

## **Trade Creation, Trade Diversion, and Endogenous Regionalism**

by

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### **Abstract**

This paper examines whether considerations about trade creation (TC) and trade diversion (TD) enter into the decisions countries make about joining free trade areas. First I generate estimates of trade creation and diversion for each new trade agreement started between 1985 and 1994. I then estimate the determinants of trade creation and diversion, which provides a test of the proposition that trade diversion is less severe among nearby countries with significant bilateral trade prior to a preferential agreement. The estimation uses a selection correction procedure to account for the fact that TC and TD are observed only for countries that sign new trade agreements during this time. Finally, the estimated determinants of trade creation and diversion can be used to predict what these values would be for country pairs that do not form preferential agreements. Thus, the paper provides preliminary estimates of whether TC and TD are lower among country pairs that sign agreements than among those that choose not to do so.

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## 1. Introduction

Viner (1950) pointed out more than a half century ago that regional trade agreements could be beneficial or harmful to the participating countries because the preferential nature of these trade deals generates both trade creation and trade diversion. Since the publication of his book, these two concepts have been central to most studies of regionalism and have led to an extensive theoretical literature. The empirical work on the subject, however, has proven to be so challenging that it can not answer “even the most basic issue regarding preferential trading agreements: whether trade creation outweighs trade diversion” according to Clausing (2001, p. 678).

In a previous paper, Magee (2004) attempted to answer this last question by providing new estimates of trade creation and trade diversion for each country signing a new free trade agreement between 1985 and 1994. The answer that emerges there is that aggregate trade creation is approximately three times as large as trade diversion in the fifth year of all these new trading blocs. There are more difficult but perhaps more interesting questions that remain unanswered, however. Do certain characteristics of country pairs mean a preferential agreement will be more beneficial economically? Do countries consider the potential trade creating and trade diverting effects of regionalism in deciding which partner countries to negotiate a deal with? This paper uses the trade creation and diversion estimates in Magee (2004) to provide preliminary answers to these questions.

One of the most common theoretical arguments about which country pairs will find preferential trade agreements to be economically beneficial is the natural trading partner hypothesis, which argues that regional trade deals between nearby countries with significant bilateral trade are more likely to be trade creating than trade diverting. The logic is that the scope of trade diversion is limited to the products that a country would normally import from outside its preferential trading area. If most trade is regional even in the absence of a preferential agreement and most preferential trade deals are regional, then there will not be much trade from outside the RTA to be reduced by the trade deal. This hypothesis has been most strongly advocated by Wonnacott and Lutz (1989) and Krugman (1995).

There is only one previous empirical study (that I am aware of) addressing this hypothesis. That article, by Pravin Krishna (2003), examines whether regional trade agreements are natural in the sense that trade deals with nearby countries and large trading partners are more beneficial. First, he estimates a model of trade price elasticities and uses the estimates to generate measures of the welfare changes associated with hypothetical preferential trade agreements between the United States and 24 trading partners. He finds no significant correlation between these welfare predictions and either bilateral trade volumes or geographic proximity. Thus, the empirical results do not find evidence supporting the natural trading partner hypothesis.

There are several reasons why it is important to extend the work begun by Krishna (2003) in assessing the factors that affect the welfare impacts of regional agreements. First, it is not clear whether the results from the study of potential U.S. preferential trading partners are applicable to other countries, which often have trade that is more heavily concentrated on one partner country. Over 72% of Mexico's imports came from the United States in 1993, for example, and thus the potential scope of trade diversion due to NAFTA is limited to the remaining 28% of its imports. More importantly, no empirical study has examined any of the other theoretical predictions about which agreements are likely to lead to trade creation as opposed to trade diversion. Some of these predictions have been available since 1950, when Viner speculated that customs unions encompassing larger economic areas and with countries that have a low degree of complementarity and a high degree of rivalry with respect to protected industries should exhibit more trade creation than trade diversion. Rosson, Runge, and Moulton (2000) summarize some of the main predictions about the effects of regional agreements by arguing that trade creation is more likely in a preferential trade deal when there are more countries involved and a larger economic area, when the countries involved are competitive rather than complementary economies, and when the nations are in close proximity.

Because regional agreements can be welfare-enhancing or welfare-reducing, the effects of regionalism depend critically on which country pairs choose to form preferential trade deals. As with many other issues in the regionalism debate, there are conflicting theoretical predictions about whether

countries will tend to form regional trading blocs that raise welfare. The natural trading partner hypothesis provides an optimistic assessment, with countries tending to sign trade deals that lead primarily to trade creation.

A political economy approach to regionalism, however, suggests that countries may have incentives to sign primarily trade diverting preferential agreements. Krishna (1998) describes this argument. Trade creation displaces a domestic industry and thus can generate considerable political opposition to a regional agreement. Trade diversion, on the other hand, harms no domestic industry and thus it is politically more acceptable. A similar argument is made in the report on a possible US-Australia free trade agreement, where the authors argued that “there is a tension between what tends to be economically beneficial [that is, trade creation] and what is politically easy” (quoted in Wonnacott and Lutz, 1989, p. 66).

