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PREFERENTIAL LIBERALIZATION AND SELF-ENFORCING MULTILATERAL COOPERATION: Evidence from Latin America's Use of Tariffs, Antidumping and Safeguards

Patricia Tovar

DEPARTAMENTO DE
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RESUMEN

En este estudio, contrasto empíricamente las predicciones de la teoría de Bagwell y Staiger (1999) sobre los efectos de la liberalización preferencial en la protección a las importaciones impuesta contra países no miembros. En contraste con la literatura existente, la cual (en su mayor parte) se ha enfocado en investigar si los aranceles externos aumentan o disminuyen debido a la liberalización comercial preferencial, al comprobar las predicciones de un modelo específico de una forma que sigue estrechamente a la teoría, puedo examinar los *canales* a través de los cuales esos efectos ocurren. Además, a diferencia de la mayoría de estudios existentes, analizo no sólo los aranceles sino también las políticas de barreras comerciales temporales de antidumping y salvaguardias. Me enfoco en América Latina y hallo un fuerte respaldo a las predicciones teóricas de Bagwell y Staiger (1999). En primer lugar, hay evidencia de *complementariedad arancelaria*: i) una mayor reducción en la protección preferencial a las importaciones conlleva a una mayor reducción en la protección contra los no miembros; ii) mientras más aumenta el consumo, más disminuye la protección externa ante la caída de la protección preferencial; y iii) mientras más caen las importaciones desde el resto del mundo, más disminuye la protección externa ante un recorte de la protección preferencial. También hallo evidencia del *efecto castigo* y del *efecto de discriminación arancelaria*, los cuales surgen cuando se incorporan en la teoría dificultades en cuanto al cumplimiento ("enforcement"). Hasta donde sé, este es también el primer estudio que evalúa predicciones teóricas que surgen específicamente de introducir problemas de cumplimiento a nivel multilateral. Finalmente, los resultados globales apuntan hacia un efecto de "building block" de la liberalización preferencial.

Palabras clave: Acuerdos comerciales preferenciales, liberalización multilateral, aranceles, antidumping, salvaguardias, barreras temporales al comercio.
Códigos JEL: F13.

ABSTRACT

I test the predictions of Bagwell and Staiger´s (1999) theory of the effects of preferential liberalization on import protection imposed against non-member countries. In contrast to the existing literature, which has (for the most part) focused on investigating whether external tariffs rise or fall due to preferential trade liberalization, by testing the predictions of a specific model in a way that closely follows the theory, I am able to examine the *channels* through which those effects take place. Importantly, and unlike most existing studies, I analyze not only tariffs but also the temporary trade barrier (TTB) policies of antidumping and safeguards. I focus on Latin America and find strong support for the theoretical predictions of Bagwell and Staiger (1999). First, there is evidence of *tariff complementarity*: i) a larger reduction in the preferential import protection leads to a larger reduction in protection against non-members; ii) the more consumption increases, the more external protection decreases with the fall in preferential protection; and iii) the more imports from the rest of the world fall, the more external protection decreases with a preferential protection cut. Furthermore, I also find evidence of the *punishment effect* and the *tariff discrimination effect*, which arise when enforcement difficulties are incorporated into the theory. To my knowledge, this is also the first paper to test theoretical predictions that specifically arise from introducing multilateral enforcement issues. Finally, the overall results point toward a building block effect of preferential liberalization.

Keywords: preferential trade agreements, multilateral liberalization, tariffs, antidumping, safeguards, temporary trade barriers.
JEL Codes: F13.

PREFERENTIAL LIBERALIZATION AND SELF-ENFORCING MULTILATERAL COOPERATION:
Evidence from Latin America´s Use of Tariffs, Antidumping and Safeguards

Patricia Tovar[†]

1. INTRODUCTION

A very important development in trade policy in the last decades has been the proliferation of preferential trade agreements (PTAs), which in turn prompted the concern of whether they can favor (be a "building block") or hurt (be a "stumbling block" to) global free trade. In a very influential study, Bagwell and Staiger (1999) develop a model that shows what they named the *tariff complementarity effect*, which leads to lower external tariffs and decreases trade diversion. They also show that, when enforcement issues at the multilateral level are introduced, two additional forces arise in the model. The *punishment effect* hinders the member countries´ ability to punish a non-member's deviation from the multilateral agreement, affecting the viability of maintaining low tariffs. And the *tariff discrimination effect* allows members to discriminate against those non-members that free ride under most-favored nation (MFN), pushing toward higher external tariffs. The impact of a PTA on multilateral trade liberalization thus depends on the relative strength of those three effects. In this paper, I empirically test the predictions of the Bagwell and Staiger (1999) model.

First, the static version of the model predicts three channels of tariff complementarity. The first one is that if the preferential tariff decreases via a PTA, consumption of the product increases and hence the consumer surplus lost when the MFN tariff increases is larger, pushing toward a lower MFN tariff. Second, if the preferential tariff falls, imports from the non-member countries decrease and so the increase in tariff revenue from increasing the MFN tariff falls, also pushing toward a lower MFN tariff. Third, when the preferential tariff is lower, the increase in imports from the partner from increasing the MFN tariff generates a smaller increase in tariff revenue, thus leading to a lower MFN tariff. When enforcement

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difficulties at the multilateral level are introduced into the model, the two additional effects described above—the punishment and tariff discrimination effects—are also present.

I test those predictions using data for eight Latin American countries in the 1990s, where a significant number of PTAs have been enacted.[1] Moreover, the MFN applied tariffs for the large majority of products in the region are well below their binding levels at the World Trade Organization, which implies that those countries have extensive room to increase or decrease their external tariffs after a PTA (c.f. Estevadeordal et al., 2008). Importantly, and in contrast to most of the existing literature (as I discuss below), I focus not only on applied import tariffs, but also on the discretionary policies of temporary trade barriers (TTBs). The Latin American countries I examine started using the TTB policies of antidumping and safeguards more frequently also in the early 1990s.

I find strong support for the predictions of the Bagwell and Staiger (1999) model. The results show that a larger reduction in the preferential tariff leads to a larger decrease in the MFN tariff. Moreover, the more consumption increases, the more the MFN tariff *decreases* with the fall in the preferential tariff. Also, the more imports from the rest of the world fall, the more the MFN tariff decreases with the preferential tariff cut. In the baseline specification using only tariffs, I find that a one standard deviation increase in each of the three variables that capture tariff complementarity leads to a combined decrease of 1.4 percentage points in the MFN tariff, or 9.5 percent of the median MFN tariff in the sample.[2] Expanding the import protection measures to include antidumping and safeguards, I find that a one standard deviation increase in each of the variables capturing tariff complementarity decreases import protection against non-member countries by 1.7 percentage points, or 11.3 percent of the median external import protection in the sample. When I test the predictions of the model once enforcement issues are accounted for, I find that a one standard deviation increase in the MFN tariffs of the non-member countries increases import protection against non-members, as predicted by the punishment and tariff discrimination effects, but by less than the combined effects of a one standard deviation increase in each of the variables that

[1] The sample period and specific countries were also defined based on the data availability, as explained in section 4.

[2] The result when I account for the endogeneity of the variables is 9.6 percent of the sample´s median MFN tariff, which is nearly identical.

capture tariff complementarity, suggesting an overall building block effect of preferential liberalization.

The theoretical literature on the effects of preferential trade agreements (PTAs) on trade liberalization against non-member countries is significant; however, different models predict different effects, and there is therefore no consensus on whether preferential liberalization acts as a building block or a stumbling block to multilateral liberalization.[3] The empirical literature, although growing, is still incipient, and has concentrated on examining whether external tariffs rise or fall due to preferential trade liberalization, without reaching a consensus or (for the most part) analyzing yet what are the *mechanisms* through which those changes in external tariffs have occurred.[4] Testing the predictions of a specific model in a way that closely follows the theory allows me to do that in this paper.

Some of the studies have tested predictions guided by a particular theory. Bohara, Gawande and Sanguinetti (2004) test a hypothesis based on Richardson's (1993) model focusing on Argentina under Mercosur, and find that Argentina's external tariffs fell in industries where the ratio of preferential imports to domestic value added increased, and especially in the industries where there was more trade diversion generated by imports from Brazil. The last result is consistent with Richardson's hypothesis. However, they do not focus on the effect of preferential *tariff* (or other forms of import protection) cuts directly.

Ketterer, Bernhofen and Milner (2014) apply a methodology similar to that of Limão (2006) and Karacaovali and Limão (2008) to study the effect of preferential tariff reductions under CUSFTA on the reduction in the multilateral tariffs implemented by Canada during the Uruguay Round. They find that preferential tariff reductions from CUSFTA led to larger multilateral tariff cuts by Canada, thus providing evidence of a building block effect. They interpret their results as consistent with the "rent destruction effect" from Ornelas (2005). However, the effect could be due to other potential building block channels that also predict

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3 For theoretical surveys, see Panagariya (2000) and Baldwin and Venables (1995).

