Do Preferential Trade Agreements Matter for Trade? The FTAA and the Pattern of Trade*

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I. Introduction

The complexities of multilateral trade negotiations are greatly compounded by the increasing speed in which regional trade agreements are being initiated and negotiated around the world. Even as the latest WTO round advances, the pendulum of the world trading system is once again swinging towards regional trade agreements. In the case of Latin America and the Caribbean the most ambitious regional initiative is the attempt to build a Free Trade Area of the Americas (FTAA) among 34 countries by 2005.

The debate among those who believe bilateral deals are dangerous distractions from the multilateral system and therefore are "stumbling blocs" and those who view them as "building blocs" that will promote broader global liberalization is alive and well, bypassing the academic circles and reaching the policy discussions. The WTO director-general Supachai Panitchpakdi has warned that "à la carte regionalism" is posing a systemic risk to the global trading system. In contrast, the US trade representative Robert Zoellick has argued that FTAs will trigger a beneficial process of "competitive liberalization" as a speedy route to global free trade.[1]

Economists have contributed relatively little on this debate thus far. Although theoretical economists have mostly favored multilateral trade liberalization (Baghwati and Panagariya (1996)) an increasing number of studies have shown the potential positive role for regional trade agreements (World Bank (2001), IDB (2002), Schiff and Winters

[1] Financial Times, November 19 2002.

(2003)). Relevant empirical studies are even harder to find. In a controversial article, Rose (2000) challenged the conventional wisdom asserting that the role played by the GATT in boosting trade was at best modest, while preferential schemes (reciprocal free trade agreements or non-reciprocal preferential arrangements such as the Generalized System of Preference) have promoted trade expansion. In general, however, the empirical literature lacks precise estimates on how preferential trade regimes affect the pattern of bilateral trade among partners, even though this is a fundamental policy question in evaluating the effects of ambitious initiatives such as the creation in the Americas of the world's largest FTA in the world (FTAA). As a result, it is difficult to anticipate the effects of the FTAA on trade patterns.[2]

In this chapter we take this challenge seriously. We offer three contributions to the academic and policy debate. First, from a policy perspective, it is important to highlight the difficulties of negotiating market access in the context of the FTAA. The unraveling of the "spaghetti bowl" created by the coexistence of overlapping agreements is an important challenge of a hemispheric agreement. We carefully provide the context in which we perform our empirical exercise by reviewing how FTA negotiations have advanced in the region since the mid 1980s, with an emphasis on market access negotiations, in particular tariffs and rules of origin.

This chapter also offers two empirical contributions. The first emphasizes the *relative* nature of trade costs. Theory suggests that, in a free trade agreement, bilateral trade patterns would depend on the bilateral tariff frictions among members (preferential

[2] We use in this chapter indistinctively free trade area (FTA) and preferential trade area. For our purposes, two countries entering into a free trade agreement will eventually converge to a intra-regional zero-tariff zone. However, both countries will impose tariffs to each other on a preferential basis (below rates applied on an MFN basis) during the phase-out period. Those phase-out or tariff elimination programs are in most cases asymmetric.

tariffs) vis-à-vis the tariff frictions that each member faces with respect the rest of the world (MFN tariffs). A small but rising number of papers simultaneously account for the effects of multilateral and bilateral tariffs, and this chapter directly contributes to this work. In this chapter we describe a theoretical framework building on previous work by Anderson (1979) and Anderson and van Wincoop (2000) illustrating how trade depends on both bilateral and multilateral resistance factors. Trade between two countries, after controlling by size and other variables, is decreasing in their bilateral trade barrier *relative* to the average barrier of the two countries to trade with all their partners. That is, the more resistant to trade with all others a country is, the more it is pushed to trade with a given bilateral partner.

The second takes advantage of the *asymmetric* nature of preferential tariffs among members of a preferential trade area. Most previous papers use proxies for tariffs such as average tariff levels or dummy variables. We ground our empirical work by explicitly incorporating asymmetric tariff barriers into the familiar gravity model, following some recent empirical attempts to directly measure trade costs (Hummels (1999), Limao and Venables (2001). To our knowledge this chapter constitutes the first study attempting to measure the direct effect of tariffs on trade patterns applying a gravity equation model with precise measures of both preferential and multilateral tariff frictions among FTA partners and with the rest of the world. Based on this analysis we simulate some potential effects of the FTAA on the pattern of trade in the region.

The chapter is organized in six sections. First, we motivate our study with some stylized facts of the increasing regionalization of the world trading system, with special attention to the blossoming of FTAs in the Americas. Next, we describe the mechanics of

preferential tariff liberalization in FTAs in the Americas since the mid-1980s , stressing the important, but often forgotten role played by rules of origin. Section IV suggests a theoretical framework that modifies a traditional gravity model by explicitly incorporating preferential and MFN tariff barriers. Section V discusses the empirical results. A final section concludes and considers some policy issues with respect to the proposed Free Trade Area of the Americas (FTAA).

II. The Rise of Regionalism around the World and the "Spaghetti-Bowl" in the Americas

Starting in the mid- to late-1980s, most of the developing world began moving toward substantial market-oriented economic reforms, which included, almost without exception, unilateral trade liberalization policies. The depth of the unilateral trade reforms by most countries in the Americas is obvious when looking at the average MFN tariff rates, which fell from 40 percent in the mid-1980s to 10 percent in 2000. Tariff dispersion has also declined substantially limiting the potential distortionary effects due to tariff escalation, from 30 percent in the mid-1980s to an average of 10 percent in 2000.

This process of opening up unilaterally was accompanied by liberalization efforts under the multilateral trade negotiations of the Uruguay Round. Latin America as a whole agreed to bind practically all tariff lines at around 35 percent level on average.[3] A new

[3] This is especially significant when compared to the existing levels of tariff bindings before the Uruguay Round began. In Latin America, only 38 percent of tariff lines for industrial products were bound, equivalent to 57 percent of imports. For agricultural products, the percentages were 36 and 74 percent, respectively.

round of negotiations was launched in Doha (Qatar) in November 2001, with further commitments to liberalize world trade.

These unilateral and multilateral efforts proceeded just as regionalism gained popularity. Nowhere has this regionalism developed faster in recent times than in Latin America during the 1990s. More than 30 new agreements have already been signed.[4] As part of the structural economic reforms implemented since mid-1980s and throughout the 1990s, countries created a complex web of simultaneous unilateral, multilateral and preferential (bilateral or regional) agreements to liberalize trade. The resulting so-called "spaghetti-bowl" of trade agreements is shown in Figure 1.[5]

Until early 1990s, most existing FTAs in the region were "partial" agreements in the sense that they covered just a few sectors negotiated within the Latin American Integration Association (LAIA, ALADI in Spanish). A turning point in the Americas was the signature of the North-American Free Trade Agreement (NAFTA) among United States, Canada and Mexico.

Other significant agreements followed NAFTA. Argentina, Brazil, Paraguay and Uruguay launched a customs union (MERCOSUR) in January 1995 that built upon some previously signed bilateral "Complementary Economic Agreements" (Acuerdos de Complementacion Economica (ACE), in Spanish). Mexico and Chile started consolidating their positions as strategic trade hubs in the region in the mid 1990s. In 1994, Mexico secured three important agreements, based on the NAFTA model, with Colombia and Venezuela (known as the G-3 Agreement), Costa Rica, and Bolivia.

[4] This count does not include existing residual preferential regimes with partial coverage of products from previous decades, i.e., partial agreements under LAIA (or ALADI) framework.
[5] See Ethier (1998) and Devlin and Estevadeordal (2001) for a discussion of the concept of New Regionalism.

Building on this momentum, Mexico concluded agreements with Nicaragua in 1997 and the Northern Triangle in 2000 and successfully broadened and deepened its agreement with Chile in 1998.

The Americas' other trade hub, Chile, acquired its status by gradually building a complete network of agreements. It signed its first and most basic agreements with Mexico in 1991, Venezuela in 1992, Colombia in 1993, and Ecuador in 1994. This network expanded with Chile's 1996 association agreement with MERCOSUR and 1998 agreement with Peru. The broadest expansion in the scope of Chilean agreements came in 1996 when it signed a free trade agreement with Canada that almost completely mimicked NAFTA. Subsequently, Chile's 1998-upgraded agreement with Mexico was based on the NAFTA model as was its 1999 accords with the countries of the Central American Common Market. Most recently, Chile has concluded free trade agreements with the European Union and United States and signed the first ever-transpacific FTA with South Korea in February 2003. In addition, other countries deepened the intra-regional liberalization of older agreements, such as the Andean Pact (renamed Andean Community in 1997 that includes Colombia, Venezuela, Bolivia, Ecuador, and Peru), CARICOM, and the Central American Common Market.

This regional dynamic continues full force. Negotiations towards the most ambitious initiative for economic integration ever to take place in the Hemisphere - the FTAA agreement - are advancing as scheduled towards the 2005 deadline. Those negotiations, however, have not stopped countries in the region from simultaneously pursuing other bilateral negotiations. This is especially true for the largest player in the region: the United States. As March 2003, the United States has FTAs with Canada,

Mexico, and Israel and has concluded negotiations with Singapore and Chile. The U.S. Congress has been notified of negotiations with Central America, Morocco, South African Customs Union and Australia. It is also considering entering into a Free Trade Agreement with South Korea, Taiwan, New Zealand, Egypt and at least three members of ASEAN (Indonesia, Philippines and Thailand) under the "Enterprise for ASEAN Initiative". Many others are willing to wait in line.

On the other side of the Atlantic, the European Union is proceeding with its enlargement policy and a somewhat more timid bilateral trade policy. The European Union has negotiated full fledge reciprocal FTAs with several countries in Latin America. The most far-reaching process to date has been the *Economic Partnership, Political Coordination and Cooperation Agreement* between Mexico and the European Union. The broad framework agreement was signed in 1997 and led to the signing of a comprehensive free trade agreement between the two parties in 1999. Framework Cooperation Agreements with Mercosur in 1995 and with Chile in 1996 were signed to open negotiations to establish full FTAs. Negotiations were formally launched in April 2000. Chile completed negotiations and signed an FTA agreement with the EU in May 2002.

Although most of the initiatives are reciprocal trade agreements, several countries in the region still are beneficiaries of important non-reciprocal agreements or "one-way" preferential arrangements. These are generally preferences granted by the United States and Canada under the Andean Trade Preferences Act, the Caribbean Basin Initiative and the Generalized System of Preferences (GSP) regime. Also, several countries are beneficiaries of the European Union GSP regime and special agreement with the

Caribbean. Under those regimes not all products in all countries are entitled to preferential treatment.

III. Negotiating Preferential Market Access in the Americas: Preferential Tariff Liberalization and Rules of Origin

When negotiating a FTA, countries must first negotiate the schedules for dismantling internal tariffs (preferential tariffs among FTA members) vis-à-vis the tariffs applied to third parties (MFN tariffs) and then agree on a system of rules of origin. Those two basic buildings blocs have evolved in Latin America since the late 1980s. These changes now constitute important precedents for FTAA negotiations. We therefore review this evolution and summarize some recent literature attempting to evaluate the impact of both instruments on the pattern of trade. We follow our discussion of the evolution of tariffs and rules of origin with a brief review of the empirical literature in order to provide context for the empirical work that follows.

