 %, respectively.

Table 3: Country Characteristics and the Effects of RTAs on Trade

	(1) Border	(2) Distance	(3) Language	(4) All Three	(5) All Seven
GDP in pair	0.394** (0.018)	0.401** (0.018)	0.404** (0.018)	0.400** (0.018)	0.433** (0.018)
Per capita GDP in pair	0.282** (0.017)	0.276** (0.017)	0.273** (0.017)	0.278** (0.017)	0.202** (0.018)
Current colony	0.295* (0.087)	0.289* (0.087)	0.246** (0.087)	0.227** (0.087)	0.314** (0.087)
Currency Union	0.648** (0.050)	0.652** (0.050)	0.642** (0.050)	0.644** (0.050)	0.659** (0.049)
RTAs/Insiders	0.333** (0.025)	2.574** (0.239)	0.341** (0.027)	0.094 (0.051)	0.185** (0.056)
RTAs/InBorder	0.662** (0.070)			0.416** (0.083)	0.049** (0.091)
RTAs/InDist		-0.311** (0.034)		-0.187** (0.039)	-0.288** (0.043)
RTAs/InLang			0.311** (0.053)	0.160** (0.056)	0.271** (0.063)
RTAs/InArea					0.028* (0.013)
RTAs/InGDP					0.061** (0.013)
RTAs/InGDPPC					-0.102** (0.018)
RTAs/InECC					-0.356** (0.100)
RTAs/Outsiders	0.058** (0.010)	0.394** (0.088)	0.096** (0.011)	0.094** (0.011)	0.065** ((0.011)
RTAs/OutBorder	0.281** (0.060)			0.272** (0.064)	0.175** (0.065)
RTAs/OutDist		-0.040** (0.011)		-0.024** (0.011)	-0.054** (0.012)
RTAs/OutLang			-0.151** (0.019)	-0.158** (0.019)	-0.038 (0.019)
RTAs/OutArea					-0.058** (0.004)
RTAs/OutGDP					0.158** (0.005)
RTAs/OutGDPPC					-0.094** (0.007)
RTAs/OutCC					-0.518** (0.033)
R-squared	0.51	0.52	0.51	0.52	0.53

Notes to Table 3: All the estimations are based on panel regressions with fixed effects. RTAs/InBorder (RTAs/OutBorder) is an interaction term between RTA/Insiders (RTA/Outsiders) and a common land border dummy. Other variables with RTAs/In-- or RTAs/Out-- are similarly defined. For the others, see also the notes in Table 2.

Table 4: Trade Effects of Expansionary RTAs

	(1) Random Effects	(2) Fixed Effects
Distance	-1.214** (0.025)	--
GDP in pair	0.862** (0.009)	0.372** (0.018)
Per Capita GDP in pair	0.038** (0.010)	0.305** (0.017)
Area in pair	-0.070** (0.008)	--
Common land border	0.636** (0.131)	--
Common language	0.377** (0.051)	--
Ex-common colonizer	0.075 (0.065)	--
Ex-colony-colonizer	2.322** (0.171)	--
Current colony	0.237** (0.087)	0.316* (0.087)
Currency Union	0.628** (0.049)	0.657** (0.050)
RTAs/Insiders	0.919** (0.052)	0.899** (0.054)
RTAs/Original	0.170 (0.103)	-0.052 (0.108)
RTAs/Expansion	-0.552** (0.057)	-0.635** (0.060)
ExpNew RTAs/Outsiders	0.071** (0.010)	0.056** (0.010)
R-squared	0.60	0.50

Notes: *RTAs / Original* is a dummy variable which is unity if both countries are the original members of an RTA that expands its membership. *RTAs / Expansion* is a binary variable which is unity if one country newly joins the existing RTA that includes the other as an original member. For the others, see also the notes in Table 2.