This paper investigates the issue of whether countries are more likely to sign trade deals that are trade creating or trade diverting by estimating the determinants of trade creation and trade diversion. Using measures of trade creation and diversion in the first five years of all new preferential trade agreements signed between 1985 and 1994, the empirical analysis examines whether trade creation and diversion are correlated with the characteristics of the country pairs involved. Using the results from this regression, the data are then used to predict the levels of trade creation and diversion that would have emerged if other country pairs had formed regional agreements. A comparison of the trade creation and diversion levels among countries that do form preferential agreements with the predicted levels of trade creation and diversion among countries that do not provides evidence about whether countries tend to form trade deals that are primarily trade creating or trade diverting.

The following section discusses the new method I use to measure trade creation and trade diversion. Section 3 then investigates the country characteristics that are associated with trade creation and diversion while the final section concludes.

## **2. Measures of trade creation and diversion**

Viner (1950, 43) discussed trade creation as being increased imports from within a trading bloc that the country “formerly did not import at all.” Trade diversion, on the other hand, means the goods “which one of the members of the customs union will now newly import from the other whereas before the customs union it imported them from a third country.” The trade flow data used in this study to measure trade creation and trade diversion come from Statistics Canada’s World Trade Analyzer (WTA) data set, which provides bilateral trade flows for each year from 1980 to 1998 between 138 countries that are members or observer governments of the WTO. These data are available at the 4-digit SITC industry and they are measured in 1998 dollars. The WTO provides a list of preferential agreements about which they have been notified at [www.wto.org](http://www.wto.org). The trade deals examined in this paper include all the new preferential agreements listed by the WTO as beginning between 1985 and 1994.

The difficulty in measuring trade creation and trade diversion is identifying the value of trade that would have occurred between a pair of countries in the absence of a preferential agreement. Magee (2004) uses trade flows between countries prior to their formation of a trade bloc in order to predict normal levels of bilateral trade in the absence of the preferential agreement. The basic assumption is that a country’s imports from a trading partner in a particular industry depend on previous levels of imports between the two countries in the same industry, ordinary growth rates, yearly aggregate shocks to a country’s imports, and any trade flow effects caused by regional blocs. The growth rate of imports is allowed to differ between separate country pairs and for each year. Thus, imports from country  $i$  to country  $j$  in industry  $k$  and time  $t$ ,  $m_{ijkt}$ , are assumed to be determined by

$$(1) \quad m_{ijkt} = \mathbf{a}_{ijk} + \mathbf{a}_{jkt} + \mathbf{b}m_{ijkt-1} + \sum_{y=1984}^{1997} \mathbf{g}_y RTA_{y,ijt} + \sum_{y=1984}^{1997} (\mathbf{f}_y RTA_{y,ijt} + \mathbf{d}_y TD_{y,ijt}) m_{ijkt-1} + \mathbf{e}_{ijkt}.$$

Equation (1) includes a fixed-effect ( $\mathbf{a}_{ijk}$ ) for each importer-exporter pair and for each importer-year ( $\mathbf{a}_{jkt}$ ) in a particular industry. The former fixed effect will account for any special trade relationships that span the entire period of 1981-1998, such as pre-existing preferential agreements, geographic proximity, and common languages. The latter fixed effect accounts for aggregate shocks that

affect a country's imports from all sources in any given year. Controlling for aggregate shocks is particularly important since Krueger (1999) concludes that NAFTA did not have a large effect on trade in the first three years of its existence relative to the impacts of shocks such as the "tequila crisis" and cuts in Mexican nontariff barriers prior to NAFTA. The relationship between past and current levels of imports prior to any new regional trade agreement is estimated by  $\mathbf{b}$ . The variable  $RTA_{y,ijt}$  equals one when countries  $i$  and  $j$  form a new preferential agreement in year  $y$  and for each year thereafter ( $t \geq y$ ). The coefficients  $\mathbf{f}_y$  measure the effects of these trade agreements on the relationship between past and current imports while  $\mathbf{g}_y$  measures any discrete jumps in imports caused by the agreements. Together, the two coefficients estimate the intra-bloc trade expansion generated by an agreement within industry  $k$ . The variable  $TD_{y,ijt}$  equals one for countries outside the trade bloc for each year after the preferential agreement is signed ( $t \geq y$ ), and thus  $\mathbf{d}_y$  measures the trade diverting effect of the agreement on extra-bloc imports. The effect of trade diversion is measured through a fall in the growth rate of imports.

Subtracting  $m_{ijkt-1}$  from both sides, equation (1) can be rewritten:

$$(2) \Delta m_{ijkt} = \mathbf{a}_{ijk} + \mathbf{a}_{jkt} + (\mathbf{b} - 1)m_{ijkt-1} + \sum_{y=1984}^{1997} \mathbf{g}_y RTA_{y,ijt} + \sum_{y=1984}^{1997} (\mathbf{f}_y RTA_{y,ijt} + \mathbf{d}_y TD_{y,ijt}) m_{ijkt-1} + \mathbf{e}_{ijkt}.$$

A regional trade agreement is likely to have different impacts on the imports of each country involved – Mexican imports of cars from the United States are likely to expand with NAFTA, for example, but U.S. imports of cars from Mexico may not increase. Since the coefficients may differ for each importer, equation (2) is estimated by OLS separately for each importer ( $j$ ) and 4-digit SITC industry ( $k$ ). Thus, in measuring the trade creation and diversion effects of U.S. trade agreements on U.S. car imports, equation (2) is estimated using U.S. car imports from each of its trading partners between 1980 and 1998. The regression is repeated using U.S. imports in each of the 434 different industries. For the effects of NAFTA on Mexican imports, a separate set of 434 regressions is estimated for Mexican imports from all of its trading partners. This process is repeated for each country signing a free trade agreement between

1985 and 1994. Each regression is estimated using 2,466 observations (137 exporting countries over 18 years). The estimates from equation (2) can be used to predict a counterfactual level of imports in industry  $k$  from all of a country's trading partners in the absence of the preferential agreement by setting  $RTA_{y,ijt} = 0$  and  $TD_{y,ijt} = 0$  for a particular agreement.