3.1. Preferential Tariff Liberalization

Market access negotiations under the "old" regionalism used a fixed preferential tariff below the most favored nation (MFN) tariffs. Unilateral and multilateral tariff reductions progressively eroded the difference between the preferential tariff and the MFN tariffs, reducing the initial margins of preference. In order to maintain those margins constant over time, countries had to continuously renegotiate the agreements.

Alternatively, some agreements were negotiated by means of preferential tariff reductions as a percentage of current MFN applied rates, which kept the margins of preference constant over time.

Today, most FTAs in the region include a tariff elimination mechanisms that are relatively quick, automatic, and nearly universal in terms of product coverage. The tariff elimination process follows pre-specified timetables ranging from immediate elimination up to generally a 10-year period phase-out, with some special phase-out periods for "sensitive" products. Negotiations usually begin by negotiating an agreement on a base rate or base level from which phase-out schedules will be applied. Those base rates usually coincide with the MFN applied rates to third parties at the time of negotiations. Although tariffs will be fully dismantled under most trade agreements currently in force (the percentage of exceptions is between 5 and 10 percent), the tariff phase-out programs vary widely across agreements. For some agreements, more than 50 percent of the products become tariff-free during the first year of implementation of the agreement. For others, those percentages will not be reached until the fifth year or much later.

The structure of these phase-out schedules for some agreements is illustrated in Figure 2. The evolution of MFN tariffs vis-à-vis the result of this process of preferential liberalization from 1985 to 1997 is presented in Figure 3. The figure compares the average MFN rate for 11 Latin American countries with the average preferential rate that each country applies to all partners in this group under different bilateral or regional trade agreements. It shows in a particularly striking way the simultaneous lowering of external and internal barriers, which minimizes the probability for trade diversion. Finally, Figure 4 estimates the percentage of tariff lines that will be fully liberalized by 2005 as a result

of implementing existing tariff liberalization programs. Estevadeordal, Harris and Shearer (2002) have estimated that 80 percent of total intra-hemispheric trade will be liberalized by 2005, the year that the FTAA is expected to enter into force. Since GATT/WTO rules require that liberalization covers "substantially all trade," the bulk of the difficulties in negotiating tariff liberalization in the FTAA will involve around 10 percent of current intra-regional trade flows, allowing for a margin of around 10 percent of trade being eventually excepted from the agreement.

3.2. Rules of Origin

The counterparts to tariffs are the rules of origin provisions. Trade preferences only apply to goods originating in the FTA region. Rules of origin are an important but often forgotten aspect in the analysis of FTAs, but they are necessary to prevent trade deflection.[6] They specify the conditions that goods must meet in order to be deemed as "originating" and hence be eligible for preferential tariff treatment.

Rules of origin vary widely depending on the agreements. While the simpler rules rely on a single uniform criterion across all products, such as in ALADI-type agreements, the more complex agreements such as NAFTA-type agreements use a general rule plus additional specific rules negotiated at the product level, combining in different ways three methods to establish "substantial transformation." Those methods can be defined in terms

[6] RoO would be unnecessary in a customs union (CU) with a common external tariff (CET) that covered the whole tariff universe. However, in practice, RoO are widely used in CUs, as well, either as a transitory tool in the process of moving toward the CET, such as in Mercosur, or as a more permanent means of covering product categories where reaching agreement on a CET is difficult, for instance due to large tariff differentials between the member countries.

of a "tariff shift" approach, a "value-added" criterion, or a "technical test." The use of these different criteria can vary widely across agreements as illustrated in Figure 5. [7]

Since RoO can be used as effective instruments to deter transshipment of goods within a FTA, they can be used for purposes beyond that of averting trade deflection. Indeed, with the lowering of tariff and non-tariff barriers and the concomitant proliferation of FTAs around the world, RoO have arguably become a widespread and potentially powerful trade policy instrument.[8]

In theoretical terms, a FTA without RoO could be expected to result in dramatic changes in trade patterns due to rise in transshipment through the country with the lowest tariff. Without RoO, a FTA would be highly liberalizing given that the lowest tariff would apply to each import category (Krishna 2002). However, in the presence of stringent RoO, the potential for a FTA to boost trade between the members will likely be moderated by the rise in the cost of inputs for the intra-FTA final goods producers—which decreases final goods production and lower the final goods' producers derived demand for intra-FTA inputs, undercutting intra-FTA trade in both inputs and final goods (Ju and Krishna 1998).[9]

The potential effects of restrictive RoO have three immediate implications to the theoretical debate over the potential trade effects of FTAs. First, RoO can reduce the utilization rates of the FTA-provided preferences. Second, RoO can hamper FTA-induced

[7] A detailed analytical survey of rules of origin regimes in FTAS in the Americas and Europe can be found in Estevadeordal and Suominen (2003).

[8] Indeed, that governments forego negotiating simple regional value added rules, and, rather, engage in prolonged, contentious bargaining over highly complex and different types of RoO suggests that RoO play a role beyond resolving the trade deflection problem.

[9] The costs of production may be compounded by the fact that RoO are based on the Harmonized System, which was not designed with a consideration for the determination of origin. For instance, a product may undergo a substantial transformation in practice yet fail to alter its tariff classification, and hence fail to meet the CTC test.

trade liberalization, undercutting the trade effect that tariff lowering between the FTA partners would have in a FTA with loose RoO. Third, the relevance of RoO *per se*—and their importance as a constraint on commerce thereby—decreases with the lowering of MFN tariff barriers across FTA members. These issues have rendered some analysts to suggest that the expanding spagetti-bowl of overlapping FTAs and RoO regimes should be accompanied by the principle of open regionalism and/or replaced by customs unions or a hybrid arrangment between and CU and FTA altogether.[10]

However, ttheoretical literature is hard-pressed to specify the exact level of restrictiveness where the RoO is loose enough to keep input prices low or restrictive enough for the price of inputs to rise to unsustainable heights, and for the negative effects of trade diversion to kick in (Ju and Krishna 1998; Duttagupta and Panargariya 2000). As such, the relationship between the restrictiveness of RoO and intra-FTA trade flows in intermediate and final goods is relegated to an empirical matter.

3.3. Results from the Empirical Literature

The empirical literature that evaluates the effects of preferential tariff liberalization on trade mainly focuses on trade creation and trade diversion.[11] Within this rather large body of literature,[12] we focus on the growing interest in using the gravity model framework to measure the effects of trade costs on the pattern of trade. In standard gravity models, trade costs are typically assumed to be a function of a number of

[10] See Bergsten (1997); Wonnacott (1996).
[11] There is a large literature based on General Equilibrium Models that estimates the impact of trade liberalization, including scenarios of regional trade agreements, on trade that we do not review here.
[12] For a review of studies concerning Latin America and the Caribbean see IDB (2002).

geographical variables, especially distance, and other cultural or political factors. Distance is also one of the most successful variables in terms of its impact and statistical significance in this class of models.[13]

Trade costs, however, are also associated with policy measures, such as being part of a free trade area (low tariff costs among members) or being part of a currency union (low transaction costs among members). The vast majority of these studies have explored the effects of preferential trade agreements on trade via the inclusion of dummy variables for trade agreements. Aitken (1973) is a pioneering study in employing this technique. Frankel (1997) provides an extensive analysis of regional trade agreements based almost solely on this technique. He found, for example, that the formation of the EC raised trade among European countries by about 65 percent and Mercosur and the Andean Pact promoted trade by a factor of about two-and-a-half among their partners. Similar impact of FTAs or regional trading blocs on trade has been confirmed by an extensive number of studies that use an FTA dummy in a gravity framework.

Relatively few studies, however, have incorporated explicit measures of tariffs into a gravity equation, and we found none that uses preferential tariffs. For example, Linnemann and Verbruggen (1991), Iwuagwu and MacPhee (1994), Di Mauro (2000), Tamirisa (1999) and Estevadeordal, Frantz and Taylor (2002) are some of the few examples that explicitly incorporate MFN tariff measures. These elasticity estimates are important because they help address concerns over the effects of the agreement on the

[13] Most studies also include other variables in other to capture the role of history, culture, politics, etc. Frankel (1997) provides a good survey of this literature.

composition of trade, such as trade diversion or trade creation.[14] Table 1 summarizes estimates from several of these studies. Since most of these studies measure tariffs indirectly, they may be subject to measurement error that could bias the estimates downward. We include this table to provide a benchmark for our empirical results.

Economic analysis of rules of origin has been relatively limited both in terms of formal modeling as well as empirical testing. Empirical evidence, for its part, is scarce given the difficulties of operationalizing RoO—translating the complex technical requirements into a variable that serves as a measure of the stringency of RoO. The pioneering works, however, clearly illustrate the dampening effect of the technical and administrative requirement of RoO on trade. Brenton and Manchin (2002) estimate that in 1999, whereas the EU's Generalized System of Preference (GSP) theoretically covered 99 percent of EU imports from eligible countries, only 31 percent of exports were shipped under preferential rates because of the EU's restrictive rules and the costs of compliance with those rules. Appiah (1999) finds that RoO distort trade flows, diverting resources from their most efficient uses and undercutting global welfare. Estevadeordal and Miller (2002) document "missed preferences"—i.e., utilization rates below 100 percent—between the United States and Canada due to the tightening of the pre-FTA RoO under NAFTA launched in 1994. Cadot et al. (2002) attribute the mere 64 percent utilization rate of NAFTA preferences in part to RoO, and also show that stringent RoO has undermined Mexican exports to the United States. Canadian producers were reported to have opted to pay the tariff rather than going through the administrative hurdles to

[14] A lively debate has recently emerged regarding some important agreements in the Americas. See for example Krueger (1999), Clausing (2001) and Romalis (2001) on NAFTA or Yeats (1998) and Soloaga and Winters (1999) on Mercosur.

meet the RoO already in the context of the NAFTA predecessor, the US-Canada FTA (Krueger 1995).

Estevadeordal (2000) has documented in the case of NAFTA the interaction between the degree of stringency of rules of origin and the speed of preferential tariff liberalization, stressing the importance of considering rules of origin as key policy instruments in the design and implementation of FTAs. In the case of NAFTA, the study finds that the origin regime clearly performed its main role as an instrument against trade deflection, based on a strong and statistically significant correlation between the MFN tariff differential and the degree of restrictiveness imposed buy the RoO. In addition, there is evidence that those sectors with more restrictive RoO had associated longer tariff phase-outs and therefore rules of origin and phase-out periods could be viewed as complementary instruments of a discriminatory tariff policy. However, a more sophisticated interpretation of this result would be the existence of a substitution effect. Longer phase-outs are usually applied to the "most sensitive sectors" with high levels of tariff protection, and although those tariffs would be eventually eliminated at the end of the tariff phase-out, the origin requirement would remain in place, eventually providing the protective effects of the original tariffs. [15] Borrowing the language of the endogenous protection literature, one could conclude that the same forces that push for tariff protection also push for more stringent origin rules. In the sections that follow, we shift the focus back to tariffs to take a first step in estimating the effects of tariffs on trade flows and generating some predictions for how the FTAA could affect the pattern of trade within the hemisphere.