4 For empirical papers, see the recent surveys by Freund and Ornelas (2010) and Limão (2016). Some examples of studies that find a stumbling block effect are Limão (2006) and Karacaovali and Limão (2008) for the US and EU, respectively; while Estevadeordal, Freund, and Ornelas (2008) find a building block effect for 10 Latin American countries. Tovar (2012) finds evidence of an initial stumbling block followed by a building block effect for the case of the Central America Free Trade Agreement (CAFTA-DR).

complementarity between tariffs.[5] Also related to the previous point, they do not include specific theory-guided variables to identify the *channels* through which the effects would take place. Their explanatory variable of interest is only an indicator equal to one if a product was imported from the US under a preference under CUSFTA. But it is not clear from which specific mechanisms the effect is occurring.[6] This last point, therefore, also applies to Limão (2006), who analyzes the link between preferential liberalization by the United States in agreements that require cooperation in non-trade issues and its multilateral liberalization during the Uruguay Round. He finds evidence of a stumbling block effect—reductions in multilateral tariffs by the U.S. were smaller in products imported under its preferential trade agreements relative to similar products imported from non-members only.[7] And the same caveat also applies to Ketterer, Bernhofen and Milner (2015), who focus on Japan´s unilateral GSP preferences given to developing countries and its multilateral tariff liberalization under the Uruguay Round. They apply a methodology similar to Limão (2006) and Ketterer et al. (2014) and find evidence of a stumbling block effect.

Mai and Stoyanov (2015) also study the effect of preferential liberalization under CUSFTA on Canada´s multilateral liberalization and find evidence of a building block (tariff complementarity) effect. Preferential tariff cuts are associated with MFN tariff reductions. They use a theoretical model that incorporates some of the channels proposed by the literature.[8] One limitation, which the authors recognize, is that they do not instrument for the change in the preferential tariff, and thus the relationship may not be causal. Also, they do not seek to study the different effects of tariff complementarity derived by Bagwell and Staiger (1999), as I do.[9] In their model, tariff complementarity is given only by the change in the interaction of the preferential tariff with the share of the partner in the home country´s market for the product.

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5 It could be consistent with trade diversion, for example. In fact, they use the pre-CUSFTA share of imports from the US as alternative explanatory variable instead of their indicator.

6 Another concern, noted by Limao (2016), is that they do not control for all agreements simultaneously, and thus it is not possible to know the effect of CUSFTA individually.

7 Karacaovali and Limão (2008) find similar results for the European Union.

8 They find only partial evidence of tariff cooperation, in the sense that tariff reductions were larger in the industries that generated the least export revenue to US exporters (lowest quintile). They do not find evidence of rent destruction or for the role of market structure for trade policy.

9 Or the other effects predicted by the Bagwell and Staiger (1999) model, such as the punishment effect and the tariff discrimination effect.

Furthermore, the literature on the effects of preferential liberalization on multilateral liberalization thus far, including all the studies previously described, has focused mostly on tariffs. Limão (2016) highlights the need for further work on the effects of preferential liberalization on NTBs against non-members. This is very important since NTBs account for an increasing share of protection. In this paper, I use more comprehensive measures of trade policy that also include the temporary trade barrier (TTB) policies of antidumping and safeguards.

Very few studies have examined the link between PTAs and the use of TTBs. Regarding antidumping, Blonigen (2005) analyzes the effect of NAFTA on antidumping use by the US, and Prusa and Teh (2010) study the impact of PTAs on the use of antidumping, finding that PTAs decrease antidumping use among PTA members but increase it against non-members. Bown and Tovar (2016) study the relationship between preferential and multilateral liberalization for Argentina and Brazil under Mercosur, including not only tariffs but also antidumping and safeguard measures, and find that focusing only on tariffs may lead to a mischaracterization of the relationship between preferential liberalization and protection against non-member countries.[10] However, they do not test the predictions of a specific theoretical model, as I do here, and they are not able to work with ad valorem measures of the TTBs and have to use categorical variables instead.

To sum up, two main aspects distinguish this study from the literature closest to it. First, I test the predictions of a specific model of the effects of preferential liberalization on liberalization against non-member countries in a way that carefully follows the theory and that allows to examine the *channels* through which those effects take place. Second, I focus not only on trade protection (against PTA members and non-members) in the form of tariffs, but also in the form of temporary trade barriers that include antidumping and safeguard policies. To the best of my knowledge, this is the first study to test the predictions of a theoretical model on the relationship between preferential and multilateral liberalization including both tariffs and TTBs. An additional contribution is that, to my knowledge, this is also the first paper to test

[10] For example, they find that any building block evidence that arises by focusing on tariffs during the period in which MERCOSUR was only a free trade area can disappear after also including changes in import protection implemented via the use of TTBs. In addition, although not focusing on PTAs, Bown and Tovar (2011) show that India´s use of antidumping and safeguards reversed part of the MFN tariff liberalization it had implemented under an exogenous reform program.

theoretical predictions that specifically arise from introducing multilateral enforcement issues into the theory.

The organization of the rest of the paper is as follows. In section 2, I briefly present Bagwell and Staiger´s (1999) model. In section 3, I describe my empirical model and predictions. I briefly review the trade liberalization experiences and the antidumping and safeguard legislations in the Latin American countries and then discuss the estimation data in section 4, before presenting the baseline results in section 5 and the instrumental variables results in section 6. I section 7, I review the theoretical predictions that arise when enforcement difficulties at the multilateral level are added to the model and show the results from testing those predictions. I conclude in section 8.

2. THE MODEL

Bagwell and Staiger (1999) consider a three-country three-good competing-exporters model, in which each country imports one good from the other two countries. I begin by describing the static model.

There are three countries denoted by A, B, and C, which are indexed by J, and three goods denoted by a, b, and c, indexed by i. Moreover, j denotes the good corresponding to the lower case value of J (e.g. if J = A, then j = a). Country J demands each of the three goods but it is endowed with zero units of good j (which it will thus import) and with 3/2 units of each of the other two goods. The demand for good i by country J is given by $D(P_i^J) = \alpha - \beta P_i^J$, where P_i^J is the price of good i in country J. As an example, country A will import good a from countries B and C, and export good b to B and good c to C (the trade patterns of the other countries are analogous).[11] We can rely on the symmetry of the model and let L(J) denote J´s "left-hand" trading partner and R(J) denote J´s "right-hand" trading partner. The good that J exports to its left-hand trading partner would then be l(J) and the good that J exports to its right-hand trading partner would be r(J).

[11] The model rules out the possibility that a country imports a good from one country and exports it to another country. Under the most-favored-nation (MFN) principle, that would never take place, and it is ruled out under a regional agreement for tractability and under the assumption that there are fixed costs of entering a new market.

I denote by $t_j^{L(J)}$ and $t_j^{R(J)}$ the specific tariffs that country J applies to imports of good j from its left-hand and right-hand trading partners, respectively. The specific tariffs that J´s exports face from its left-hand and right-hand trading partners are $t_{l(J)}^J$ and $t_{r(J)}^J$, respectively. I maintain Bagwell and Staiger´s (1999) focus on non-negative and non-prohibitive tariffs. They solve for the equilibrium prices as a function of the tariffs:

$$P_j^J\left(t_j^{L(J)}, t_j^{R(J)}\right) = (\alpha - 1)/\beta + \left(t_j^{L(J)} + t_j^{R(J)}\right)/3 \tag{1}$$

$$P_{i(J)}^J\left(t_{i(J)}^J, t_{i(J)}^{I(J)}\right) = (\alpha - 1)/\beta - \left(2t_{i(J)}^J - t_{i(J)}^{I(J)}\right)/3, \qquad (I, i) \in \{(R, l), (L, r)\} \tag{2}$$

and for the equilibrium trade volumes, with exports given by:

$$X_{i(J)}^J\left(t_{i(J)}^J, t_{i(J)}^{I(J)}\right) = 1/2 - \beta\left(2t_{i(J)}^J - t_{i(J)}^{I(J)}\right)/3, \qquad (I, i) \in \{(R, l), (L, r)\}$$

A country´s welfare is defined as the sum of consumer surplus, producer surplus and tariff revenue:[12]

$$W^J\left(t_j^{L(J)}, t_j^{R(J)}; t_{l(J)}^J, t_{l(J)}^{R(J)}; t_{r(J)}^J, t_{r(J)}^{L(J)}\right) = \int_{P_j^J}^{\alpha/\beta} D(P)dP + \int_{P_{l(J)}^J}^{\alpha/\beta} D(P)dP + \int_{P_{r(J)}^J}^{\alpha/\beta} D(P)dP + 3P_{l(J)}^J/2 + 3P_{r(J)}^J/2 + t_j^{L(J)}X_j^{L(J)} + t_j^{R(J)}X_j^{R(J)}$$