One complication is that the anticipation of the preferential agreement may influence trade flows before the agreement is enacted. As Frankel (1997, 78) argues, "There is a tendency for trade flows to be affected in advance of the date when the agreement goes into effect, as businesses position themselves for future markets." Since anticipated regional agreements may affect trade patterns in advance of the trade bloc formation, Magee (2004) generates predicted trade flows based on the average bilateral trade flows in the industry three, four, and five years prior to the beginning of the agreement.

The basic measurement strategy is illustrated in Figure 1. Let AB represent the time path of U.S. imports in a particular industry from Mexico prior to NAFTA and BC the time path after NAFTA is enacted. The line BD shows the projected imports after 1994 based on the pre-NAFTA time path. The latter is the counterfactual predicted imports in the absence of the agreement. The difference between BC and BD is the total expansion of trade between the U.S. and Mexico attributed to NAFTA. A similar projection is made for each of the countries outside the trading bloc, where EF shows the pre-NAFTA sequence of import levels in the industry and FH the post-NAFTA series. The change in these countries' import paths after NAFTA is enacted is estimated by  $d_y$  in equation (2). A fall in actual imports (FH) below FG (the predicted time path of imports based on pre-NAFTA trade flows) reveals trade diversion in the industry. The time series of imports into the U.S. is allowed to differ across exporters in the estimation by the inclusion of the exporter-importer fixed effect  $a_{ijk}$ .

Because trade flows are measured at the industry level, it is possible to impose several plausible restrictions on the estimated impacts of a trade agreement. Since preferential agreements involve the removal of trade barriers, an RTA is assumed never to cause a fall in imports within the trade bloc. The estimated expansion of U.S. imports from Mexico in industry  $k$  is thus

$$(3) \quad TE_{ijkt} = \max(m_{ijkt} - \hat{m}_{ijkt}, 0), \quad \text{where } i \in RTA.$$

$TE_{ijkt}$  is the intra-bloc trade expansion, and it is composed of both trade creating and trade diverting effects. The predicted level of imports  $\hat{m}_{ijkt}$  is restricted to be nonnegative, so the estimated impact of the agreement lies between 0 and the actual level of imports.

There are two requirements to identify trade diversion in an industry. First, imports from countries outside the trade bloc must fall below their projected levels based on pre-RTA trade patterns. Secondly, intra-bloc imports must rise so that trade is actually being diverted. Thus, trade diversion is limited to be no less than zero and no greater than the rise in intra-bloc imports in the industry. Imposing these two restrictions on the measured trade diversion yields:

$$(4) \quad TD_{jkt} = \min\left\{\max\left[-\sum_{h \notin RTA} (m_{hjkt} - \hat{m}_{hjkt}), 0\right], \sum_{h \in RTA} TE_{hjkt}\right\}.$$

These assumptions differ from previous studies using aggregate data, where any fall in extra-bloc imports in an industry, regardless of whether or not it is accompanied by a rise in intra-bloc imports, is counted as trade diversion and any rise in extra-bloc imports in one industry serves to offset declines in extra-bloc imports in other industries. In Magee (2004), any rise in extra-bloc imports in an industry above the projected level in the absence of the agreement is attributed to factors other than the preferential agreement. Since the trade effects of a regional agreement are examined only over the first five years of the agreement, it is unlikely that the RTA would raise national income sufficiently to cause a rise in imports from countries outside the trading bloc.

Trade diversion in equation (4) is measured at the importing-country level. For the purposes of this paper, a measure of TC and TD for each pair of countries is needed. Since most regional trade agreements are between more than two countries, we need a way of measuring how much of the overall trade diversion in country  $j$ 's imports is caused by each of its preferential trading partners. Summing this exporter-specific trade diversion over all  $j$ 's preferential trading partners must yield the total trade



diversion measured in equation (4), and each specific TD measure must not be greater than the partner-specific trade expansion measured in equation (3). The simplest way to satisfy these constraints is

$$(5) \quad TD_{ijkt} = TD_{jkt} * \frac{TE_{ijkt}}{\sum_{h \in RTA} TE_{hkt}}.$$

What equation (5) means in simpler terms is that if country j forms a regional trade agreement and 30% of its total new intra-bloc imports in an industry are offset by a fall in imports from countries outside the preferential trading area, then 30% of country j's new imports from country i are measured as trade diversion.

Trade creation is measured as the difference between the intra-bloc trade expansion in equation (3) and the trade diversion measured in equation (5):

$$(6) \quad TC_{ijkt} = TE_{ijkt} - TD_{ijkt}.$$

Aggregate trade creation and trade diversion for a pair of countries are the sum of TD and TC in equations (5) and (6) over all industries.