[15] See an extension of this result in Cadot et al. (2002)

IV. Model

Trade negotiations in Latin America are complex and involve asymmetric trade barriers that depend on both the bilateral and average tariff rates as well as rules of origin regulations. In this section we describe a model that emphasizes the *relative* and *asymmetric* nature of some trade costs and, for the sake of simplicity, we focus on tariffs as our policy variable. In a free trade agreement, bilateral trade patterns would depend on the bilateral tariff frictions among members (preferential tariffs) vis-à-vis the tariff frictions that each member faces with respect the rest of the world (e.g. MFN tariffs). Trade between two countries, after controlling by size and other variables, is decreasing in their bilateral trade barrier *relative* to the average barrier of the two countries to trade with all their partners. That is, the more resistant to trade with all others a country is, the more it is pushed to trade with a given bilateral partner. Also, by explicitly measuring bilateral and multilateral tariff liberalization, the model also introduces an important asymmetry since as shown in the previous section preferential tariff rates vary considerably *over* and *between* partners.

Since we are focusing on the effects of regional trade agreements on national imports and exports, it is helpful to begin with the assumption that all goods are differentiated by place of origin and that each country produces only one good. We next follow Anderson and van Wincoop (2000) and assume that consumers have identical, homothetic preferences that can be approximated with a CES utility function. For example, consider the following function for consumers in country j consuming goods z from country i :

$$\left(\sum_i \beta_i^{1/\sigma} z_{ij}^{(\sigma-1)/\sigma}\right)^{\sigma/(\sigma-1)} \tag{1}$$

which is maximized according to the budget constraint

$$\sum_i p_{ij} z_{ij} = y_j . \tag{2}$$

The σ represent the constant elasticity of substitution between goods from each country, β_i are positive consumption weights (summing over *i* to one), p_{ij} are the prices of region i goods in country j, and finally y_j represents the nominal income of consumers in country j. Maximizing this system yields the country *j's* demand function for goods produced by country *i*.

$$\frac{y\beta_i p_i^{1-\sigma}}{\sum_i^N \beta_i p_i^{1-\sigma}} = z_i p_i \text{ or } \frac{y\beta_i p_i^{-\sigma}}{\sum_i^N \beta_i p_i^{1-\sigma}} = z_i \tag{3}$$

For the sake of intuition, assume that the elasticity of substitution is greater than 1. Then imports from country i (defined as $z_i p_i$) are a decreasing function of the own price and an increasing function of the price of substitutes. They are also a positive function of home income and the preference parameter beta.

At this point it is useful to explicitly incorporate tariffs and distance. Tariffs and distance reduce the price that the producer receives and increase the price that importing consumers pay. We can formalize this relationship defining the importing price p_i as

$$p_i = \pi_i \tau_i \delta_i \tag{4}$$

which decomposes the price into the exporter's price, the tariff, and distance (respectively). As pointed out by Anderson (1979), (3) implies that bilateral trade is increasing in the average resistance measures of the importer (tariffs and distance) because higher average tariffs and greater average distance from trading partners push any given bilateral trade higher (furthermore, $\partial z_i / \partial p_j > 0$).

To complete the framework, we now turn to the production side. Higher tariffs and distance discourage bilateral trade, but average exporter tariffs and distance also matter. To illustrate how they affect trade, we assume that demands are independent across countries for each exporter's good j. That is, we rule out third-party exports. Each exporter will face the sum of demand curves in (3) as the total demand. Since costs are not distinguished by destination, the exporter in country i maximizes

$$\sum_j^N \pi_j z_j(\pi_j) - C(\sum_j^N z_j). \tag{5}$$

The first order condition equates marginal revenue with marginal costs in each market.

$$\pi_j \frac{\partial z_j}{\partial \pi_j} + z_j = \frac{\partial C}{\partial z_j}\frac{\partial z_j}{\partial \pi_j} \quad \forall j. \tag{6}$$

Given imperfect competition, this condition leads to the familiar Ramsey Rule:

$$\frac{\pi_i - C'(Z)}{\pi_i} = \frac{1}{\varepsilon} \tag{7}$$

in which ε is the absolute value of the price elasticity of demand. Exporters would prefer to sell less (charge higher prices) to importers

The price elasticity of demand, $\frac{\partial z}{\partial \pi}\cdot\frac{\pi}{z}$, can be expressed as

$$\sigma + \frac{(1-\sigma)\beta_i \pi_i^{1-\sigma}}{\sum_i^N \beta_i \pi_i^{1-\sigma}} \tag{8}$$

which is a decreasing function of π when $\sigma > 1$.

Exporters consider their home market as one of the N markets. Higher average tariffs and distance decrease the elasticity of home demand, making firms want to charge a higher price by selling less at home. The result is that the residual supply of exports will be greater, suggesting that higher average exporter tariffs and distance will increase bilateral trade.

The final step towards our estimation equation is to incorporate exporter income. Equation (7) can be expressed as

$$\pi_i = C'(Z)\left(\frac{\varepsilon}{\varepsilon-1}\right) \tag{9}$$

Economies of scale suggest that marginal costs are decreasing in total output. Thus, the price is falling with total output. Since trade is an inverse function of price, trade is an increasing function of exporter market size.

This offers an additional motivation for focusing on asymmetry: the role of the traditional gravity model elements are not symmetric because they depend on whether a country is an exporter or an importer. Furthermore, the role of average tariffs and average distance are not symmetric. Higher average distance and tariffs of the importing country increase bilateral trade for importers and exporters, but there is no reason to believe that these effects are of a similar magnitude.

The theory sketched here identifies the key element of the traditional gravity equation and suggests how each variable should affect bilateral trade. We therefore consider the following estimation equation:

$$\begin{aligned} \ln x_{ij} &= \alpha + \vartheta_1 \ln \delta_{ij} + \vartheta_2 \ln \tau_{ij} + \vartheta_3 \ln y_i + \vartheta_4 \ln y_j \\ &+ \vartheta_5 \ln \overline{\delta}_j + \vartheta_6 \ln \overline{\tau}_j + \vartheta_7 \ln \overline{\delta}_i + \vartheta_8 \ln \overline{\tau}_i + \varepsilon_{ij} \end{aligned} \tag{10}$$

in which the variables are defined as above. One contribution of this paper is that we include asymmetric trade barriers (τ) along with distance (δ). These variables enter both as the level of tariffs and distance between the two countries and the average tariff level and distance for the importing country *j*.

Section II also suggests that bilateral tariffs, as preferential tariffs, are considered relative to the MFN tariff or the average tariff level. The model above suggests that, for the importing country, the increasing the difference between the bilateral tariff and the

importing country's average tariff will reduce bilateral trade. Therefore, we include both the bilateral tariff and the ratio of the bilateral tariff relative to the average tariff when estimating our gravity equation. We will, of course, also consider the effects of including the traditional gravity variables, such as exchange rates, language, border, island, and being landlocked. We also explore the effects of various interaction terms and regional effects in the next section.

V. Empirical Analysis

The major data collection effort of this paper has consisted in constructing from original sources the preferential bilateral tariff rates for all possible bilateral relations among the 29 countries included in our sample, in addition to the MFN rates that each country applies to the rest of the world. The data has been collected on a yearly basis for the period 1985-1997. All data comes directly from the tariff liberalization schedules of existing FTA agreements at every point in time. In some few cases, due to the lack of data, we had to make some simplifying assumptions to have a completely balanced panel. A description of the dataset as well as the methodology regarding other standard variables used in gravity model estimates can be found in the Appendix.

We present the empirical analysis in four sections. First, we motivate our focus on asymmetry by contrasting the symmetry of trade and the asymmetry of tariffs. Second, we present our basic cross section results. Third, we present panel estimates. We conclude with some estimates of how a projected Free Trade Agreement of the Americas would affect both imports and exports of the participating members.

5.1. Asymmetry

One contribution of this paper is that it incorporates asymmetric tariff variables. Trade patterns are generally symmetric: bilateral exports are generally and excellent predictor of bilateral imports. Figure 6a illustrates the symmetry of trade in 1999. One country's exports to a given partner explain about 80% of the variation of that country's imports from the same partner (the R^2 value is 0.803).

Tariffs, in contrast, are generally not symmetric. Figure 6b illustrates this point. In 1999, a given country's tariffs explain less than 40% of the variation in their partner's tariffs towards them. The symmetry of tariffs increases over our sample. Prior to 1990, one country's tariffs explain less than 1% of the variation in the partner's tariffs.

The implication of this asymmetry is that average trade barriers introduce possibly significant measurement error when they are used as proxies for partner-specific tariffs. This measurement error would bias the estimated effects of tariffs towards zero, suggesting that the literature that relies on average tariffs underestimates the real impact of tariffs on trade.

5.2. Cross Section Results

We begin with equation (10) and add variables that are now standard in the gravity equation: controls for being landlocked, sharing a common language, being an island, and sharing a common border. The relatively few papers that employ specific

tariffs use the form ln(1+tariff/100). We follow this convention. We restrict the sample to the 1985-1997 period due to the availability of data.

Table 2 contains the central cross section results. As expected, the GDP of the importer and the exporter have strong effects on trade. Distance and being landlocked discourages trade, and having a common border or a common language increases trade. Tariffs significantly reduce trade. Our estimated tariff coefficient in the baseline regression in the first column of results is -0.313 which is much smaller than the estimates from our comparison studies.

In column (2) we introduce the multilateral resistance measures. The exporter's average tariff and average distance from other trading partners seems to have a significant and positive effect on trade, as the theory above suggests. The importer's average distance does not have a statistically significant effect on bilateral trade in column (2), but the bilateral tariff/average tariff ratio has a significant and negative coefficient. As expected, the more preferential the bilateral tariff is relative to the importer's average tariff, the more trade occurs between the trading partners.

Since we have multiple years of data, we consider two alternative controls for time. In columns (3) and (4) of table 2, we alter our basic gravity model by including a linear time trend (column (3)) and individual year effects (column (4)). We considered a time trend because trade increases over our sample period. Surprisingly, neither the time trend nor the interaction of the time trend and tariffs are significant. The estimate of the tariff effect is similar when the trend is not interacted with tariffs or when year effects are included (results not shown).

When the tariff is interacted with the year effects, however, the tariff coefficient increases. The year effects (not shown) are all significant. The interaction between tariffs and the year effect (using 1985 as the omitted year) is only significant for 1986-1989 and ranges from 0.924 (in 1989) to 1.656 (in 1988), but show no pattern of change over the sample period. The tariff effects remain robust in sign and significance, and generally in magnitude, when different time controls are included.

We explore the robustness of our results in several ways. Our tariff estimate remains very stable when we omit the average distance measures. We also replaced the average distances of the importer and the exporter with the Baier and Bergstrand (2001) remoteness index. The remoteness measure itself emerges significantly, which is consistent with earlier studies. Including this index does not affect our estimated tariff coefficient, suggesting that the tariff estimate is robust to alternative measures of distance. We also explored the effect of exchange rate volatility. We find that real exchange rate volatility has an unexpected positive effect on trade volumes, but this effect is imprecisely estimated. We did note that including real exchange rate volatility slightly raises our estimate of the tariff effect, but the estimated tariff effect is within the range of the estimates presented in table 2.