Bagwell and Staiger (1999) solve for the Nash tariffs. I calculate and show the first order conditions since then I will use them to identify the forces behind the tariff complementarity effect. The first order condition for country J´s tariff choice on imports of good j from its left-hand trading partner is:

$$\frac{\partial W}{\partial t_j^{L(J)}} = -D\left(P_j^J\right)\frac{\partial P_j^J}{\partial t_j^{L(J)}} - D\left(P_{l(J)}^J\right)\frac{\partial P_{l(J)}^J}{\partial t_j^{L(J)}} - D\left(P_{r(J)}^J\right)\frac{\partial P_{r(J)}^J}{\partial t_j^{L(J)}} + \frac{3}{2}\frac{\partial P_{l(J)}^J}{\partial t_j^{L(J)}} + \frac{3}{2}\frac{\partial P_{r(J)}^J}{\partial t_j^{L(J)}} + X_j^{L(J)} + t_j^{L(J)}\frac{\partial X_j^{L(J)}}{\partial t_j^{L(J)}} + t_j^{R(J)}\frac{\partial X_j^{R(J)}}{\partial t_j^{L(J)}} = 0$$

[12] Scaling producer surplus by political-economy parameters would not affect the qualitative results.

which, noting that $\partial P_{l(J)}^{J}/\partial t_j^{L(J)} = \partial P_{r(J)}^{J}/\partial t_j^{L(J)} = 0$, simplifies to:

$$\frac{\partial W}{\partial t_j^{L(J)}} = -D\left(P_j^J\right)\frac{\partial P_j^J}{\partial t_j^{L(J)}} + X_j^{L(J)} + t_j^{L(J)}\frac{\partial X_j^{L(J)}}{\partial t_j^{L(J)}} + t_j^{R(J)}\frac{\partial X_j^{R(J)}}{\partial t_j^{L(J)}}$$

$$= -\frac{1}{3} + \frac{\beta}{9}t_j^{L(J)} + \frac{\beta}{9}t_j^{R(J)} + \frac{1}{2} - \frac{\beta}{3}\left(2t_j^{L(J)} - t_j^{R(J)}\right) - \frac{2}{3}\beta t_j^{L(J)} + \frac{\beta}{3}t_j^{R(J)} = 0 \quad (3)$$

Solving equation (3), and analogously for country J´s tariff on imports of good j from its right-hand trading partner, we obtain:

$$\tilde{t}_j^{L(J)}\left(t_j^{R(J)}\right) = 3/22\beta + 7t_j^{R(J)}/11$$

$$\tilde{t}_j^{R(J)}\left(t_j^{L(J)}\right) = 3/22\beta + 7t_j^{L(J)}/11 \quad (4)$$

Equation (4) implies that a country´s tariff on the good imported from its left-hand trading partner positively depends on the tariff that it imposes on the same good imported from its right-hand trading partner. Therefore, there is a complementarity between the tariffs that a country applies on imports of the same good from different trading partners. This complementarity is composed of three effects. The first one is that if J´s tariff on imports of good j from its right-hand trading partner, $t_j^{R(J)}$, increases, consumption of the good falls and thus the consumer surplus lost when $t_j^{L(J)}$ increases is lower; therefore, the incentive to raise $t_j^{L(J)}$ increases. This effect is captured by the third term in (the second line in) equation (3). The second effect is that if $t_j^{R(J)}$ increases, imports from J´s left-hand trading partner increase and so the increase in tariff revenue from increasing $t_j^{L(J)}$ raises, also generating a larger incentive to raise $t_j^{L(J)}$. This effect is in the terms in parenthesis in equation (3). The last effect is that when $t_j^{R(J)}$ is higher, the increase in imports from J´s right-hand trading partner from increasing $t_j^{L(J)}$ generates a larger increase in tariff revenue, and thus the incentive to raise $t_j^{L(J)}$ also increases. This is given by the last term in equation (3).

Bagwell and Staiger (1999) also solve (4) for the Nash equilibrium tariffs, which can be found by setting $t_j^{L(J)} = t_j^{R(J)}$ using the model´s symmetry. Then, $t^N = 3/8\beta$. The Nash tariffs are inefficiently high due to the well-known terms-of-trade externality.

I now consider the effect that a free trade agreement (FTA) has on the external tariffs. Assume that A and B form an FTA, such that $t_a^B = t_b^A \equiv 0$. From (4), a country´s tariffs are independent of the tariffs of its trading partners, which in turn implies that C´s tariffs will remain as $t_C^A = t_C^B = t^N = 3/8\beta$.[13] Nonetheless, the external tariffs chosen by A and B will be affected by the FTA. Country A selects its tariff against C given that its tariff against B has been reduced to zero, which by equation (4) is $\tilde{t}_a^C(\tilde{t}_a^B = 0) = 3/22\beta \equiv \tilde{t} < t^N$. The same applies to country B, which sets its tariff against C given that its tariff against A has been reduced to zero, that is, $\tilde{t}_b^C(\tilde{t}_b^A = 0) = 3/22\beta \equiv \tilde{t} < t^N$. Therefore, while C´s tariffs are not affected by the FTA, A and B lower their external tariffs as a consequence of the FTA. This is due to the tariff complementarity effect, explained above. As a country reduces its tariffs against its FTA partners under a preferential trade agreement, it also has an incentive to lower its tariffs against the countries that are non-members of the FTA.[14]

When Bagwell and Staiger (1999) introduce enforcement issues in a repeated game, the tariff complementarity effect of preferential trade agreements remains but two new effects appear. However, they also show that countries are sufficiently impatient, one of the new effects is eliminated, and the tariff complementarity dominates the other new effect.[15] I examine the case with enforcement issues in section 7.

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13 This independence is relaxed in the dynamic game, as I discuss later.

14 Bagwell and Staiger (1999) show that the tariff complementarity effect is also present under a customs union (CU) but it is less strong, and hence A and B´s tariffs against C are reduced with a CU but by less than under an FTA.

15 More precisely, if the non-member country is sufficiently impatient, the "punishment effect" is eliminated; and if the member countries are sufficiently impatient, the tariff complementarity effect dominates the "tariff discrimination effect".

3. EMPIRICAL PREDICTIONS AND STRATEGY

My objective is to analyze how changes in the import protection that country *j* offers to its partners on good *i* under a preferential trade agreement (PTA) affect the import protection that country *j* applies on good *i* against countries that are non-members of the trade agreement. I start out with the following estimating equation:

$$\Delta\tau_{ijt} = \propto_j + \propto_I + \propto_t + \beta\left(\Delta\text{Pref}_{ijt-1}\right) + \Delta\mathbf{X}_{\boldsymbol{ijt}}\gamma + \left(\Delta\text{Pref}_{ijt-1}\right) * \Delta\mathbf{X}_{\boldsymbol{ijt}}\delta + \varepsilon_{ijt} \qquad (5)$$

where $\Delta\tau_{ijt}$ represents the change in the import protection that country *j* applies on imports of good *i* coming from non-members of the PTA between years t and $t-1$, and $\Delta\text{Pref}_{ijt-1}$ denotes the lagged change in the bilateral import protection that country *j* applies on imports of good *i* coming from PTA members. The vector $\mathbf{X}_{\boldsymbol{ijt}}$ incorporates other variables that will influence changes in import protection through the tariff complementarity effect.

I test the three effects that generate tariff complementarity due to a preferential trade agreement. Recall that the first effect predicted by the theory is that if the preferential tariff increases, consumption of the good falls and so the consumer surplus lost when the MFN tariff increases is lower; therefore, the MFN tariff will increase. To capture this effect, I include the change in consumption interacted with the (lagged) change in preferential import protection (in $\left(\Delta\text{Pref}_{ijt-1}\right) * \Delta\mathbf{X}_{\boldsymbol{ijt}}$), and expect that its coefficient be negative. The second theoretical effect is that if the preferential tariff increases, imports from the non-members increase and so the increase in tariff revenue from increasing the MFN tariff raises, hence the MFN tariff will increase. I capture this by including the change in imports from the rest of the world interacted with the preferential import protection change, and the coefficient of this interaction should be positive. The third effect that the theory predicts is that when the preferential tariff is higher, the increase in imports from the partner from increasing the MFN tariff generates a larger increase in tariff revenue, and thus the MFN tariff will increase. That means that the coefficient of the change in the preferential import protection should be positive. As reflected by the last term in equation (3), this third effect is associated only to the higher level of the preferential tariff (and not to changes in any other variable), and thus the change in that variable is what drives the effect. I also include the change in consumption and

the change in imports from the rest of the world alone as controls. Therefore, I rewrite equation (5) as follows:

$$\Delta\tau_{ijt} = \propto_j + \propto_I + \propto_t + \beta\left(\Delta\text{Pref}_{ijt-1}\right) + \gamma\Delta\text{cons}_{ijt} + \delta\left(\Delta\text{Pref}_{ijt-1}\right) * \Delta\text{cons}_{ijt} + \theta\Delta\text{imp\_row}_{ijt} + \emptyset\left(\Delta\text{Pref}_{ijt-1}\right) * \Delta\text{imp\_row}_{ijt} + \varepsilon_{ijt} \quad (6)$$

Estimating equation (6) in differences allows me to eliminate some unobserved heterogeneity (such as product or country characteristics that are constant over time and affect the level of external import protection), but unobservable industry characteristics that affect the *changes* in import protection may remain (e.g. lobbying for import protection usually occurs at the industry level), and hence I include an industry fixed effect, $\propto_I$.[16] I also include a country fixed effect, $\propto_j$, to control for country characteristics that may affect changes in trade protection. And $\propto_t$ is the difference between year fixed effects from *t* and *t* – 1. Finally, ε_{ijt} denotes the error term.