The trade creation and trade diversion measures in equations (5) and (6) have a number of advantages over previous estimates. They are measured at a disaggregated industry level, and the counterfactual predicted imports in the absence of the preferential agreement are based on pre-RTA bilateral trade flows in the industry. Thus, the counterfactual accounts for any special trading relationships the two countries might have as well as any bilateral comparative advantage one country has in the industry being examined. Also, by including importing-country-year fixed effects in the estimation, the predicted counterfactuals control for country-specific aggregate shocks. In much of the previous literature, aggregate shocks are not accounted for in measuring the trade effects of preferential agreements. Regional trade agreement dummy variables included in gravity-model equations, for instance, capture residual trade flows caused both by the regional agreement and by any country-specific shocks in the year of study.

### 3. Empirical determinants of trade creation and diversion

The goal of this paper is to examine whether certain characteristics of country pairs are associated with higher levels of trade creation or trade diversion. The natural trading partner hypothesis suggests that trade creation will be greater relative to trade diversion if the two countries involved are already major trading partners and are close geographically. This hypothesis suggests two potential variables that might be correlated with TC and TD: log distance between the countries and the share of each country's imports that come from the partner in the year prior to the RTA. Trading partners might also be considered more "natural" if both countries speak the same language, so a dummy variable indicating whether or not they do is included. Viner (1950) proposed that regional agreements are more likely to be trade creating if they encompass a large economic area and are formed between competitive rather than complementary economies. This paper uses the logged GDP of the trading bloc to measure the size of the economic area. The degree of complementarity between countries' economies is measured in several different ways. One is the share of bilateral trade between the two countries that is intraindustry. A second is the absolute value of the log difference in the two countries' capital labor ratios. The data set also includes the absolute value of the log difference in the two countries' GDP and GDP per capita levels. In order to test whether the type of regional agreement signed influences the trade creating and diverting effects, dummy variables are included indicating if the trade deal is a free trade agreement, a customs union, or merely a preferential agreement. Because the trade deals are signed in different years, the regression also includes a time trend.

Table 1 presents each of these variables with their definitions, sources, and mean values (among country pairs with and without preferential agreements). The estimates will examine three separate dependent variables, all measured over the first five years of the agreement: trade creation as a share of bilateral imports, trade diversion as a share of bilateral imports, and trade creation minus trade diversion as a share of bilateral imports. On average among all country pairs, trade creation was nearly three times as large as trade diversion in the first five years of the new regional agreements signed between 1985 and 1994. Trade creation from the new agreements accounted for roughly 31% of bilateral imports while

trade diversion accounted for 24%. As a share of a country's total imports, trade creation and trade diversion were estimated to be much smaller, accounting for 0.8% and 0.4% of imports, respectively.

Table 1 reveals several intuitive results about trade agreements. They tend to be between countries that are close geographically; they are between countries that already have large levels of bilateral trade; they are between countries with similar capital-labor ratios and high levels of intraindustry trade; and the countries involved are somewhat more likely to share the same language. Finally, roughly 56% of the country pairs signing new trade agreements during this time period signed a preferential agreement, 30% enacted a free trade area, and 14% joined or formed a customs union. There were 580 country pairs signing new trade deals between 1985 and 1994.

Table 2 presents the results of regressing different measures of trade creation and trade diversion on the explanatory variables. An observation here is a pair of countries that formed a new regional trade agreement between 1985 and 1994. In the first column, the dependent variable is trade creation divided by imports from the partner country, where each is measured over the first five years of the trade agreement. In the second and third columns, the dependent variables are trade diversion and TC-TD as shares of the imports from the partner country.

Table 2 presents only very weak evidence in favor of the natural trading partner hypothesis. The distance between two countries and their bilateral import shares prior to the preferential agreement are not significantly related to any of the measures of trade creation or trade diversion at the 5% level. If a country imports a large share of its total imports from the partner country, however, there is a slightly smaller level of trade diversion generated by a regional agreement. Including a dummy variable for country adjacency strengthens the negative correlation between import share prior to the RTA and trade diversion, but countries that are adjacent are found to have slightly higher levels of trade diversion all else equal. Viner's contention that a sizeable trading area increases the relative strength of trade creation is not supported empirically. The size of the trading area does not have a statistically significant effect on TC, TD, or the difference between the two as a share of a country's imports.

The argument that competitive economies are more preferable trading partners than complementary economies is supported in the estimates. High levels of intraindustry trade between two countries mean less trade diversion and a larger difference between TC and TD if the countries form a regional agreement. Country pairs with similar capital-labor ratios have much higher levels of trade creation than country pairs with very different capital-labor ratios. When the capital-labor ratio difference is controlled for, a large difference in the per-capita income levels of the two countries is positively associated with trade creation. Table 2 also indicates that customs unions had greater trade creation than PTAs, while free trade areas had lower trade diversion than PTAs. Finally, there is a time trend toward more negative outcomes among the more recent regional agreements signed, with those signed in the 1990's have lower levels of trade creation and higher trade diversion than the agreements signed in the mid to late 1980's.

The results in Table 2 provide a preliminary picture of the characteristics associated with trade creation and diversion, but there is clearly a sample selection issue that is not accounted for. The trade effects of regional agreements are only observed when a pair of countries forms an agreement, and it seems likely that countries will consider the impacts of trade creation and trade diversion when they decide which potential partners to incorporate into preferential trading areas. Table 3 estimates a Heckman selection correction model in order to account for this sample selection problem.