The experience of the different regions in our sample – notably North America, Europe, and Latin America – varied through our sample period. We therefore explored the robustness when we include various regional controls. Specifically, we included controls for when a North American country (U.S. or Canada) is an importer or an exporter. We find that these controls have a very small effect on the magnitude of our tariff coefficient. We also dropped all European countries from the sample. Our tariff

estimate remained very close to -0.80 and statistically significant. Including dummy variables for pairs in which a European country is an exporter or an importer does not affect the sign or significant of the tariff coefficient, but it does increase the absolute magnitude of the effect. That is, tariffs have a larger negative effect on trade (more than 50 percent larger) when the European controls are included. This seems to be the only control that affects our tariff estimates. We hope to more fully explore the ramifications of the European effect in future research.

Since we have a particular interest in the Americas, we also allowed the tariff effect to differ for pairs in which both countries are Latin American. Including a control for Latin American pairs, as well as the tariff interaction term, does not significantly affect the main tariff effect. The marginal effect of tariffs on intra-Latin American trade seems large and significant, suggesting that reducing tariffs within Latin America would have much larger effects on trade within Latin America than global tariff removal. The total effect (standard error) for Latin America is -1.891 (0.254). This is not surprising, given the fact that tariffs in Latin America are generally higher than in the rest of our sample.

Our primary emphasis here, however, is the effect of the Free Trade Agreement of the Americas. Latin American countries may be interested in lowering barriers among themselves, but one significant motivation of joining the FTAA is to secure access to Canadian and the U.S. markets. We therefore consider the possible effects of an FTAA by including a dummy variable for FTAA countries (U.S., Canada, and Latin America) and interacting this variable with the tariff. These results are shown in the last column of table 2. FTAA countries already trade more, even with our other controls. The main

effect of the FTAA tariff remains similar to previous columns. The marginal tariff effect is negative, significant, and nearly equal to the main tariff effect in magnitude. This is consistent with the idea that the potential trade effects of the FTAA could be large even if other countries (e.g. Europe) are not included.

5.3. Panel Data Approaches

Most gravity models in the current literature have been estimated using cross-section data. The increasing availability of panel data and estimation techniques have also begun to affect the gravity literature (Matyas 1997, Soloaga and Winters 2001, Carrere 2002). These papers suggest that controlling for country-specific effects in gravity models is important. To explore the effects of panel estimation with our sample, and in particular to test for the robustness of the tariff effect, we first estimated a random effects model using OLS. We found a larger coefficient on the tariff effect, but the other variables are generally similar to those estimated in previous tables. We chose not to report these results, however, because the random effects specification may not adequately control for sample heterogeneity. We formally tested the random effects specification using a Hausman test. Our results reject the random effects specification. Table 3 contains the results that emerge when we include country-specific (not pair specific) effects. This specification now passes the Hausman specification test, but the tariff estimate remains virtually identical to our earlier estimate. Although larger, our tariff effects seem generally robust to panel specification.

We also explored the effects of interacting the tariff term with a dummy for Latin American pairs. We do found that the tariff effect is reduced, although it remains negative and significant. The total effect (standard error) for Latin America was -1.870 (0.149), which is very similar to our previous estimates. This is also consistent with higher tariffs in Latin America than the rest of the world. Column 2 of table 3 contains the results when FTAA controls are included in the panel specification. These results again suggest large potential gains from and FTAA because the marginal effect of the FTAA tariff is approximately equal to the main tariff effect.

To pursue the tariff effect in FTAA countries further, we restricted the sample to just the FTAA countries. These results are found in the last two columns of table 3. Latin America experienced a great deal of trade liberalization in the 1990s. It is possible that these countries signed so many bilateral agreements because the cost of doing so was not large. That is, many agreements may have been signed between countries that traded relatively little. In periods of rapid trade liberalization, this bias could create the impression that lowering tariffs lowered trade.

To explore this possibility, we replaced the current tariff with the lagged tariff and again restricted the sample to just FTAA pairs. Using lagged tariffs generates a result very similar to those found in previous tables. The magnitude, however, is slightly smaller than the total effect found in the previous columns. The potential for increasing trade seems to be statistically significant with a tariff coefficient greater than one when lagged tariffs replace contemporary tariffs in the panel regression.

We also experimented with the Arellano-Bond estimator for dynamic panel data (Arellano and Bond 1991). In our estimation, which generated results very similar to

those obtained with other approaches, we consistently rejected the hypothesis that the over-identifying restrictions were valid. The estimation results also suggested the presence of first-order serial correlation. Therefore, we decided to employ an estimation approach that allows us to directly estimate and test the degree of serial correlation in the error terms.

Table 4 contains results from the fixed effects model (using country pair fixed effects) that tests and adjusts for first-order serial correlation. The modified Bhargava, Franzini, and Narendranathan (1982) test statistic for serial correlation in balanced panel data is shown at the bottom of each column. This statistic falls short of the suggested minimum Durbin-Watson bound, suggesting serial correlation. The statistic also falls above the suggested maximum value for the random walk test statistic, leading us to reject the random walk hypothesis. Therefore, we adjust our estimation using the estimated correlation coefficient (also shown at the bottom of each column).

Compared to earlier estimates, the estimated lagged tariff effects in the first two columns of table 4 are somewhat higher. Including the multilateral resistance measures does not have a large effect on the estimated tariff effect. The multilateral resistance measures emerge in the expected way. The larger the difference between the importer's bilateral and average tariff, the less bilateral trade occurs. The contemporaneous exporter's average world tariff is positive, but the lagged value is negative and nearly the same magnitude.

The estimates for the FTAA area are found in the second column. In the second column, we interact the tariff (and lagged values) with a FTAA dummy variable. These results suggest that the early effects of reducing tariffs would be higher in Latin America,

but the second lagged value is significant and positive, raising questions about the long term effects of tariff reduction. A similar result emerges when we restrict the sample to only the FTAA countries. The initial effect of the tariff change in positive, but the second lag is positive and significant, suggesting some mitigation of the tariff change on trade flows in the long run. The sum of the two estimates, however, is still negative, suggesting an increase in trade when tariffs fall in the Americas.

The last two columns of table 4 contain the results from the differenced model. As when pair-specific dummy variables are included, the constant effects of distance, language, island, border, and landlocked drop out when the data are differenced. We include year effects and two lags of differenced log exports. All right hand side variables are represented by contemporaneous and a lagged differenced value. We test for serial correlation of the error terms using the BDN modified Durbin Watson statistic as described above. We reach the same conclusions with the differenced estimates and therefore use the same correction procedure.

The results in the last two columns of table 4 tell a similar story as the first two columns. Contemporaneous changes in tariffs are correlated with higher trade, perhaps suggesting endogeneity. The lagged values, however, are negative, significant, and hardly affected by the inclusion of the multilateral resistance measures. We also focus on the FTAA countries by first interacting a FTAA dummy variable with the change in tariffs in column 4. The result is somewhat similar to the earlier tables, except here the effect of a change in tariffs seems slightly larger in the FTAA countries. Given the higher tariffs in Latin America relative to the rest of the world, these results may suggest

that the FTAA agreement could have a significant and positive effect on trade volumes in the region.

Our estimates seem to be towards the upper end of the estimates from previous studies shown in Table 1. One possible explanation for this is that previous studies use less precise measures of tariffs which could bias the previous estimates downward. The implication of our results is that trade agreements may have a larger positive effect on trade volumes than was previously expected. We now use our estimates to generate some predictions for how a FTAA would affect bilateral trade patterns.

5.4. Counterfactual Scenarios

One of the most pressing questions about the FTAA is "how will trade patterns be affected?" In particular, nations are especially interested in how exports and imports are expected to change. To predict how an FTAA would affect trade flows, we relied on our dynamic panel estimates from column (2) of table 4. We are most interested in comparisons between three statistics: the actual level of imports or exports, the model's prediction of the level of imports or exports, and the effect that an FTAA would have on the predicted level of exports.

To generate the predicted values of pairwise trade, we simply constructed the linear projection of the estimation equation presented in column 2 of table 4 (adding in pair-specific fixed effect). To generate the predicted effects of NAFTA tariff removal, first subtracted the product of the tariff effect and the tariff (including all lagged terms). Since by our specification the bilateral tariff / average tariff ratio would also go to zero for FTAA countries, we subtracted the product of the coefficient and the ratio for each

pair. If FTAA tariffs all go to zero, then each FTAA member's average tariff would also be affected. Therefore, we calculated the new average tariffs that would be in place if only FTAA member tariffs went to zero and subtracted the product of this change with the estimated effect of the average tariff on trade (again, including lags). This process produces the expected change in each pair's trade volume. To illustrate the effect on imports and exports we summed the predicted value of trade over all partner countries for importers and exporters, respectively.

The effects on exports as a share of GDP (exports divided by GDP) for all FTAA countries are shown in figure 7. The United States, Canada, and Mexico trade the most. The model generally fits very well for most countries (as seen by the closeness of the first and second bars for each country). The main exception to this good fit is Mexico, which both exports and imports more than predicted by the model. Not surprisingly, Mexican and U.S. exports would increase relatively more than Canadian exports if the FTAA brought all tariffs to zero.

The effects on imports are shown for all FTAA countries in figure 8. Again the fit of the model, as illustrated by the closeness of the first and second columns for each country, is generally very good. The model underpredicts trade for Bolivia and over predicts trade for Canada, which may suggest some nonlinearities that we are not capturing. The changes in imports, however, seem relatively large for many Latin American countries.

To get a more clear sense of the expected change in imports and exports by country, figure 9 shows the log difference in the model's predicted trade flow and the FTAA predicted values. Mexico, Peru, Bolivia, and Venezuela have the largest predicted

increases in import shares, while Canada and the United States have the smallest. Mexico and Venezuela have the largest predicted increases in export shares.

One result emerges immediately from figure 9: the model predicts a larger percentage increase in the import shares than the export shares for all Latin American countries, while the reverse is true for the United States and Canada. This result probably reflects the fact that the United States and Canada have initially smaller tariff levels than most of the Latin American countries.

VI. Conclusions

As the Americas approach the deadline for negotiating the FTAA, the question of how trade patterns may be affected becomes increasingly important. This chapter takes four steps towards understanding the potential implications of the FTAA on trade patterns.

First, we review the evolution of trade agreements in the Americas. Trade agreements are also complex in that they involve both negotiations about tariff levels and rules of origin. We focus on the evolution of both these key components of trade agreements. The evolution of these trade agreements generated several characteristics of tariffs. Tariffs are generally asymmetric, since, even in reciprocal agreements, countries do not always match their partner's tariff levels. Tariffs are also important relative to average tariff levels, and countries in the Americas have largely focused on negotiating preferential tariffs. We also emphasized the importance of rules of origin and note again here that this is a fertile area for future research.

Given the fact that tariffs are asymmetric and depend on both bilateral and

average tariff levels, we then described a theoretical model that illustrates how these characteristics can be expressed in the context of the gravity equation. The advantage of this model is that is provides guidance on the expected values in our empirical work.

In our empirical work, we focused on two main results. First, we employ very specific tariff data to estimate the effects of tariffs on trade. Not surprisingly, we find that our precise data generate estimates of the effects of tariffs that are in the upper range of those found in the literature. We find that our estimates are robust to a large number of different specifications. We find that the tariff reducing effect of trade is larger in the Americas than in our full sample. Our results seem to be robust to alternative measures of distance, regions, and time effects.