In contrast to most of the literature, which has focused on MFN and preferential tariffs only, I also include in my import protection measures the temporary trade barriers (antidumping and safeguards) that country *j* may apply.[17] Thus, τ_{ijt} in (6) will be defined as the *sum* of the applied *ad valorem* MFN tariff plus the *ad valorem* temporary trade barrier that country *j* applies on good *i* imported from countries that are non-members of its PTAs; and Pref_{ijt-1} will be the sum of the applied bilateral preferential tariff plus the *ad valorem* temporary trade barrier that country *j* imposes on good *i* imported from PTA members. I explain how I sum tariffs and temporary trade barriers in more detail in the next section.

There are a number of econometric issues that have been identified by the previous literature that can affect the estimation of the relationship between the changes in the import protection that a country applies against its PTA partners and against PTA non-members. First, $\Delta\text{Pref}_{ijt-1}$ is lagged one year because it may be considered predetermined relative to the MFN tariff (or TTB), which may generate a lag in its effect (preferential tariff reductions are

16 Industry fixed effects are defined at the three-digit ISIC level, but I also tried using more disaggregated fixed effects, as I discuss later on.

17 An exception is Bown and Tovar (2016), who study the case of Mercosur. However, due to their focus on Argentina and Brazil, they are not able to include the *ad valorem* temporary trade barriers and have to work with categorical variables instead.

negotiated in each trade agreement, and they take place following a specific schedule).[18] Lagging the variable by one year also helps reduce simultaneity bias. Moreover, to measure the preferential tariff, we have to take into account that a country may simultaneously belong to different PTAs. I follow Estevadeaordal et al. (2008) and others, and define the preferential tariff that country *j* applies in industry *i* in year *t* as the minimum of the preferential tariffs that country *j* applies in industry *i* in year *t* against all its different PTA partners.[19] Finally, I drop the observations for which the MFN tariffs are zero. If the MFN tariff is zero, the preferential tariff will also have to be zero and that may lead to biased results.

Another issue is the possibility of endogeneity. The preferential liberalization variable may be subject to reverse causation. Since the tariff concessions are negotiated in the agreement and their reductions over time take place under a specific schedule (also set during the negotiations), the changes in preferential tariffs are predetermined to changes in MFN tariffs and to antidumping (AD) or safeguard (SG) duties. However, if some MFN tariff changes were expected when the preferences were negotiated, they could have affected the level of those preferences. To address this, I adopt an instrumental variables approach. I instrument for a country´s preferential liberalization using the preferential liberalization of the three countries in the sample most correlated with the country´s preferential liberalization. These correlations are generally high, and those are valid instruments as long as the preferential tariffs of a country´s trade *partners* are not influenced by the same factors that determine that country´s *own* MFN tariffs or TTBs.

The change in consumption and the change in imports from the rest of the world could also be endogenous. I instrument for them in a similar way, that is, for each country, I use the corresponding variables from the three countries in the sample for which those variables are most correlated with the ones of the given country. Furthermore, for the change in imports from the rest of the world I use as an additional instrument the change in the index of revealed comparative advantage (RCA) of the rest of the world. I calculate an index of RCA that is based

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18 Similarly, I allow for a lag in the effect of $\Delta\text{Pref}_{ijt-1}$ on the other variables that change as a result, i.e. the change in consumption and the change in imports from the rest of the world.

19 Estevadeordal et al. (2008) mention that the results are qualitatively similar if preferential tariffs are aggregated using the share of preferential imports as weights, but an advantage of the previous formula is that it avoids other difficulties due to endogeneity of the import shares, and it allows the inclusion of observations for which there is tariff data available but not import data.

on Balassa (1965) for each 4-digit ISIC sector, country, and year. The index for a given year is defined as $RCA = (X_{i(-j)}/X_{T(-j)})/(X_{iw}/X_{Tw})$, where $X_{i(-j)}$ and $X_{T(-j)}$ denote exports of product *i* by countries other than *j* and total exports by countries other than *j*, respectively, and X_{iw} and X_{Tw} are exports of product *i* and total exports by the world, respectively. A value greater than one indicates that the rest of the world has a revealed comparative advantage in that product relative to the world. I test for the endogeneity of the variables and also perform a test of overidentifying restrictions to verify the validity of the instruments.

4. DATA

4.1. Trade Liberalization, Antidumping and Safeguards in Latin America

For most Latin American countries, the most significant phases of their unilateral trade liberalization reforms took place since the mid or late 1980s until the early 1990s.[20] This followed a period of protectionism that took place with the import substitution policies and also as an initial reaction to the 1982 debt crisis. The reforms included a reduction in both the level and the dispersion of tariffs, as well as a substantial reduction or elimination of non-tariff barriers such as import licenses and prohibitions. In addition, there was substantial preferential liberalization during the 1990s, with important trade agreements such as NAFTA and Mercosur being negotiated and entering into force in that decade.[21]

In most cases, the antidumping legislation in the Latin American countries was introduced in the 1980s or early 1990s (Argentina being an exception), during the periods of trade liberalization.[22] Later in the 1990s, the countries reformed their legislations, and they were also made consistent with the GATT/WTO regulations. Safeguard legislations were typically introduced in the 1990s. The first AD investigations were usually initiated in the late 1980s or early 1990s (i.e. also during the trade reform periods), and the first SG investigations took

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20 The case of Chile is different from that of other countries in the region. The trade liberalization process took place much earlier, starting at the end of 1973, and was implemented by a military government (Sáez, 2006).

21 See Finger and Nogués (2006) for a group of country studies on Latin America with descriptions of their trade liberalization experiences and their creation and use of antidumping and safeguard policy mechanisms. This section draws on those studies. The list of PTAs in force in the 1990s and in included in this study is the same as that described in Estevadeordal et al. (2008).

22 Argentina's antidumping legislation dates back to 1972. It also allowed the use of safeguards (Moore, 2011).

place later in the 1990s or, in a few cases, in the 2000s. Some countries allow the application of a lesser duty (lower than the dumping margin), and some also have a national interest clause that allows them to deny antidumping measures even if dumping and injury are found. There are also rules regulating the use of TTBs in some of the preferential trade agreements.[23]

4.2. Data Sources

I use data for eight Latin American countries —Argentina, Chile, Colombia, Ecuador, Mexico, Peru, Uruguay and Venezuela— for 1990-1999.[24] The preferential tariff data come from the tariff schedules of the trade agreements, which specify how tariffs are to be reduced over time for each country and product. The tariffs are aggregated as simple averages into roughly one hundred four-digit ISIC industries.[25] In the year before a country grants the first preference in a given sector, the preferential tariff is set equal to the MFN tariff, and in that way the impact of the first reduction in a preferential tariff will be captured. In addition, when a country does not offer any preference in a given sector in years *t* and *t* – 1, I set the change in the preferential tariff to be zero, since a change in the MFN tariff in such case would *not* be related to preferential tariff changes. The MFN tariff data are from the World Integrated Trade Solution (WITS).

As explained above, I include in my measures of changes in the levels of import protection, $\Delta\tau_{ijt}$ and $\Delta\text{Pref}_{ijt-1}$, not only the change in the MFN applied tariff and in the preferential tariff, respectively, but also the *ad valorem* TTB (AD and SG import restrictions) imposed against the non-PTA members and the PTA partners. This last variable was constructed using data at the exporter-product level, in the following way. Although some AD measures were imposed as specific duties, I also have data on the final dumping margin calculated in *ad*

23 For more details about each country´s specific regulations and use of antidumping and safeguards, see Finger and Nogués (2006).

24 This is a subset of the ten countries used by Estevadeordal et al. (2008), determined by the availability of output data. Output data are used to construct the consumption variable, which I calculate as output minus net trade. Output data for Brazil are missing for many industries, and for Paraguay are missing for that period, thus I am unable to include those two countries.

25 I thank Estevadeordal, Freund and Ornelas for sharing their data. As mentioned by Estevadeordal et al. (2008), the preferential tariff data had to be converted into a common nomenclature using the 4-digit ISIC classification, because the PTAs negotiated during the sample period used different tariff nomenclatures (e.g. NANDINA, NALADISA, HS) and tables for conversion were only available for ISIC codes.

valorem terms.[26] In some of the cases the dumping margin is reported for each exporting firm in an investigated country, but in other cases it is only reported as a *range* of values of the new trade barriers facing the exporters of the product in a given investigated country. Due to this, for each AD case I calculate two variables: i) AD_min, which is the average of the minimum AD margins, where the average is taken across all foreign countries that are being subject to the country´s AD measure in that product; and ii) AD_max, defined analogously as the average of the maximum AD margins across all foreign countries that are being subject to the country´s AD measure over that product. [27] I report results using both variables for robustness. In contrast to tariffs, AD duties may apply to only certain exporting countries, therefore, I calculate the final protection measure as the sum of the applied tariff and the AD margin *weighted* by the import share of the affected countries in total imports of the product in the imposing country.[28] Furthermore, I also estimate the model by defining the changes in import protection as the sum of tariffs plus AD *and* SGs, for which I use data on safeguard duties imposed by the countries in the sample. Product-specific information on the countries´ use of AD/SG are derived from government sources as described in the *Temporary Trade Barriers Database* (Bown, 2015).