The selection correction is performed in the following manner. The data set is first limited to including only country pairs that had no preferential agreement in 1984. The selection term then equals one if the pair of countries signs a preferential trade agreement between 1985 and 1994; it equals zero if the countries do not. Trade creation and diversion are only observed for the former group of countries. There are a number of theoretical predictions about which countries are likely to form regional agreements. Magee (2003) tests these predictions and finds that a pair of countries is more likely to have a preferential agreement if they are close geographically, have high incomes, speak the same language, are both democracies, are similar in economic size, and have similar capital-labor ratios. In addition, high levels of bilateral trade raise the probability of RTA formation. These variables along with a measure of

the countries' intraindustry trade, the difference in their per-capita incomes, and the bilateral trade balance between the two countries ( $\frac{|bilateral\ exports - imports|}{total\ bilateral\ trade}$ ) are included in the selection equation. The latter variable is predicted to influence RTA formation by Grossman and Helpman (1995), who argue that a bilateral trade deficit makes the formation of a preferential agreement more difficult politically.

In order to identify the trade creation and diversion equations, it is necessary to have instruments that influence the probability countries will sign a trade deal without directly affecting the levels of trade creation and diversion. The variables excluded from the trade creation and diversion equations are: the both democracies dummy variable, the sum of log GDP per capita for the two countries involved, and the bilateral trade balance between the two countries. None of these three variables significantly affects (at the 5% level) the trade creation and diversion measures when they are added to the regressions in Table 2. Each variable in the selection equation is measured using data from 1984, while the variables in the TC and TD equations are measured in the year prior to the RTA formation.

In addition to correcting for sample selection, the regressions in Table 3 drop the log RTA GDP variable from Table 2. The main reason this variable was dropped is that the estimates in Table 3 will be used to predict trade creation and trade diversion among countries that did not form regional agreements. The log RTA GDP variable is unknown for country pairs without regional agreements, however, because it depends on which other countries join together with the pair. Thus, if the variable is in the regression, the results can not be used to predict TC and TD for non-RTA pairs. Since the variable does not significantly affect trade creation or diversion, dropping it from the regression appears warranted.

Correcting for sample selection does not alter the basic conclusions from Table 2 in any significant way. The coefficient estimate on the selection correction term ( $\rho$ ) is not statistically significant in any of the three trade creation and diversion equations, which helps account for the similarity in results between tables 2 and 3.

The selection equation indicates that nearby countries and those pairs whose bilateral trade is a significant fraction of their total trade in 1984 are more likely to form free trade agreements. In that

sense, there is support for the natural trading partner hypothesis: geographically close countries with considerable bilateral trade do form preferential agreements more often. The weakness in the hypothesis is the contention that such agreements are more likely to be trade creating and less likely to be trade diverting. Country pairs with high levels of intraindustry trade are more likely to form preferential agreements, as are country pairs that have similar capital-labor ratios and similar per-capita incomes. Similarity in economic size also increases the chances a pair of countries will form a regional agreement, although the coefficient is only statistically significant at the 10% level. Countries with high per-capita income in 1984 were significantly more likely to form free trade agreements in this time period.

How do trade creation and trade diversion among preferential trade partners compare with potential trade creation and diversion among country pairs that do not sign trade deals? There are several different ways the results in Table 3 can be used to answer this question. First, the coefficient estimates in Table 3 can be used to predict the levels of trade creation and trade diversion for every pair of countries. Then the predicted levels of TC and TD for country pairs that have a regional agreement can be compared to the predicted levels for those that do not. The top half of Table 4 presents these comparisons. The predictions are generated separately for four different cases: treating each country pair as if they formed a free trade agreement, a customs union, a preferential agreement, or a generic regional agreement, which uses a weighted average of the predicted values for FTAs, CUs, and PTAs with the weights determined by the number of each type of new agreement signed between 1985 and 1994. Since the trade agreements were signed at different times during the period, I calculate the predicted TC and TD levels for each pair of hypothetical preferential trading partners for every year between 1985 and 1994 and then take a weighted average of the yearly predictions where the weights depend on the number of each type of agreement signed in the year. Let  $\hat{TC}_{CU,86}$  ( $\hat{TC}_{CU,91}$ ) be the predicted level of trade creation for a pair of countries if they had formed a customs union in 1986 (1991), for example. There were 72 pairs of countries forming customs unions in 1986 and 12 pairs that formed a customs union in 1991. The predicted level of TC for a pair of countries had they formed a CU between 1985 and 1994 is

then  $\hat{TC}_{CU} = \frac{72\hat{TC}_{CU,86} + 12\hat{TC}_{CU,91}}{84}$ . The predicted levels of trade creation and trade diversion for countries had they formed a PTA or and FTA are similarly calculated using the actual number of country pairs in each year that signed new PTAs and FTAs.

In general, the predicted levels of trade creation tended to be significantly higher and predicted levels of trade diversion lower among countries that formed regional agreements than among countries that did not. The only exception to this conclusion was that the countries forming free trade agreements had slightly lower levels of trade creation than country pairs without regional agreements. Even for free trade agreements, however, the difference between TC and TD was significantly larger among the countries signing FTAs than among country pairs without regional agreements. Thus, the top half of Table 4 shows that the characteristics that are associated with regional trade agreement formation are also correlated with more beneficial outcomes of the agreement.