Several recent papers have found that appropriately treating dynamics in the context of gravity models is important. We provide some evidence here that is consistent with this argument, and use dynamic tariff estimates to generate predictions for changes in trade flows with the FTAA. We find that our model does reasonably well in predicting both imports and exports. Therefore, we use our estimates to generate some preliminary predictions about how trade would change if the FTAA reduced tariffs to zero among member countries. Our predictions suggest that changes in trade could be very substantial. Generally, imports for Latin American countries are predicted to rise more than exports. The reverse is true for the United States and Canada. While this result is most likely due to the differences in initial tariff levels, it could also help explain some of the resistance to the FTAA in some countries.

Appendix

The dataset used in this study covers the period from 1985 to 1997 and the following countries: Argentina, Bolivia, Brasil, Colombia, Chile, Ecuador, Mexico, Paraguay, Peru, Uruguay, Venezuela, United States, Canada and the European Union (15 countries). The standard gravity variables (bilateral trade values, GDP, distance, dummy variables for common border, common language, landlocked) come from standard sources in the gravity literature, in particular, from Andrew Rose's data set from his website, data7web.dta; complemented by trade data from United Nations COMTRADE database. All MFN tariff data has been collected from official national statistical sources and regional secretariats. All preferential tariff data has been collected directly from original tariff schedules of regional and bilateral trade agreements (reciprocal and non-reciprocal) signed and implemented during this period (1985-1997). It includes bilateral and regional agreements signed under the LAIA framework among Latin American Countries (Acuerdos de renegociacion del Patrimonio Historico, Acuerdos Comerciales, Acuerdos de Complementacion Economica, Acuerdos Regionales), the North-American Free Trade Agreement (NAFTA) between United States, Canada and Mexico and the non-reciprocal preferential agreements between Latin American Countries-United States and Latin American Countries-European Union under the Generalized System of Preferences. A full detailed appendix can be obtained directly from the authors.

References

Aitken, N.D. 1973. The Effect of the EEC and EFTA on European Trade: A Temporal Cross-Section Analysis. *American Economic Review* 63 (5) pp. 881-92.

Anderson, J. E. 1979. A Theoretical Foundation for the Gravity Equation. *American Economic Review* v69, no. 1 (March) pp. 106-116.

Anderson, J. and E. Van Wincoop. 2000. Gravity with Gravitas: A Solution to the Border Puzzle. Mimeo.

Appiah, A. J. 1999. Applied General Equilibrium Model of North American Integration with Rules of Origin. PhD Dissertation. Simon Fraser University, Canada.

Arellano, M. and S. Bond. 1991. Some Tests of Specification for Panel Data: Monte Carlo Evidence and an Application to Employment Equations. *Review of Economic Studies* v58, n2 (April 1991): 277-97

Bhargava, A., L. Franzini, W. Narendranathan. 1982. Serial Correlation and the Fixed Effects Model. *Review of Economic Studies* v49, n4 (October 1982): 533-49.

Bhagwati. J. and A. Panagariya. 1996. *The Economics of Preferential Trade Agreements.* Washington, D.C.: American Enterprise Institute.

Baier, S. L. and J. H. Bergstrand. 2001. The Growth of World Trade: Tariffs, Transport Costs, and Income Similarity. *Journal of International Economics* v53, n1 (February 2001): 1-27

Bergsten, C. F. 1997. Open Regionalism. In C. Fred Bergsten, ed. *Whither APEC: The Progress to Date and Agenda for the Future.* Washington: Institute of International Economics.

Brenton, P. and M. Manchin. 2002. *Making EU Trade Agreements Work: The Role of Rules of Origin*. CEPS Working Document No. 183. Brussels: Centre for European Policy Studies (March).

Brun, J.-F., C. Carrère, P. Guillaumont and J. de Melo. 2002. s Distance Died? Evidende from a panel Gravity Model. Mimeo.

Cadot, O., J. de Melo, A. Estevadeordal, A. Suwa-Eisenmann and B. Tumurchudur. 2002. Assessing the Effect of NAFTA's Rules of Origin. Mimeo.

Clausing, K.A. 2001. Trade Creation and Trade Diversion in the Canada-United States Free Trade Agreement. *Canadian Journal of Economics* 34 (3).

Coe, D.T., a. Subramanian, and N.T. Tanirisa with R. Bhavrani. 2002. *The Missing Globalization Puzzle*. IMF Working paper WP/02/171.

Devlin, R. and A. Estevadeordal. 2001. What's New in the New Regionalism in the Americas? In Victor Bulmer-Thomas, ed. *Regional Integration in Latin America and the Caribbean: Thcal Economy of Open Regionalism*. London: ILAS.

Devlin, R. and A. Estevadeordal. 2001. What's New in the New Regionalism in the Americas. In V. Bulmer-Thomas, ed., *Regional Integration in Latin America and the Caribbean.* London: The Institute of Latin American Studies.

Di Mauro, F. 2000. *The Impact of Economics Integration on FDI and Exports: A Gravity Approach*. CEPS Working Document No. 156 (November).

Duttagupta, R. and A. Panagariya. 2001. Free Trade Areas and Rules of Origin: Economics and Politics. Seminar Paper.

Duttagupta, R. 2000. Intermediate Inputs and Rules of Origin: Implications for Welfare and Viability of Free Trade Agreements. PhD Dissertation, University of Maryland, College Park.

Estevadeordal, A. 2000. Negotiating Preferential Market Access: The Case of the North American Free Trade Agreement. *Journal of World Trade* 34, 1 (February).

Estevadeordal, A., B. Frantz, A.M. Taylor. 2003. The Rise and Fall of World Trade 1870-1939. *Quarterly Journal of Economics* 118 (2).

Estevadeordal, A. and E. Miller. 2002. Rules of Origin and the Pattern of Trade between U.S. and Canada. Washington, DC: Integration, Trade and Hemispheric Issues Division, Inter-American Development Bank.

Estevadeordal, A., J. Harris and M. Shearer. 2002. Towards Free Trade in the Americas. Inter-American Development Bank. Mimeo.

Estevadeordal, A. and K. Suominen. 2003. Rules of Origin in FTAs in Europe and in the Americas. Washington, D.C. Inter-American Development Bank. Mimeo.

Ethier, W. 1998. The New Regionalism. *The Economic Journal* 108 (449). July.

Frankel, J. A. 1997. Regional trading blocs in the world economic system With Ernesto Stein and Shang-Jin Wei. Washington, D.C.: Institute for International Economics

Hummels, D. 1999. Towards a Geography of Trade Costs. Mimeo.

Inter-American Development Bank. 2002. Beyond Borders: The New Regionalism in Latin America. Economic and Social Progress Report. Washington, D.C. IDB

Iwuagwu Oguledo, V. and C.R. Macphee. 1994. Gravity Models: A Reformulation and an application to discriminatory Trade Agreements. *Applied Economics* Vol 26 pp. 107-120.

Ju, J. and K. Krishna. 1998. *Firm Behavior and Market Access in a Free Trade Area With Rules of Origin.* NBER Working Paper No. 6857. Cambridge, MA: NBER.

Krishna, K. and A. O. Kruger. 1995. Implementing Free Trade Areas: Rules of Origin and Hidden protection. In Alan Deardorff, James Levinsohn and Robert Stern, eds. *New Directions in Trade Theory.* Ann Arbor: University of Michigan Press.

Krishna, K. 2002. Understanding Rule of Origin. Mimeo (15 December).

Krueger, A. O. 1999. *Trade Creation and Trade Diversion under NAFTA*. NBER Working Paper No. 7429.

Limao, N. and A. Venables. 2001. Infrastructure, Geographical Disadvantage, Transport Costs, and Trade. *The World Bank Economic Review* v.15,n.3.

Linnemann, H. and H. Verbruggen. 1991. GSTP Tariff Reduction and Its Effects on South-South Trade in Manufactures. *World Development* v19, n5 May: 539-51

Matyas, L. 1997. Proper Econometric Specification of the Gravity Model. *World Economy* v20, n3 (May 1997): 363-68

Redding, S. and A. Venables. 2000. Economic Geography and International Inequality. CEPR DP.

Romalis, J. 2001. NAFTA's Impact on North American Trade. Mimeo, Chicago GSB.

Rose, A. K. 2002. Do we really know that the WTO increases trade. CEPR Discussion Paper 3538.

Shiff, M. and L.A. Winters. 2003. *Regional Integration and Development.* Washington, D.C.: World Bank and Oxford: Oxford University Press.

Soloaga, I. and L.A. Winters. 2001. *Regionalism in the Nineties: What Effect on Trade?* Policy Research Working Paper 2156. Washington, D.C.: World Bank.

Tamirisa, N.T. 1999. *Exchange and Capital Controls as Barriers to Trade*. IMF Staff Papers XLVI. pp. 69-88

UNCTAD 2001. Imrpoving Market Access for Least Developed Countries. UNCTAD/DITC/TNCD/4. Geneva: United Nations.

Wonnacott, P. 1996. Beyond NAFTA—The Design of a Free Trade Agreement of the Americas." In J. Bhagwati and A. Panagariya, eds., *The Economics of Preferential Trading Agreements*. Washington, D.C.: the AEI Press, pp. 79-107.

World Bank. 2000. *Trade Blocs*. Oxford: Oxford University Press.

Yeats, A. J. 1998. "Does Mercosur's Trade Performance Raise Concerns about the Effects of Regional Trade Arrangements? *World Bank Economic Review* v12, n1.

Table 1a: Estimated Effects of Free Trade Agreements on Trade Flows

Study	Dep.Variable	Estimation Method	Estimated FTA Effect	
Coe et al (2002)	Log Total Trade	Nonlinear Cross Sect.	Avg 75-2000	0.71
	Log Total Trade	Nonlinear Cross Sect.	2000	0.64
	Log Total Trade	OLS Panel	1975-2000	0.55
Aitken (1973)	Log Exports	OLS Cross Sect.	Avg. 1960-67	0.23
			1967	0.57
Melitz (2001)	Log Total Trade	OLS Cross Sect.	Range: Min	1.03
			Range: Max	1.24
Carrere (2002)	Log Imports	IV Panel	EU	0.29
Frankel and Rose (2000)	Log Total Trade	OLS Cross Sect.	Range: Min	1.16
			Range: Max	1.31
Rose (2002)	Log Total Trade	OLS Panel	Range: Min	0.94
			Range: Max	1.50
Soloaga and Winters (2001)	Log Imports	OLS Cross Sect	Range: Min (avg)	

Table 1b: Estimated Effects of Tariffs on Trade Flows

Study	Dep.Variable	Estimation Method	Estimated Tariff Effect	
Linneman and Verbruggen (1991)	Log Exports	OLS Cross Sect.	Range: Min	-1.531
			Range: Max	-2.157
Baier and Bergstrand (2001)	Log Total Trade	Differenced Cross Section	Range: Min	-2.71
			Range: Max	-4.49
Estevadeordal et al (2002)	Log Total Trade	OLS Panel	Range: Min	-0.843
			Range: Max	-1.687