Table 5: Mean Values for Subgroups

	(1) Expansionary RTAs		(2) Duplicate RTAs		(3)Overlapping RTAs		
	Original Members	New Members	Duplicate	Non-Duplicate	Single	Group	Non-Overlap
Number of Obs.	1,321	5,565	28,583	87,583	3,393	585	4,997
Year	1988.6	1991.2	1992.3	1985.0	1993.2	1995.0	1988.2
Trade	11.532	12.986	9.975	10.105	12.605	12.639	12.499
Distance	6.281	6.905	8.426	8.198	6.983	6.668	6.615
GDP in pairs	44.516	49.138	48.217	48.110	48.734	48.303	47.294
p/c GDP in pairs	16.787	17.786	16.911	16.395	17.449	17.073	17.118
Area in pairs	18.561	22.661	23.145	23.785	23.356	23.693	21.253
Common land border	0.164	0.059	0.009	0.253	0.080	0.138	0.136
Common language	0.713	0.157	0.175	0.013	0.086	0.029	0.499
Ex-common colonizer	0.691	0.073	0.054	0.075	0.054	0.118	0.308
Ex-colony-colonizer	0.011	0.038	0.027	0.025	0.017	0.046	0.040
Current colony	0	0	0.001	0.001	0	0	0
Currency union	0.130	0.019	0.001	0.001	0.009	0	0.060

Notes: All the variables are taken logarithms except year and dummy variables. See the text for an explanation of the variables.

Table 6: Trade Effects of Duplicate RTAs

	(1) Random Effects	(2) Fixed Effects
Distance	-1.226** (0.025)	--
GDP in pair	0.878** (0.009)	0.418** (0.018)
Per Capita GDP in pair	0.015 (0.010)	0.256** (0.017)
Area in pair	-0.078** (0.008)	--
Common land border	0.662** (0.132)	--
Common language	0.393** (0.052)	--
Ex-common colonizer	0.119** (0.065)	--
Ex-colony-colonizer	2.289** (0.171)	--
Current colony	0.258** (0.087)	0.321* (0.087)
Currency Union	0.602** (0.049)	0.638** (0.050)
RTAs/Insiders	0.567** (0.024)	0.459** (0.024)
RTAs/Outsiders	0.077** (0.010)	0.058** (0.010)
RTAs/Duplicate	0.202** (0.013)	0.166** (0.013)
R-squared	0.60	0.51

Notes: *RTAs / Duplicate* is a binary variable which is unity if both countries belong to different RTAs. For the others, see also the notes in Table 2.

Table 7: Trade Effects of Overlapping RTAs

	(1) Single Country Overlapping		(2) Group of Countries Overlapping	
	Random Effects	Fixed Effects	Random Effects	Fixed Effects
Distance	-1.222** (0.025)	-	-1.221** (0.025)	--
GDP in pair	0.871** (0.009)	0.395** (0.018)	0.873** (0.009)	0.402** (0.018)
Per Capita GDP in pair	0.026* (0.010)	0.280** (0.017)	0.024* (0.010)	0.272** (0.017)
Area in pair	-0.075** (0.008)	--	-0.077** (0.008)	--
Common land border	0.673** (0.132)	--	0.680** (0.132)	--
Common language	0.371** (0.052)	--	0.379** (0.052)	--
Ex-common colonizer	0.115 (0.065)	--	0.113 (0.065)	--
Ex-colony-colonizer	2.304** (0.172)	--	2.312** (0.171)	--
Current colony	0.242** (0.087)	0.312* (0.087)	0.228** (0.087)	0.294* (0.087)
Currency Union	0.618** (0.049)	0.656** (0.050)	0.611** (0.049)	0.648** (0.050)
RTAs/Insiders	0.697** (0.031)	0.616* (0.031)	0.538** (0.024)	0.444** (0.024)
RTAs/SingleOverlap	-0.396** (0.044)	-0.445** (0.045)		
RTAs/GroupOverlap			-0.364** (0.084)	-0.465** (0.087)
RTAs/Outsiders	0.102* (0.010)	0.082* (0.010)	0.087** (0.010)	0.065 (0.010)
R-squared	0.60	0.51	0.62	0.51

Notes: *RTAs/SingleOverlap* is a dummy variable which is unity if both countries belong to the same RTA and at the same time one of the two countries belongs to another RTA. *RTAs/GroupOverlap* is a binary variable which is unity if both i and j belong to two or more different RTAs. For the others, see also the notes in Table 2.