The bottom half of Table 4 compares the predicted levels of trade creation and diversion among country pairs without regional agreements to the measured levels of TC and TD among those that do. In every comparison made, the average measured levels of trade creation are higher among countries signing regional agreements than the predicted levels among countries that did not negotiate a trade deal. The measured levels of trade diversion are always lower among country pairs with regional agreements than the predicted levels among countries without such agreements. The differences on average can be quite substantial. Using the average among all regional agreements, trade creation as a share of bilateral imports is about 8 percentage points higher among the RTA pairs than the predicted level among non-RTA country pairs while trade diversion is about 4 percentage points lower.

Table 5 assesses whether the predicted levels of trade creation and trade diversion for a pair of countries had an effect on the likelihood that they would form a regional trade agreement between 1985 and 1994. The table presents the results of a probit regression where the dependent variable equals one if the countries formed a new regional agreement between 1985 and 1994 and it equals zero otherwise. Country pairs that had pre-existing preferential agreements were excluded from the data set. The first

column reveals that a high predicted level of trade creation as a share of bilateral imports significantly raises (at the 10% significance level) the probability the pair of countries will negotiate a regional trade agreement. In the second column, a high predicted level of trade diversion significantly lowers the probability the two countries will sign a regional agreement. Column three includes the predicted difference between TC and TD and it shows that greater net trade creation raises the likelihood of RTA formation. Each of these results is consistent with an economic motivation for signing regional trade deals, since the economic gains are likely to be larger when an RTA leads to trade creation than when it leads to trade diversion. The last column includes both TC and TD in the regression, however, and the coefficient on the predicted TC variable becomes negative and highly significant. Thus, the positive effect of predicted trade creation on RTA formation is in some doubt. The negative effect of trade diversion on RTA formation appears to be the more robust result. This result is more consistent with the economic motivation to negotiate regional agreements than with the political economy prediction that such trade deals are easier to sign when they are trade diverting.

#### **4. Conclusion**

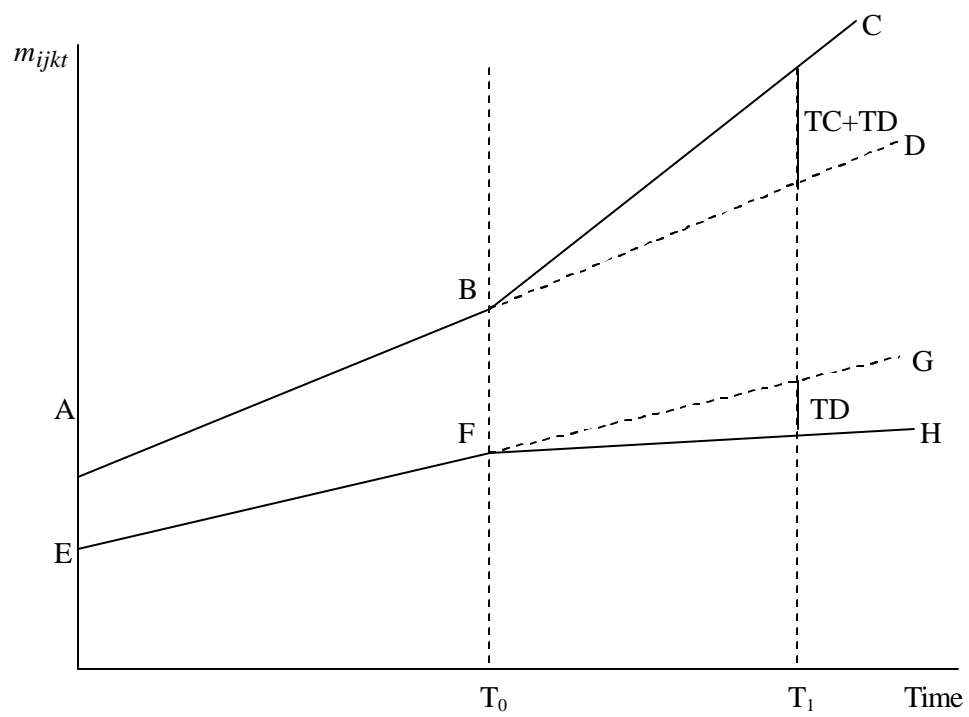
This paper investigates the determinants of trade creation and trade diversion among country pairs that inked new regional trade agreements between 1985 and 1994. The measures of trade creation and trade diversion used are estimated using disaggregated time series data and are thus able to overcome some of the measurement problems of earlier efforts in this direction.

One of the main theoretical arguments suggesting that regional trade agreements are beneficial has come to be known as the natural trading partner hypothesis. In its simple form, this hypothesis suggests that countries tend to form preferential agreements with partners that are nearby geographically and with whom they are major trading partners. These trade agreements between countries that are “natural trading partners” are presumed to be more beneficial than agreements such as the US-Israel FTA between countries far apart and that have relatively smaller levels of trade. This paper shows that, while nearby countries are more likely to sign preferential trade deals, the agreements do not lead to more trade



creation or less trade diversion. There is some weak evidence that high bilateral import shares reduce the trade diversion a regional agreement causes, but the support for the simple natural trading partner hypothesis is weak at best. This conclusion is very similar to that in Krishna (2003), who found even less support for the natural trading partner hypothesis using data from US trading partners.