Table 2: Cross Section Estimates

	Resistance Measures	Trend x Tariff	Year Effects	FTAA
Log Tariff	-0.772	-0.886	-1.743	-0.794
	(5.34)**	(4.46)**	(6.28)**	(4.49)**
Time Trend		0.002		
		(0.190)		
Trend x Log Tariff		0.041		
		(0.840)		
FTAA Countries				0.345
				(5.72)**
FTAA Countries x Log Tariff				-0.597
				(2.18)*
Log GDP Importer	0.798	0.799	0.801	0.805
	(107.16)**	(105.59)**	(104.85)**	(107.30)**
Log GDP Exporter	0.943	0.941	0.947	0.965
	(133.38)**	(130.22)**	(123.43)**	(116.29)**
Log Distance	-0.891	-0.892	-0.908	-0.903
	(32.21)**	(31.55)**	(30.46)**	(29.94)**
Bilat. Tariff/Avg. Importer Tariff	-0.305	-0.312	-0.281	-0.202
	(9.46)**	(9.32)**	(7.44)**	(5.08)**
Exporter Avg World Tariff	2.628	3.015	0.221	-5.485
	(8.41)**	(3.89)**	(0.130)	(2.74)**
Log Avg Dist Importer to World	-0.114	-0.129	-0.098	-0.222
	(1.440)	(1.600)	(1.180)	(2.64)**
Log Avg. Dist Exporter to World	0.535	0.525	0.617	0.594
	(7.52)**	(7.01)**	(6.89)**	(6.64)**
Common Border	0.807	0.804	0.795	0.78
	(15.48)**	(15.36)**	(15.09)**	(14.86)**
Either Is Landlocked	-0.665	-0.663	-0.661	-0.661
	(20.99)**	(20.85)**	(20.74)**	(20.90)**
Either Is An Island	-0.028	-0.026	-0.032	0.023
	(0.920)	(0.850)	(1.040)	(0.720)
Common Language	0.198	0.194	0.202	0.151
	(6.08)**	(5.93)**	(6.14)**	(4.47)**
Constant	-12.151	-11.983	-12.282	-10.829
	(14.17)**	(13.69)**	(13.36)**	(12.22)**
Year Effects?	No	No	Yes	Yes
Year x Tariff Effects?	No	No	Yes	No
Observations	9709	9709	9709	9709
R-Squared	0.84	0.84	0.84	0.84

Table 3: Initial Panel Estimates

	Country Fixed Effects	FTAA	FTAA	FTAA
Log Tariff	-0.902	-0.603	0.007	
	(10.32)**	(5.38)**	(0.02)	
Lagged Log Tariff				-1.268
				(3.14)**
FTAA Countries		-0.115		
		(0.55)		
FTAA Countries x Log Tariff		-0.688		
		(4.24)**		
GDP Importer	0.707	0.707	0.283	0.238
	(21.65)**	(21.67)**	(3.51)**	(2.70)**
GDP Exporter	0.113	0.12	-0.093	-0.009
	(3.36)**	(3.57)**	(1.20)	(0.11)
Log Distance	-0.463	-0.586	-1.051	-1.06
	(7.18)**	(7.52)**	(6.76)**	(6.97)**
Diff Bilat and Avg M Tar	-0.814	-0.735	-1.444	-1.233
	(10.94)**	(8.81)**	(6.42)**	(5.46)**
Rep. Avg World Tariff	1.159	-0.613	0.724	-0.611
	(0.71)	(0.36)	(0.18)	(0.15)
Ln Avg Dist Partner World	-8.163	1.685	0	0
	(8.37)**	(1.73)	(.)	(.)
Ln Avg Dist Reporter World	8.072	-1.625	1.328	1.412
	(8.23)**	(1.66)	(5.71)**	(5.90)**
Common Border	0.799	0.718	0.712	0.7
	(6.31)**	(5.47)**	(3.12)**	(3.14)**
Either Is Landlocked	0.203	0.205	0.252	0.273
	(0.46)	(0.46)	(0.29)	(0.32)
Common Language	0.623	0.613	0.52	0.476
	(5.57)**	(5.56)**	(1.53)	(1.43)
Year Effects?	Yes	Yes	Yes	Yes
Year x Tariff Effects?	No	No	Yes	Yes
Country Fixed Effects?	Yes	Yes	Yes	Yes
Observations	9269	9269	1872	1728
Number of Pairs	713	713	144	144

Table 4: Panel Estimates
Controlling for Serial Correlation

	1	2	3	4
	Levels	Levels	Differences	Differences
Log Tariff	0.571	0.782	1.251	1.378
	(2.67)**	(2.86)**	(6.99)**	(6.16)**
First Lag	-1.548	-1.434	-1.351	-1.103
	(6.11)**	(4.44)**	(7.76)**	(4.93)**
Second Lag	0.101	-0.24	-0.277	-0.32
	(0.57)	(1.08)	(1.69)	(1.54)
FTAA x Log Tariff		-0.507		-0.393
		(1.21)		(1.15)
First Lag		-0.287		-0.819
		(0.56)		(2.36)*
Second Lag		0.818		0.211
		(2.45)*		(0.68)
GDP Importer	0.601	0.601	0.593	0.595
	(13.90)**	(13.90)**	(13.82)**	(13.94)**
First Lag	-0.179	-0.178	0.48	0.45
	(4.16)**	(4.16)**	(11.28)**	(10.61)**
GDP Exporter	0.247	0.254	0.149	0.149
	(6.16)**	(6.30)**	(3.48)**	(3.51)**
First Lag	-0.192	-0.186	-0.096	(0.11)
	(4.63)**	(4.49)**	(2.26)*	(2.65)**
Diff Bilat and Avg M Tar	-0.306	-0.319	-0.292	-0.252
	(2.06)*	(2.11)*	(1.99)*	(1.68)
First Lag	-0.023	-0.066	-0.297	-0.203
	(0.15)	(0.41)	(2.03)*	(1.37)
Rep. Avg World Tariff	1.598	1.571	-1.097	-2.101
	(2.15)*	(2.11)*	(0.53)	(1.01)
First Lag	-1.411	-1.355	5.912	4.853
	(2.31)*	(2.22)*	(3.14)**	(2.54)*
Constant	-2.478	-2.578	0.027	0.011
	(4.01)**	(4.17)**	(1.49)	(0.62)
Correlation coefficient	0.086	0.086	0.163	0.068
Modified Bhargava et al DW	1.828	1.828	1.864	1.863
Observations	7130	7130	7130	7130
Number of Pairs	713	713	713	713

Figure 1 The Spaghetti Bowl:
Trade Agreements Signed and Under Negotiation in the Americas

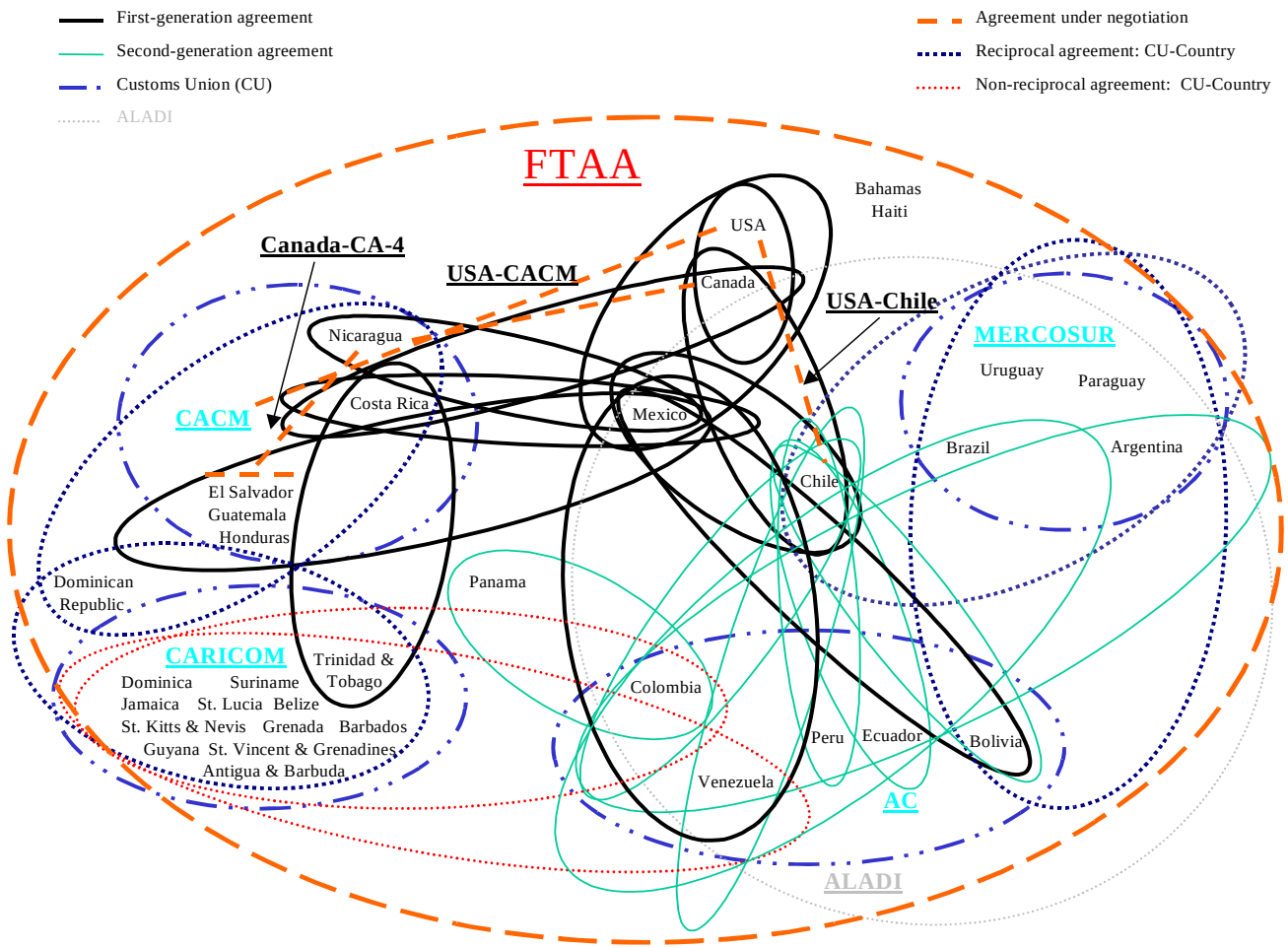


Figure 2: Preferential Tariff Liberalization in Selected FTAs in Latin America: Phase-Out Schedules