Import data for each of the eight Latin American countries and export data for the non-PTA members (rest of the world) are obtained from WITS. Moreover, MFN tariff and export data for each country´s main trade partners that do not share a PTA with it, which I use later on in section 7, were also obtained from WITS. Finally, the consumption variable is calculated as output minus net trade, using data at the three-digit ISIC level from the World Bank's *Trade and Production* database (Nicita and Olarreaga, 2007). Given that the output data is not

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26 In some instances in which the final AD margin was missing, I use the preliminary margin.

27 The minimum of the range is the lowest exporting firm-specific dumping margin (trade barrier) that the imposing government calculated across all of the producers from that country in that case, whereas the maximum is the highest exporting firm-specific dumping margin (trade barrier) that the imposing government calculated across all of the producers from that country in that case. I average across countries by trade-weighting the average by the exporting countries' share of the imposing country´s market in the product, as follows: AD_min= $\sum_j x_{ij} * \mathrm{Impshare}_{ij}$,where x_{ij} denotes the minimum of the AD margins that apply to firms in country *j* in a given product *i*, and $\mathrm{Impshare}_{ij}$ denotes the share of imposing country´s imports of product *i* that come from exporting country *j* (and analogously for AD_max).

28 I use as weights the *counterfactual* import shares, which are obtained assuming that, starting in the year in which the AD measure is imposed, the imports of products affected by AD would have grown at the same rate as the country´s non-affected products. I do this because we expect that imports are likely to decrease due to an AD measure. This methodology follows Bown (2011).

available for all years and countries, I use the long change in consumption, defined as the change from 1990 to 1999.[29] Since consumption only varies at the three-digit ISIC level, in all regressions I adjust the standard errors for clustering at that level.

5. BASELINE RESULTS

In this section, I present the baseline panel estimates of my econometric model, before discussing the results using instrumental variables in the following section. The summary statistics for the estimation sample are provided in Table 1. Table 2 reports the results from estimating equation (6). In column 1, the dependent variable is the change only in the MFN tariff that country *j* applies on good *i* against countries that are not PTA members, and the key explanatory variable, $\Delta\text{Pref}_{ijt-1}$, is only the lagged change in the preferential tariff that country *j* applies on good *i* coming from PTA members. The estimates provide support for the theoretical predictions. The coefficient of the (lagged) change in the preferential tariff is positive and statistically significant at the 1 percent level, consistent with the prediction that when the preferential tariff is higher, the increase in imports from the partner that arises from increasing the MFN tariff generates a larger increase in tariff revenue; therefore, the MFN tariff will increase. The coefficient of the change in the preferential tariff interacted with the change in consumption is negative and significant at the 1 percent level, which is aligned with the prediction that if the preferential tariff increases, consumption of the good falls and so the consumer surplus lost when the MFN tariff increases is lower; therefore, the MFN tariff will increase. Finally, the change in the preferential tariff interacted with the change imports from the rest of the world has a positive coefficient, also statistically significant at the 1 percent level. This is in line with the prediction that when the preferential tariff rises, imports from the non-members increase and so the increase in tariff revenue from increasing the MFN tariff raises, thus the MFN tariff will increase. Hence, I find strong support for the tariff complementarity effect arising from PTAs, as postulated by Bagwell and Staiger (1999).

In order to account for more comprehensive measures of import protection, in columns 2 and 3, I redefine both the dependent variable and the key explanatory variable so that they

[29] For Peru, I use the change from 1990 to 1996, and for Venezuela the change from 1990 to 1997, due to the data availability.

include not only tariffs, but also the antidumping import restrictions that country *j* imposed against non-PTA partners (in $\Delta\tau_{ijt}$), and against its PTA partners (in $\Delta\text{Pref}_{ijt-1}$). Column 2 uses the average of the minimum AD margins and column 3 uses the average of the maximum AD margins (as defined in the previous section). I exclude some outlier observations where the dependent variable —the change in the MFN tariff plus the AD duty— was greater than 100 percent or lower than -100 percent.[30] The results are very similar to those based on tariffs only (column 1). The coefficients of the three variables of interest are still statistically significant and have their predicted signs. For the change in the bilateral import protection toward PTA partners variable by itself, the coefficient is slightly lower now that I include AD (relative to column 1), suggesting that the building block effect of preferential liberalization becomes slightly smaller once we take into account more expansive measures of import protection toward PTA members and outsiders. This is the coefficient used in other studies (e.g. Estevadeordal et al., 2008) to determine the existence of a building block or stumbling block of preferential liberalization, albeit in most cases based on tariffs only, as already discussed. On the other hand, the coefficient of the interaction of the change in imports from the rest of the world with the change in the preferential tariff becomes larger once I include AD, which works toward increasing the magnitude of the tariff complementarity effect.[31]

Some AD import restrictions are imposed as a duty if the price falls below a given level (DPU). In those cases, there is an economic incentive for the firms to raise prices and "enjoy" the associated rents, rather than face the duty. If that occurs, there would not be any tariff revenue collected, in contrast to an import tariff or an AD duty, and that would affect the second and third components of the tariff complementarity effect (discussed earlier), since they are related to tariff revenue or to an increase in the preferential tariff. Due to this, in columns 4 and 5 of Table 2, I replicate the same specifications from columns 2 and 3 but only weighting by the (counterfactual) import shares those AD duties that are *not* DPU (i.e., I

[30] This means dropping 33 out of 4749 observations (less than 1 percent of the sample). In column 1, I use the same sample as in columns 2 and 3 for consistence, but the results are similar if I do not drop the 33 observations in column 1. I note that the results are similar if I use as a cutoff dropping the observations where the dependent variable is greater than 150 or lower than -150 (i.e., dropping only 13 observations instead of 33); or greater than 200 or lower than -200 (dropping only 10 observations) instead. But the R-square was higher when I use the 100 and -100 cutoffs.

[31] I compare the effects in more detail below.

exclude DPU measures). The results are qualitatively and quantitatively similar to those where I do not exclude those measures (columns 2 and 3).

Finally, in columns 6 and 7 of Table 2, I include in the measures of import protection both the antidumping *and* safeguard import restrictions that a country imposes against its PTA partners and non-partners.[32] The results are very similar to those from columns 2 and 3, and again all the theoretical predictions hold.

Using the coefficients from column 1, a one standard deviation increase in the preferential tariff reduction leads to a decrease of 0.8 percentage points in the MFN tariff, which is sizeable considering that median MFN tariff in the sample is 14.7 percentage points. Moreover, a one standard deviation increase in the change in consumption interaction reduces the MFN tariff by 0.4 percentage points. And a one standard deviation decrease in the change imports from the rest of the world interaction generates a reduction of 0.2 percentage points in the MFN tariff. Including TTBs and using the estimates from column 7, a one standard deviation increase in preferential liberalization lowers protection (the MFN tariff plus AD and SGs) against non-PTA members by 0.7 percentage points. The median protection against non-members in the sample is 15.0 percentage points. A one standard deviation rise in the change in consumption interaction also leads to a decrease of 0.5 percentage points in the external protection. Finally, a one standard deviation decrease in the change imports from the rest of the world interaction reduces import protection against non-members by 0.5 percentage points as well. Therefore, the results are also economically significant, and the overall tariff complementarity effect becomes a little larger when including TTBs (a fall of 11.3 percent in the median protection against non-members when including TTBs versus a fall of 9.5 percent with tariffs only).

The industry fixed effects in the regressions in Table 2 are defined at the three-digit ISIC level (the level of variation of the consumption variable). However, I also re-estimated all the specifications from Table 1 using fixed effects defined at the four-digit ISIC level, and the results were both qualitatively and quantitatively similar.[33]

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32 In these regressions I again exclude the observations where the dependent variable--in this case the change in the MFN tariff plus the AD duty plus the SG duty--was greater than 100 percent or lower than -100 (this means that 3 additional observations are excluded). I note that the results from the previous columns also hold using this slightly smaller sample.

33 These results are not shown but are available upon request.

Overall, I find strong empirical support for Bagwell and Staiger´s (1999) theoretical predictions regarding the tariff complementarity effect, which leads countries to reduce their external tariffs after they enter a preferential trade agreement. Importantly, I find that this holds not only for import tariffs, but also when I account for more comprehensive measures of import protection that include the use of AD and SG import restrictions toward both PTA members and non-members.