Support for a more sophisticated version of the natural trading partner hypothesis emerges in the empirical tests presented here, however. The estimates indicate that country pairs with regional trade agreements consistently have higher levels of trade creation and lower levels of trade diversion than country pairs trading without preferences are predicted to have. Among all countries with regional agreements, trade creation is measured as 7 percentage points higher than trade diversion as a share of imports. Among country pairs without regional agreements, however, trade diversion is predicted to be about 5 percentage points higher than trade creation. Thus, whether it is by good fortune or by design, the pairs of countries that have joined together in regional agreements are the ones for whom the trade deals are most beneficial economically.

**Figure 1: Measurement of trade creation and trade diversion**

**Table 1: Definitions, sources, and summary statistics**

Variable	Definition	Source	Mean	
			RTA=1	RTA=0
TC as share of bilateral imports	Trade creation in first 5 years of RTA / imports from partner country	Magee (2004), from World Trade Analyzer	31.101	
TD as share of bilateral imports	Trade diversion in first 5 years of RTA / imports from partner country	Magee (2004), from World Trade Analyzer	24.267	
TC – TD as share of total imports	Difference between TC and TD in first 5 years of RTA / imports from partner country	Magee (2004), from World Trade Analyzer	0.779	
Log distance	Natural log of distance between countries	CIA World Fact Book	0.603	1.951
Import share	Partner country's share of total imports in year before RTA	World Trade Analyzer	0.021	0.006
Log RTA GDP	Natural log of total GDP in RTA area	<a href="http://www.imf.org">www.imf.org</a>	6.025	
Intraindustry trade	Intraindustry trade as share of trade between two countries	World Trade Analyzer	6.640	1.760
Log diff. in K/L	Absolute value of the log difference in capital-labor ratios		0.928	1.827
Log diff. GDPPC	Absolute value of log difference in countries' GDP per capita	World Trade Analyzer	0	0
Log diff. in GDP	Absolute value of log difference in countries' GDP	World Trade Analyzer	0	0
FTA	=1 if the two countries formed a free trade area	<a href="http://www.wto.org">www.wto.org</a>	0.300	0
Customs union	=1 if the two countries formed a customs union	<a href="http://www.wto.org">www.wto.org</a>	0.145	0
Same language	=1 if the two countries speak the same language	CIA World Fact Book	0.172	0.102
Trade balance	bilateral exports – imports   / total bilateral trade	World Trade Analyzer	0.342	0.385
Log GDPPC	Logged sum of two countries' GDP per capita	<a href="http://www.imf.org">www.imf.org</a>	15.318	15.205
Both democracies	=1 if both countries are democracies	CIA World Fact Book	0.762	0.773

**Table 2: Determinants of trade creation and trade diversion**

	TC as share of bilateral imports	TD as share of bilateral imports	TC – TD as share of bilateral imports
Log distance	-0.324	2.544	-2.868
Import share	-2.678	-26.649 *	23.971
Log RTA GDP	0.191	0.662	-0.471
Intraindustry	0.084	-0.267 **	0.351 *
Log difference in K/L	-12.660 ***	2.722	-15.381 ***
Log difference in GDPPC	9.245 ***	-2.603	11.848 ***
Log difference in GDP	-0.115	0.951	-1.066
Same language	2.087	1.828	0.259
FTA	-0.613	-10.958 ***	10.345
Customs union	13.617 ***	-6.155	19.772 **
Time trend	-1.227 **	1.465 ***	-2.692 ***
Constant	32.867 ***	15.474 **	17.393
R <sup>2</sup>	0.169	0.183	0.153
Observations	466	466	466

\*, \*\*, \*\*\* indicate that the coefficient is statistically significant at the 10%, 5%, and 1% levels  
The explanatory variables are measured for the year prior to the start of the regional agreement  
The dependent variables use the average values of TC, TD, and imports over the first 5 years of the RTA

**Table 3: Determinants of trade creation and trade diversion, selection correction**

	TC as share of bilateral imports	TD as share of bilateral imports	TC – TD as share of bilateral imports
<b>RTA effect equation</b>			
Log distance	-1.679	2.462	-3.962
Import share	-3.000	-23.869 *	20.587
Intraindustry trade	0.108	-0.255 **	0.363 *
Log difference in K/L	-12.066 ***	2.883	-14.938 ***
Log difference in GDPPC	9.070 ***	-2.854 *	11.924 ***
Log difference in GDP	-0.539	1.045	-1.571
Same language	2.840	1.525	1.325
Free trade area	1.247	-8.819 ***	9.979 *
Customs union	16.061 ***	-5.149	21.177 ***
Time trend	-1.161 **	1.377 ***	-2.532 ***
Constant	29.882 ***	18.032 ***	12.150
<b>Selection equation</b>			
Log distance	-0.799 ***	-0.800 ***	-0.800 ***
Import share <sub>84</sub>	1.735 ***	1.734 ***	1.733 ***
Intraindustry trade <sub>84</sub>	0.009 **	0.009 **	0.009 **
Log difference in K/L <sub>84</sub>	-0.125 ***	-0.126 ***	-0.126 ***
Log difference in GDPPC <sub>84</sub>	-0.111 ***	-0.112 ***	-0.111 ***
Log difference in GDP <sub>84</sub>	-0.081 *	-0.080 *	-0.080 *
Same language	-0.132 *	-0.132 *	-0.132 *
Trade balance <sub>84</sub>	0.044	0.047	0.046
Log GDPPC <sub>84</sub>	0.110 ***	0.110 ***	0.110 ***
Both democracies	0.090	0.085	0.087
Constant	-1.360 ***	-1.355 ***	-1.357 ***
Rho	0.105	0.062	0.022
Sigma	19.758	17.937	32.622
Lambda	2.082	1.114	0.703
Log likelihood	-3448.86	-3405.976	-3680.565
Total observations	16594	16594	16594
RTA pairs observed	458	458	458