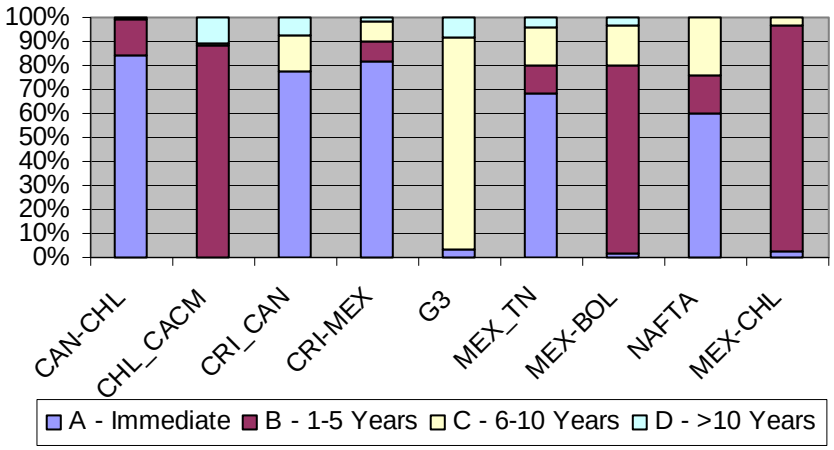
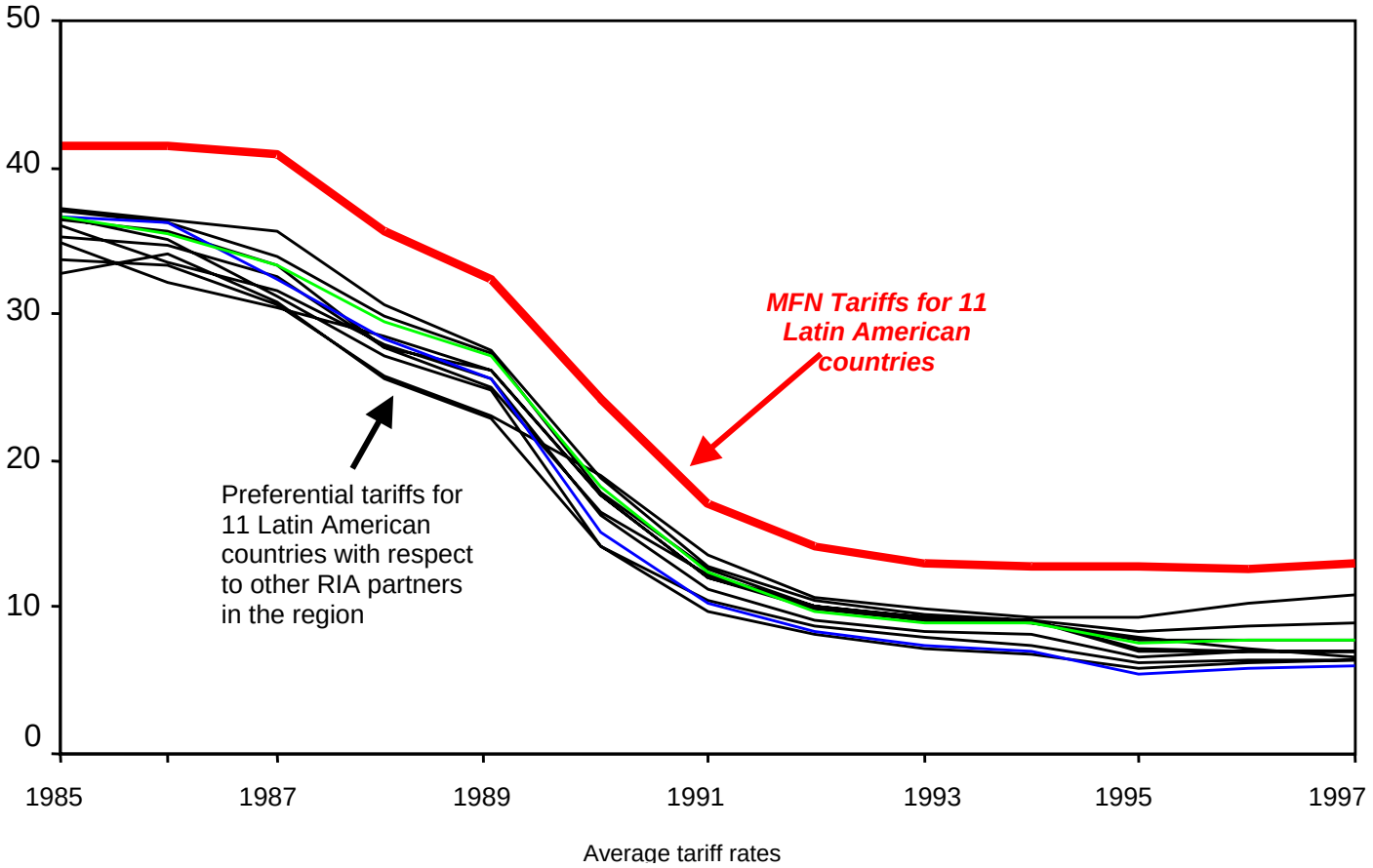
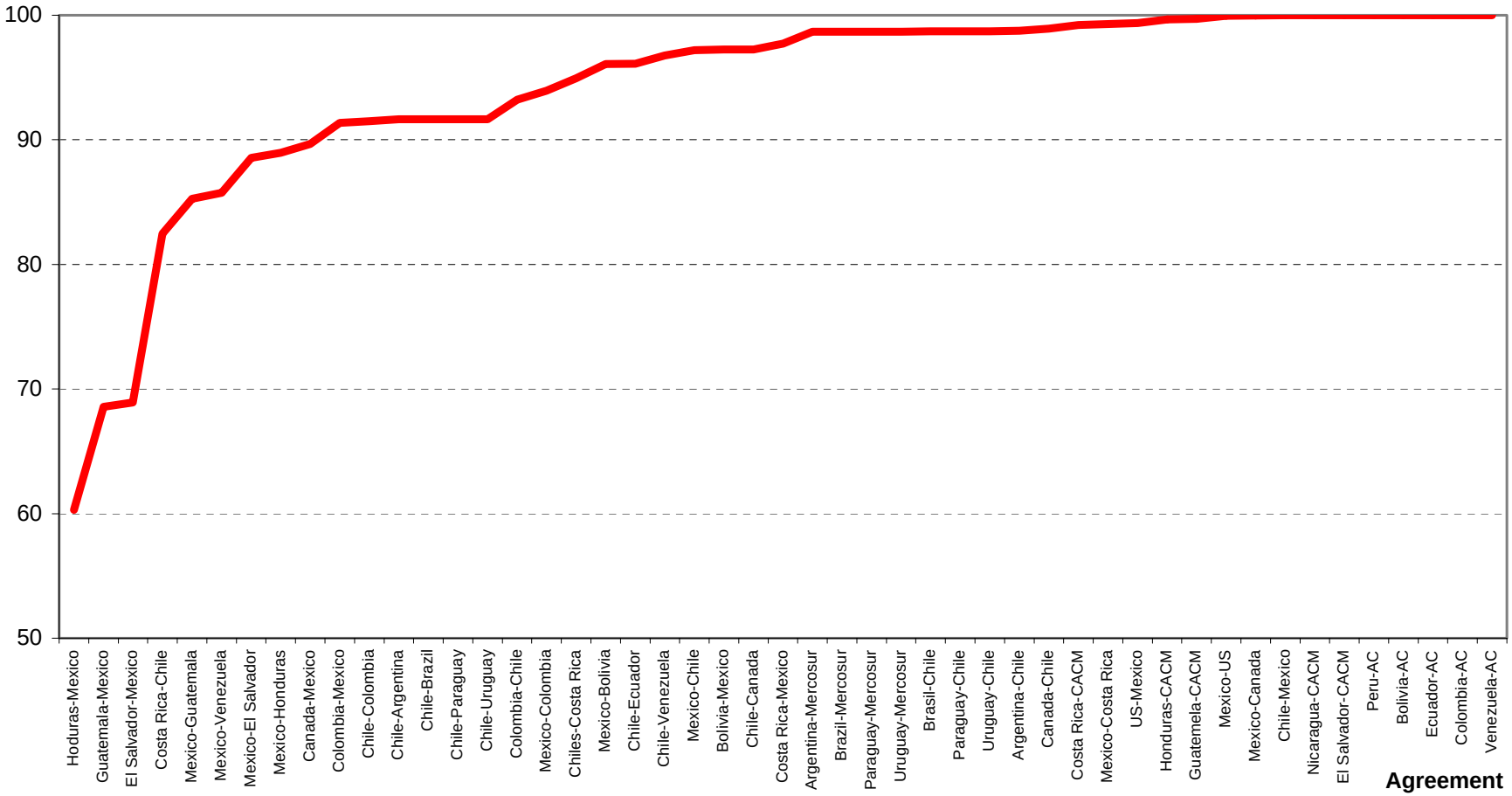


Figure 3 MFN and Preferential Tariff Liberalization in Latin America, 1985-1997
(In percent)



Note: The countries included are Argentina, Bolivia, Brazil, Chile, Colombia, Ecuador, Mexico, Paraguay, Peru, Uruguay and Venezuela. Calculations include only ad valorem tariffs.

Figure 4 Trade Liberalization by 2005:
Percent of items to be Tariff-Free



Note: The first country is the importer (liberalizing country in the bilateral relation), and the second is the exporter (beneficiary country in the bilateral relation).

Figure 5: Preferential Tariff Liberalization in Selected FTAs in Latin America: Rules of Origin

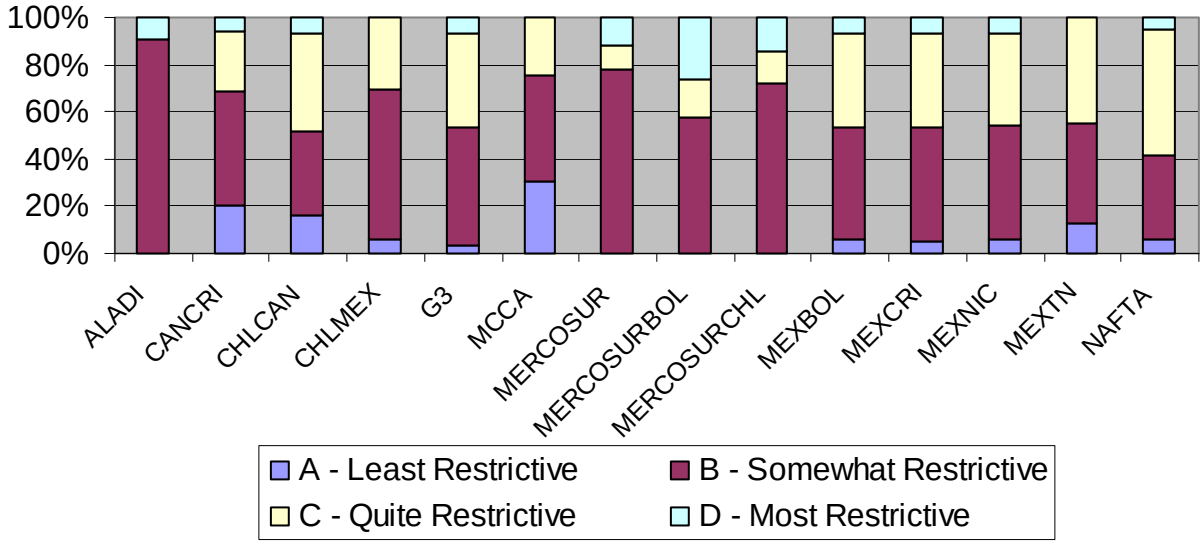
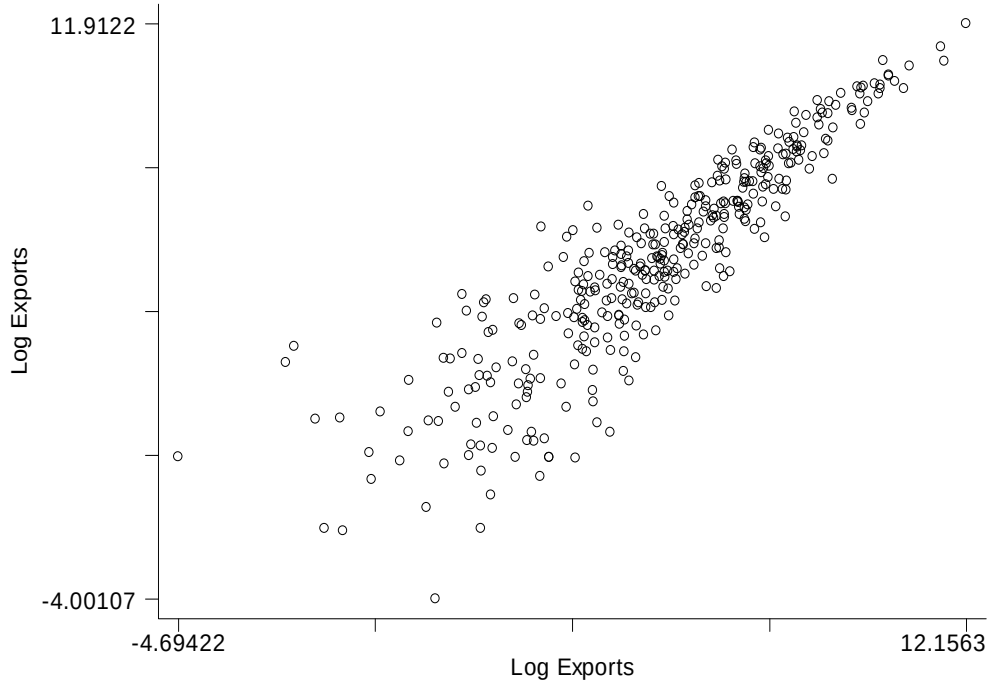