6. INSTRUMENTAL VARIABLES RESULTS

A potential issue with the results from the previous section is the possibility of endogeneity of the variables. To address this, I instrument for a country´s change in the preferential import protection that it applies on PTA members using the change in the preferential import protection of the three countries in the sample most correlated with the country´s own change in preferential import protection. I also instrument for the change in consumption and the change in imports from the rest of the world in a similar way, that is, for a given country I use the corresponding variables from the three countries in the sample for which those variables are most correlated with the ones of the own country. Moreover, for the change in imports from the rest of the world I use as an additional instrument the change in the index of revealed comparative advantage (RCA) of the rest of the world, as defined above.

The instrumental variables (IV) results are reported in Table 3. In column 1 I replicate the specification from column 1 of Table 2, but I use 2SLS instrumenting for the change in the preferential tariff, the change in consumption and the change in imports from the rest of the world. The (lagged) change in the preferential tariff has a positive coefficient, consistent with the theory, and statistically significant at the 10 percent level. The coefficient of the change in imports from the rest of the world interacted with the change in the preferential tariff is also positive, as predicted, and significant at the 5 percent level. However, the coefficient of the change in consumption interaction has the wrong sign. Therefore, here I find that two out of the three effects of tariff complementarity hold. In column 2, I replicate the specification from column 1 but now I use an IV-GMM procedure. The results are similar and now they are significant at the 1 percent level. The Hansen-J statistic (reported at the bottom of the table)

indicates that the instrument are valid.[34] Next, I test for the endogeneity of the variables using the Durbin and Wu-Haussman tests, and find that we cannot reject the null hypothesis of exogeneity of the change in consumption, but we do reject the exogeneity of the change in the preferential tariff and the change in imports from the rest of the world. Therefore, in column 3 of Table 3 I repeat the specification from column 2, but I treat the change in consumption as exogenous, while instrumenting for the other variables. The results support all the theory predictions. The (lagged) change in the preferential tariff, its interaction with the change in consumption, and its interaction with the change in imports from the rest of the world, all have the predicted signs and are statistically significant at the 1 percent level, as I had obtained in the non-IV results in the previous section.[35] The first-stage regressions corresponding to column 3 are reported in columns 1 and 2 in Appendix Table A1.

With the coefficients from column 3, I obtain that an increase of one standard deviation in the preferential tariff cut causes a decrease of 0.7 percentage points in the MFN tariff, which again is non-negligible given that the median MFN tariff in the sample is 14.6 percentage points. Additionally, a one standard deviation increase in the change in consumption interaction lowers the MFN tariff by 0.4 percentage points. Lastly, an increase of one standard deviation in the change imports from the rest of the world interaction leads to a reduction of 0.3 percentage points in the MFN tariff.

Do the tariff complementarity effects still hold when we incorporate the use of temporary trade barriers? In columns 4 and 5 of Table 3 I redefine the variables to include antidumping import restrictions (column 4 uses the average of the minimum of the AD margins and column 5 uses the average of the maximum). The results are similar to those of column 3, with the exception that the change in consumption interacted with the change in the preferential tariff is not significant in column 5 (but it is in column 4). Lastly, in columns 6 and 7 of Table 3, I also include in the variables the safeguard import restrictions (in addition to tariffs and AD). The results are again similar, except that the change in consumption interaction is not significant. Regarding this variable, I cannot rule out the possibility that having more detailed data could

[34] To be able to estimate regressions with that many fixed effects, I demean the data by country, year and industry. Therefore, the R-squared statistics reported in Table 3 do not include fixed effects.

[35] Here the overidentification test is passed at the 5 percent level.

help improve its statistical significance, since (as already explained) I am forced to work with long changes in that variable given the data availability.

Overall, I find support for Bagwell and Staiger´s (1999) predictions and evidence of tariff complementarity for the Latin American countries.

7. ENFORCEMENT UNDER MULTILATERAL COOPERATION

7.1. Theory and Empirical Predictions

Bagwell and Staiger (1999) also introduce enforcement difficulties at the multilateral level into the model. They incorporate the fact that PTAs take place in a context of efforts to maintain multilateral cooperation and consider enforcement issues as a reason why multilateral cooperation does not go all the way to the fully efficient outcome. For this, they assume that the multilateral agreement must be self-enforcing and model multilateral cooperation as a repeated game among the three countries, where the repeated game consists of infinite repetition of the static game that I described in section 2. The countries seek to achieve tariffs that are below their static Nash levels, and the credible punishment that will be triggered if a country defects from the multilateral agreement is infinite reversion to the static Nash tariff levels.

In this setting, it is assumed that countries A and B are patient and hence willing to cooperate at very low multilateral tariffs, while country C is less patient and will not be able to maintain as much multilateral tariff cooperation as A and B would like. This implies that, under multilateral cooperation but without an FTA, A and B will reduce their tariffs by more than they reciprocally solicit from C. The reason is that, under non-discrimination, the patient countries can only liberalize their bilateral tariffs further if they also offer to liberalize their multilateral tariffs further.

Then, if A and B form an FTA, Bagwell and Staiger identify three effects that will arise and shape A and B´s external (multilateral) tariffs.[36] First, the *tariff complementarity effect* that I

[36] They assume that the FTA survives even if multilateral cooperation breaks down. This may be due to A and B´s high discount factors, or to cultural or political links between them that might make it more feasible to have explicit enforcement mechanisms than at the multilateral level. See Bagwell and Staiger (1999) for more details.

described in the static model is still present. The fact that A and B lower their bilateral tariffs under the FTA leads them to also lower their tariffs against the non-member country C. Second, a new effect arises that Bagwell and Staiger call the *punishment effect*. Because A and B have an incentive to reduce their multilateral tariffs due to the tariff complementarity effect, their ability to punish the non-member country if it deviates from multilateral cooperation is diminished. This leads to less cooperation and higher multilateral tariffs. Third, another new effect that arises is the *tariff discrimination effect*. Under an FTA, the member countries no longer need to cooperate multilaterally in order to cooperate bilaterally, and thus they will have an incentive to increase their tariffs against the non-member country, which was free riding (to some extent) under MFN.

Bagwell and Staiger (1999) also show that, if the non-member country is sufficiently impatient, the punishment effect disappears (since the non-member country will be focused on the present). Moreover, if the member countries are sufficiently impatient, the tariff complementarity effect will outweigh the tariff discrimination effect and the FTA will enhance multilateral liberalization. But if the member countries are sufficiently patient, the tariff discrimination effect will dominate, since multilateral liberalization under MFN will be large enough.[37] In that case, the FTA will harm multilateral liberalization.

Therefore, I incorporate and test for the new effects that arise in the repeated game. The punishment effect arises in the model because the Nash punishment tariff that A and B set against the non-member is lower than the Nash tariff under no FTA. Hence, the FTA reduces the effectiveness with which its members can punish the non-member if the non-member were to defect from the multilateral agreement. This leads the non-member country C to increase its tariff. The increase in C´s tariff, in turn, then leads A and B to increase their external tariffs.[38] The tariff discrimination effect arises because, with the FTA, A and B can cooperate bilaterally without having to cooperate multilaterally. They can now discriminate against C with their external tariff. Thus, it is associated to how much country C cooperates multilaterally by lowering its tariff. The less C liberalizes, the more A and B will increase (or the less they will reduce) their MFN tariff.

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37 The tariff complementarity effect is independent of the size of the discount factors.

38 Bagwell and Staiger show that A and B´s multilateral tariff is increasing in C´s tariff in the dynamic setting.

Therefore, I propose that both effects may be captured empirically by including as an explanatory variable in equation (6) the change in the MFN tariffs of non-member countries. According to the principal supplier rule in the GATT, countries negotiate only with the top exporters, and thus I use the (change in the) trade weighted average of the MFN tariffs of each country´s five main trade partners that are non-PTA members. That is, for a given country and year in the sample, I start out with the average annual MFN tariff of each of its five main trade partners that do not share a PTA with it, and then calculate the weighted average using as weights their shares in the country´s imports.[39] I then include the change in this variable, $\Delta\mathrm{wMFN\ non\_members}_{ijt}$, in the estimating equation (6). I also control for the lagged level of the non-members MFN tariff, that is, $\mathrm{wMFN\ non\_members}_{ijt-1}$, since it could also affect the MFN tariffs of the countries in the sample.

The predictions are that an increase in the MFN tariffs of the non-members will lead the member countries to increase their tariffs (a positive coefficient for $\Delta\mathrm{wMFN\ non\_members}_{ijt}$). We also expect that a larger lagged level of the non-members MFN tariffs be associated with higher tariffs by the member countries (a positive coefficient for $\mathrm{wMFN\ non\_members}_{ijt-1}$). In other specifications, I also try adding the interactions of each of those two variables with the lagged change in the preferential tariff, $\Delta\mathrm{Pref}_{ijt-1}$, as I had done for the other variables in equation (6). I discuss this in more detail below.