\*, \*\*, \*\*\* indicate that the coefficient is statistically significant at the 10%, 5%, and 1% levels

The explanatory variables in the RTA effect equation are measured for the year prior to the start of the regional agreement

The explanatory variables in the selection equation are measured for 1984

The dependent variables use the average values of TC, TD, and imports over the first 5 years of the RTA

The data set used includes only country pairs without regional trade agreements as of 1984

**Table 4: Average and predicted values of TC and TD among countries with and without RTAs**

	<b>Preferential trade agreements</b>	<b>Free trade agreements</b>	<b>Customs unions</b>	<b>All regional agreements</b>
<b>TC as share of bilateral imports</b>				
Predicted values				
Country pairs w/o RTAs	19.944	22.122	32.791	22.614
Country pairs with RTAs	24.459	21.574	42.345	25.516
T-statistic	17.062 ***	-1.654 *	8.517 ***	17.559 ***
<b>TD as share of bilateral imports</b>				
Predicted values				
Country pairs w/o RTAs	33.948	23.864	22.671	29.000
Country pairs with RTAs	29.687	17.310	15.022	23.603
T-statistic	21.608 ***	26.035 ***	18.754 ***	38.366 ***
<b>TC – TD as share of bilateral imports</b>				
Predicted values				
Country pairs w/o RTAs	-13.262	-1.094	10.795	-5.683
Country pairs with RTAs	-4.736	4.637	27.732	2.354
T-statistic	20.499 ***	10.924 ***	11.787 ***	29.424 ***
<b>TC as share of bilateral imports</b>				
Predicted value				
Country pairs w/o RTAs	20.113	22.122	32.791	22.982
Actual values				
Country pairs with RTAs	30.723	24.523	45.726	31.101
T-statistic	30.276 ***	6.909 ***	11.427 ***	33.130 ***
<b>TD as share of bilateral imports</b>				
Predicted value				
Countries w/o RTAs	33.473	23.864	22.671	28.319
Actual values				
Countries with RTAs	31.192	18.996	16.881	24.267
T-statistic	7.784 ***	18.491 ***	13.759 ***	18.952 ***
<b>TC – TD as share of bilateral imports</b>				
Predicted value				
Countries w/o RTAs	-12.620	-1.094	10.795	-4.641
Actual values				
Countries with RTAs	-0.470	5.526	28.844	6.834
T-statistic	21.206 ***	12.142 ***	12.404 ***	28.515 ***

\*, \*\*, \*\*\* indicate that the means are significantly different at the 10%, 5%, and 1% levels  
There are 288 country pairs with PTAs, 174 with FTAs, and 84 with CUs in the data set

**Table 5: Effect of TC and TD on RTA formation****Probit Regression**

Dependent variable = 1 if countries form RTA between 1985 and 1994

Variable	Coefficients	Coefficients	Coefficients	Coefficients
Log distance	-0.837 ***	-0.565 ***	-0.749 ***	-0.535 ***
Import share <sub>84</sub>	1.507 ***	-1.259 *	0.882	-2.154 ***
Intraindustry trade <sub>84</sub>	0.006 *	-0.019 ***	-0.001	-0.023 ***
Log difference in K/L <sub>84</sub>	-0.048	-0.025	-0.017	-0.065 *
Log difference in GDPPC <sub>84</sub>	-0.090 ***	0.012	-0.056 ***	0.023
Log difference in GDP <sub>84</sub>	-0.174 ***	-0.277 ***	-0.246 ***	-0.222 ***
Same language	-0.165 **	0.049	-0.158 **	0.192 **
Trade balance <sub>84</sub>	-0.092	-0.052	-0.080	-0.042
Log GDPPC <sub>84</sub>	0.073 ***	0.070 ***	0.093 ***	0.031
Both democracies	-0.138 **	-0.140 **	-0.121 **	-0.175 ***
Predicted TC as share of bilateral imports	0.017 *			-0.034 ***
Predicted TD as share of bilateral imports		-0.117 ***		-0.149 ***
Predicted (TC – TD) as share of bilateral imports			0.029 ***	
Constant	-1.100 ***	2.054 ***	-0.922 ***	4.015 ***
Observations	16,596	16,596	16,596	16,596
Pseudo- R <sup>2</sup>	0.326	0.338	0.330	0.340

\*, \*\*, \*\*\* indicate that the coefficient is statistically significant at the 10%, 5%, and 1% levels

All 4 regressions use the predicted values of TC and TD for a typical RTA (a weighted average of predicted TC and TD values for PTAs, FTAs, and CUs, where the weights reflect the number of such new agreements signed between 1985 and 1994).

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