Figure 6a: The Symmetry of Trade in 1999



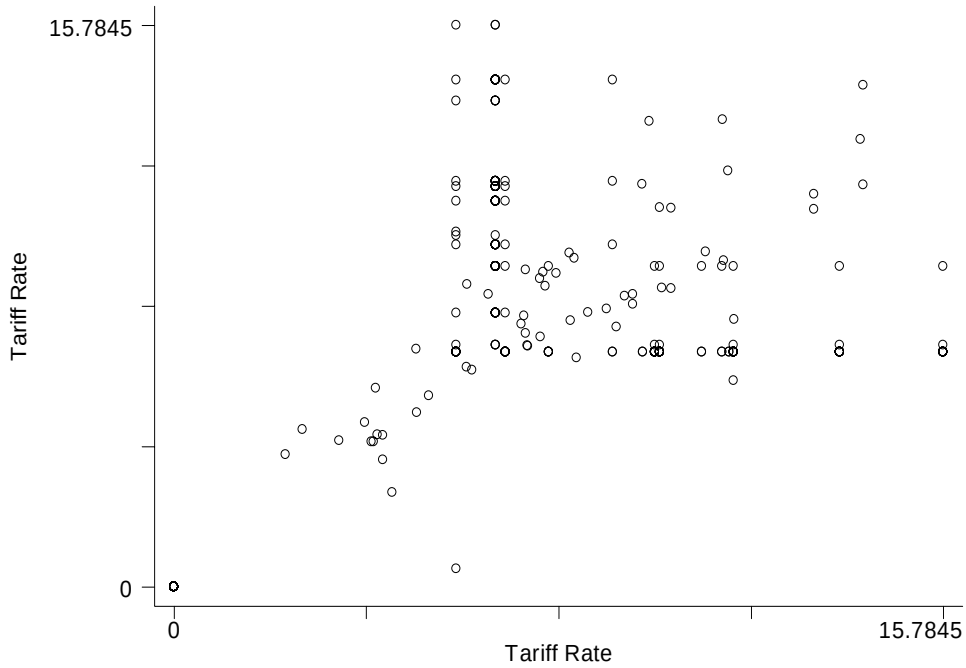


Figure 7: Export Shares of GDP by FTAA Country

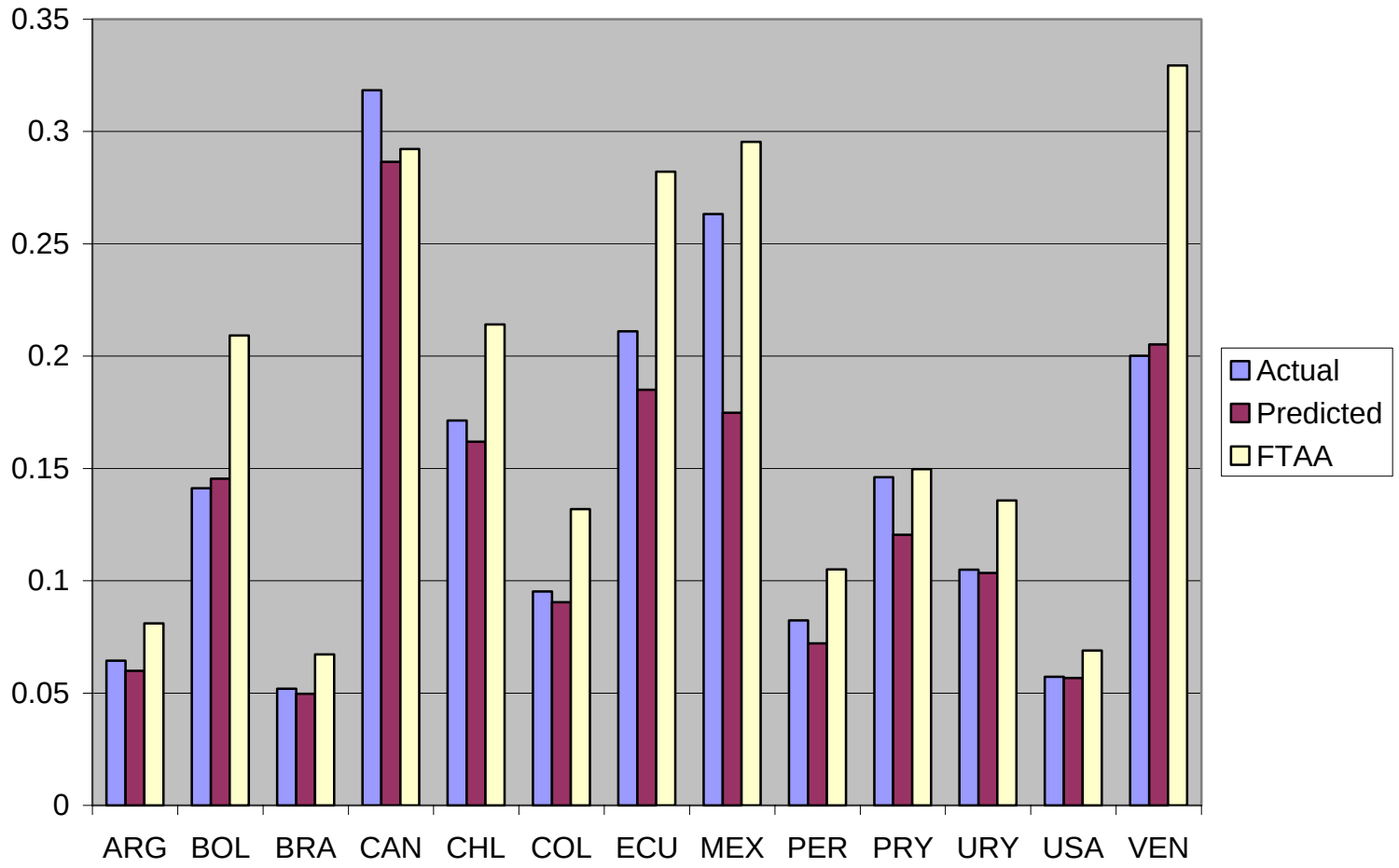


Figure 8: Import Shares of GDP by Country

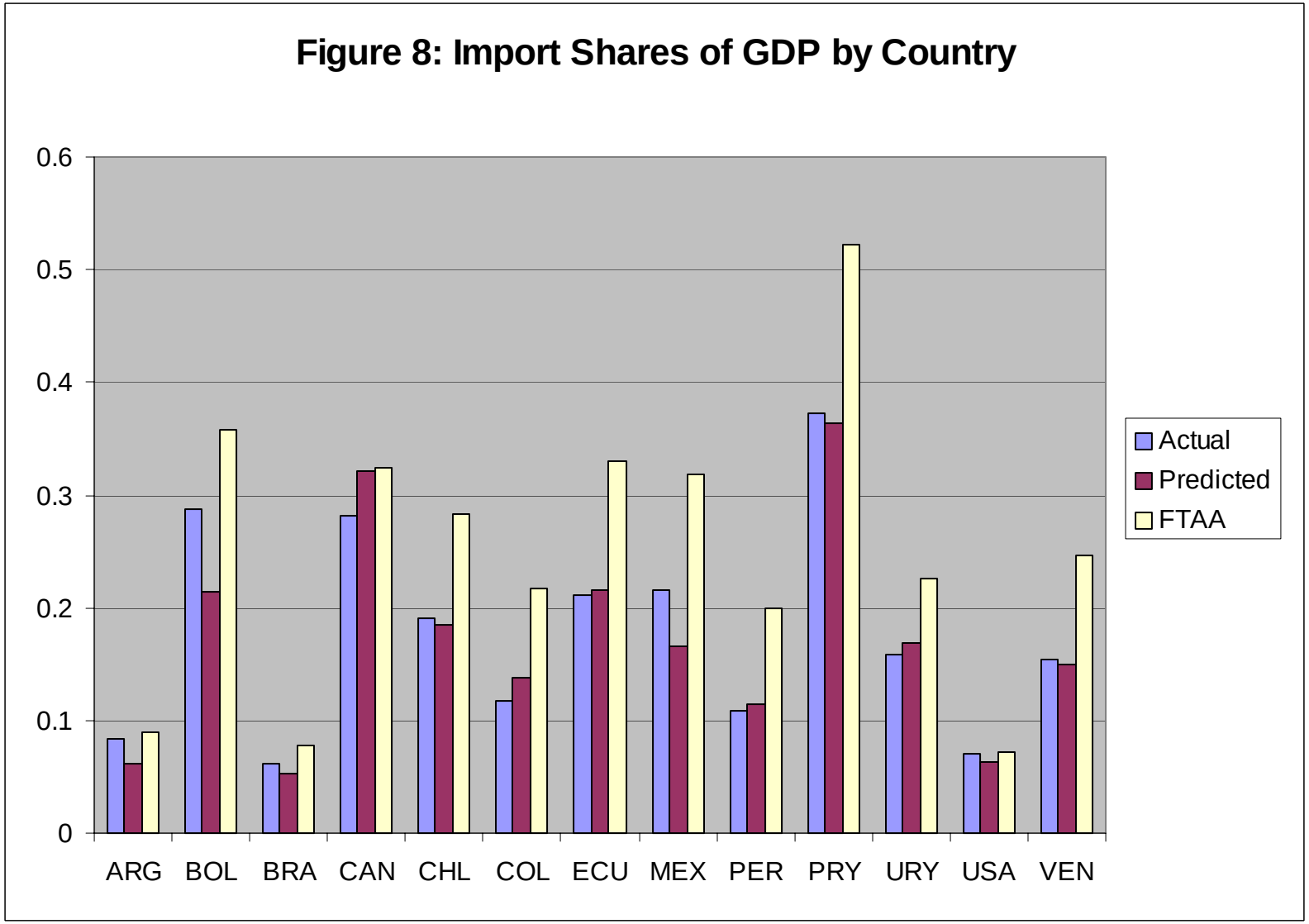


Figure 9: Percent Predicted Changes in Trade with FTAA