The average MFN tariff of the non-member countries might be endogenous to a country´s own industry-level MFN tariff. Therefore, I also use an IV estimation strategy where I instrument for the non-members MFN tariffs using their revealed comparative advantage (RCA). I calculate an index of RCA that is based on Balassa (1965) for each 4-digit ISIC sector, country, and year, as I described in section 3, and then I use its annual average (across industries for each non-member country) as an instrument for each non-member country´s average MFN tariff.[40] I calculate the trade weighted average of the non-members RCA index in the same way that I calculated the trade weighted average of the MFN tariffs of the non-

[39] I use the annual average MFN tariff and not the industry average for each year because cooperation in reducing tariffs by the non-members could come in other industries. Moreover, I also tried using the change in the non-members MFN tariffs by industry-year and it had the predicted sign but it was not significant.

[40] For consistency, the average MFN tariff for each non-member country is also calculated as the simple average across industries for each year.

members. I thus use the change in the weighted average RCA index to instrument for $\Delta\text{wMFN non\_members}_{ijt}$, and the lagged level of the weighted average RCA index to instrument for $\text{wMFN non\_members}_{ijt-1}$. As before, I use a test of overidentifying restrictions to assess the validity of the instruments.

7.2. Results

In Table 4, I report the results of estimating the model when I add the variables related to enforcement issues. In column 1, the dependent variable is the change only in the MFN tariff that country *j* applies on good *i* against countries that are not PTA members, and the key explanatory variable, $\Delta\text{Pref}_{ijt-1}$, is only the lagged change in the preferential tariff that country *j* applies on good *i* coming from PTA members. All the previous results (regarding tariff complementarity) still hold: the coefficient of the (lagged) change in the preferential tariff is positive and statistically significant at the 1 percent level; the coefficient of the change in the preferential tariff interacted with the change in consumption is negative and significant at the 1 percent level; and the change in the preferential tariff interacted with the change imports from the rest of the world has a positive coefficient, also statistically significant at the 1 percent level. In addition, the results are also quantitatively similar to those from column 1 of Table 2. Moreover, the new variables, the change in the MFN tariff of the non-PTA partners and its lagged level are positive, as expected, and statistically significant at the 1 percent level. This provides evidence for the punishment and tariff discrimination effects, although I cannot estimate each of them separately.

Also, using those results, I find that a one standard deviation increase in the MFN tariffs of the non-PTA members leads to an increase of 0.5 percentage points in the own country´s MFN tariff (or 4 percent of the median MFN tariff in the sample). This implies that if non-member countries increased their MFN tariffs by one standard deviation after the PTA, the effect of that on the own-country´s MFN tariff would be smaller (in absolute value) even than the effect of a one standard deviation increase in the preferential tariff reduction alone (calculated using the first coefficient from column 1), which leads to a *decrease* of 0.8 percentage points in the MFN tariff. In addition to that effect, recall that the other two channels of tariff complementarity imply additional reductions in the MFN tariff as a result of

preferential liberalization (through the effects of consumption and rest-of-the-world import changes, as I discussed in the previous section). This suggests that the PTAs in Latin America had an overall building block effect, which is consistent with the results from Estevadeordal et al. (2008), although they only include the effect of the change in the preferential tariff alone in their regression to estimate their building block effect.

In columns 2 and 3, I redefine both the dependent variable and the key explanatory variable to include not only tariffs, but also the antidumping import measures that country *j* imposed against non-PTA partners (in $\Delta\tau_{ijt}$ in equation (6)), and against its PTA partners (in $\Delta\text{Pref}_{ijt-1}$). Column 2 uses the average of the minimum AD margins and column 3 uses the average of the maximum AD margins. As in column 1, all the theoretical predictions are satisfied. In columns 4 and 5, I include in my measures of import protection both the antidumping *and* safeguard import restrictions that a country imposes against its PTA partners and non-partners. Again, all the variables of interest have the predicted sign and are statistically significant. The results from column 5 imply that a one standard deviation increase in the MFN tariffs of the non-members increases import protection against non-members by 1 percentage point, or 7 percent of the median import protection against non-members in the sample, which is substantial, but still smaller than the combined (tariff complementarity) effects of a one standard deviation increase in preferential liberalization, a one standard deviation increase in the change in consumption interaction, and a one standard deviation decrease in the imports from the rest of the world interaction (which lead to decreases of 0.8, 0.5, and 0.5 percentage points in the import protection against non-members, respectively).

As I did with the variables that capture the effects of tariff complementarity, I also try including the interactions of the change in the non-PTA members MFN tariff and of its lagged level with the lagged change in the own country´s preferential tariff (I still include the non-PTA members MFN tariff variables by themselves as controls). The intuition behind this is as follows. Consider, for example, the punishment effect. We have that, *due to the FTA*, the non-member country C will increase its tariff (given the weakening of the member countries´ ability to punish it in case it defects from the multilateral agreement). This, in turn, will lead the member countries to increase their tariffs. Thus, I use the preferential liberalization that takes place interacted with the change in the MFN tariffs of the non-member countries. I expect to find a negative coefficient for the newly added interactions, since a negative

coefficient would mean that the more the preferential tariff *falls*, the more positive the effect of the MFN tariffs of non-members on the country´s own MFN tariff. Table 5 shows the results when I include these interactions. In column 1, I replicate the specification from column 1 of Table 4 but adding the interaction variables, $(\Delta\text{Pref}_{ijt-1}) * \Delta\text{wMFN non\_members}_{ijt}$ and $(\Delta\text{Pref}_{ijt-1}) * \text{wMFN non\_members}_{ijt-1}$. As expected, the new interactions have negative coefficients and they are significant at the 1 percent level. Furthermore, the coefficients of the variables that capture tariff complementarity remain highly significant and with the predicted signs. Again, the building block effects of a one standard deviation increase in the variables associated with tariff complementarity (the change in the preferential tariff, the change in consumption interaction and the change in imports from the rest of the world interaction) far outweigh the stumbling block effect of a one standard deviation increase in the variable associated with the punishment and tariff discrimination effects (the change in the MFN tariffs of non-members interaction). The tariff complementarity effects lead to a decrease of 2.4 percentage points in the MFN tariff, while the punishment and tariff discrimination effects lead to an increase of only 0.3 percentage points in the MFN tariff.

In columns 2 and 3 of Table 5, I replicate the specification from column 1 but I redefine the dependent and key explanatory variables to include AD and SG import restrictions (column 2 uses the average of the minimum of the AD margins and column 3 uses the average of the maximum). The results are qualitatively similar to those of column 1. All the theoretical predictions hold.[41]

There is a potential (new) endogeneity problem, because the average MFN tariff of the non-member countries could be endogenous to a country´s own industry-level MFN tariff. To address this, I use an IV-GMM estimation strategy where I instrument for the change in the trade weighted average MFN tariff of the non-members by using the change in the trade weighted average RCA index of those countries.[42] Similarly, I instrument for the lagged level of the average MFN tariff of the non-member countries with the lagged level of their average

[41] The results including AD only (but not SGs) are not shown to save space but they are also similar and are available upon request.

[42] The correlation between the change in the MFN tariff of non-members and the change in the RCA index is negative, as expected. Its correlation with the lagged level of the RCA index is also negative (the correlations are -8 percent and -21 percent).

RCA index. I also instrument for the other potentially endogenous variables (including the lagged change in the preferential tariff) as explained in section 5.

I report the IV estimates in Table 6. The Hansen-J statistic (reported at the bottom of the table) indicates that the instrument are valid. Column 1 replicates the specification from column 1 of Table 4 but using IV-GMM. The results are qualitatively equivalent to the non-IV ones. All the coefficients have their predicted signs and are statistically significant at the 1 percent level.[43] In columns 2 and 3, I incorporate the use of TTBs (AD and SGs) in the dependent variable and key explanatory variable (again, column 2 uses the average of the minimum AD margins and column 3 uses the average of the maximum AD margins). Regarding tariff complementarity, all the previous results still hold with the exception that the coefficient of the change in consumption interaction becomes not significant in column 3. I again find evidence of the punishment and tariff discrimination effects, since the change in the average MFN tariff of the non-member countries has a positive and highly significant coefficient.

In column 4 of Table 6, I report the results from a similar IV specification to the one from column 1, but where I add the interactions of the change in the non-PTA members MFN tariff and of its lagged level with the own country´s lagged change in the preferential tariff (as I had done in the non-IV specification from column 1 of Table 5). I find strong support for all the theoretical predictions. Each coefficient has the predicted sign and is highly significant. In columns 5 and 6, I replicate the specification from column 4 but including the use of AD and SGs as already explained. With regards to tariff complementarity, all predictions still hold except that the change in consumption interaction becomes not significant in column 6. As I discussed in section 6, it is possible that having more detailed data on the change in consumption variable could help improve its statistical significance. As for the punishment and tariff discrimination effects, the interaction of the change in the non-members MFN tariff (and of its lagged level) with the own country´s lagged change in the preferential tariff become not significant, although those variables by themselves (i.e., not interacted with the change in the preferential tariff) remain positive and significant. A possible reason why the interactions become not significant when adding TTBs is that the dependent variable in those

[43] The first-stage results for the new variables are shown in columns 3 and 4 in Appendix Table A1

regressions includes TTBs but the MFN-tariff-of-non-member variables do not include the use of TTBs by those non-members.[44]

To summarize, I find support for Bagwell and Staiger´s (1999) theoretical predictions of the effects of preferential trade liberalization on the external import protection imposed by the PTA-member countries. There is evidence of tariff complementarity and also of the punishment and tariff discrimination effects (although I am not able to separately estimate the last two effects). Importantly, this holds not only when I consider only the use of preferential and MFN tariffs, but also, in most regressions, when I also include the use of antidumping and safeguard import restrictions. Furthermore, comparing the impacts of one-standard deviation changes of the different channels, overall the effects point towards a building block effect of preferential liberalization on trade liberalization toward non-member countries.

8. CONCLUSIONS

This paper finds support for the predictions of Bagwell and Staiger´s (1999) model of the effects of preferential trade agreements (PTAs) on external import protection. I test those predictions using data for eight Latin American countries in the 1990s. By testing the predictions of a specific model in a way that is closely linked to the theory, I am able to study the *mechanisms* through which preferential liberalization affects protection against non-member countries. This contrasts with the existing literature, which has mostly focused on finding out the *sign* of the effect only.

As predicted by the theory, I find evidence of a *tariff complementarity effect*. First, products subject to larger reductions in preferential tariffs also experienced larger reductions in their MFN tariffs. Second, the more consumption of a product increases, the more the MFN tariff decreases with the reduction in the preferential tariff. Third, the more imports from the rest of the world fall, the more the product´s MFN tariff decreases due to the preferential tariff

[44] Although not shown, in a specification where I add only the use of AD using the average of the *minimum* AD margins, the interactions remain significant, but once I depart more from the tariffs-only specification by using the average of the *maximum* of the AD margins, or by adding also the use of SGs (as in columns 5 and 6), they lose significance. Thus, it is possible that this may be due to the fact that those variables do not include the use of TTBs by the non-PTA countries.

cut. Moreover, I also find evidence of the two additional effects that arise when enforcement issues are included in the model —the *punishment effect* and the *tariff discrimination effect*. Although all the effects are not only statistically but also economically significant, I also find that if we consider a one-standard deviation change in each of the different channels, overall the results suggest the existence of a building block effect of preferential liberalization on trade liberalization toward non-member countries.

Unlike most of the existing research on the topic, I examine not only the use of tariffs but also of the temporary trade barriers of antidumping and safeguards (against both PTA members and non-members). This is important given that other studies have shown that the use of those discretionary policies may considerably alter the results found when one focuses exclusively on tariffs (e.g. Bown and Tovar, 2016; Bown and Tovar, 2011). I show that the results are robust to including these other forms of import protection. To the best of my knowledge, this is the first paper to test the predictions of a theoretical model of the link between preferential and external trade liberalization by including both tariffs and TTBs, which I also include in *ad valorem* form. The findings are robust to the use of instrumental variables as well.

The results suggest as an important avenue for future research to empirically test, in a way that carefully follows the theory, the existence of other channels via which PTAs may affect multilateral trade liberalization and that are predicted by other theoretical models. My approach for testing the predictions of the Bagwell and Staiger (1999) model could also be extended and improved once more disaggregated consumption data and for more recent years becomes available for the Latin American and other countries.

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Table 1. Summary Statistics

Variable	Mean	Std. Deviation	Minimum	Maximum	Observations
ΔMFN	-0.32	2.67	-21.76	32.00	4,716
ΔMFN+AD min	-0.33	4.07	-70.59	89.89	4,716
ΔMFN+AD max	-0.30	6.08	-99.32	95.73	4,716
ΔMFN+AD+SG min	-0.16	20.05	-476.66	1250.44	4,716
ΔMFN+AD+SG max	-0.13	20.55	-476.66	1250.44	4,716
L.ΔPref tariff	-3.04	6.41	-55.80	20.00	4,716
L.ΔPref tariff + AD min	-3.03	6.45	-55.80	25.72	4,716
L.ΔPref tariff + AD max	-3.01	6.48	-55.80	25.72	4,716
L.ΔPref tariff + AD + SG min	-3.01	6.57	-55.80	80.55	4,716
L.ΔPref tariff + AD + SG max	-2.99	6.60	-55.80	80.55	4,716
L.ΔPref tariff * Δcons	-2659752	13000000	-271000000	110000000	4,716
L.ΔPref tariff + AD min * Δcons	-2630708	13200000	-271000000	110000000	4,716
L.ΔPref tariff + AD max * Δcons	-2604873	13300000	-271000000	110000000	4,716
L.ΔPref tariff + AD + SG min * Δcons	-2618967	13200000	-271000000	110000000	4,716
L.ΔPref tariff + AD + SG max * Δcons	-2593132	13300000	-271000000	110000000	4,716
Δcons	1291698	2922784	-5893307	17300000	4,716
L.ΔPref tariff * Δimp_row	-8183	277361	-11900000	5687794	4,716
L.ΔPref tariff + AD min * Δimp_row	-12267	316443	-11900000	5687794	4,716
L.ΔPref tariff + AD max * Δimp_row	-13031	337414	-11900000	5687794	4,716
L.ΔPref tariff + AD +SG min * Δimp_row	-11564	317677	-11900000	5687794	4,716
L.ΔPref tariff + AD +SG max * Δimp_row	-12327	338573	-11900000	5687794	4,716
Δimp_row	6150	130199	-3408452	3098506	4,716
ΔwMFN non_members	-0.21	1.73	-8.41	4.49	4,716
L.wMFN non_members	8.56	5.61	5.01	32.47	4,716
L.ΔPref tariff * ΔwMFN non_members	0.79	14.87	-79.92	219.72	4,716
L.ΔPref tariff + AD +SG min * ΔwMFN non_members	0.77	15.09	-130.90	219.72	4,716
L.ΔPref tariff + AD +SG max * ΔwMFN non_members	0.77	15.11	-130.90	219.72	4,716
L.ΔPref tariff * *L*.wMFN non_members	-28.85	95.27	-1459.77	166.48	4,716
L.ΔPref tariff + AD +SG min * *L*.wMFN non_members	-28.62	96.01	-1459.77	534.21	4,716
L.ΔPref tariff + AD +SG max * *L*.wMFN non_members	-28.53	96.09	-1459.77	534.21	4,716

Table 2. Estimates of the Effect of Preferential Liberalization on External Import Protection

	Dependent variable:						
	ΔMFN	ΔMFN +AD min	ΔMFN +AD max	ΔMFN +AD min	ΔMFN +AD max	ΔMFN +AD+SG min	ΔMFN +AD+SG max
Explanatory Variables	**(1)**	**(2)**	**(3)**	**(4) 1/**	**(5) 1/**	**(6)**	**(7)**
L.ΔPref tariff	0.1217***						
	(0.014)						
L.ΔPref tariff + AD min		0.1134***		0.1123***			
		(0.022)		(0.022)			
L.ΔPref tariff + AD max			0.1101***		0.1071***		
			(0.027)		(0.028)		
L.ΔPref tariff + AD + SG min						0.1167***	
						(0.023)	
L.ΔPref tariff + AD + SG max							0.1135***
							(0.027)
L.ΔPref tariff * Δcons 2/	-0.0003***						
	(0.0001)						
L.ΔPref tariff + AD min * Δcons 2/		-0.0003***		-0.0003***			
		(0.0001)		(0.0001)			
L.ΔPref tariff + AD max * Δcons 2/			-0.0004***		-0.0004***		
			(0.0001)		(0.0001)		
L.ΔPref tariff + AD + SG min * Δcons 2/						-0.0003***	
						(0.0001)	
L.ΔPref tariff + AD + SG max * Δcons 2/							-0.0004***
							(0.0001)
Δcons 2/	-0.0006***	-0.0006	-0.0008	-0.0006	-0.0009	-0.0006	-0.0008
	(0.0002)	(0.0004)	(0.0008)	(0.0004)	(0.0008)	(0.0004)	(0.0008)
L.ΔPref tariff * Δimp_row 2/	0.0068***						
	(0.002)						
L.ΔPref tariff + AD min * Δimp_row 2/		0.0132**		0.0132**			
		(0.005)		(0.005)			
L.ΔPref tariff + AD max * Δimp_row 2/			0.0165**		0.0180**		
			(0.006)		(0.007)		
L.ΔPref tariff + AD +SG min * Δimp_row 2/						0.0129**	
						(0.005)	
L.ΔPref tariff + AD +SG max * Δimp_row 2/							0.0162**
							(0.006)
Δimp_row 2/	0.0052***	0.0069	0.0128	0.0071	0.0152	0.0069	0. 0128
	(0.001)	(0.005)	(0.012)	(0.005)	(0.012)	(0.005)	(0.012)
Constant	1.1475***	1.3003***	1.4128	1.2197***	1.0809***	0.9452***	1.0570**
	(0.090)	(0.172)	(0.225)	(0.190)	(0.284)	(0.318)	(0.431)
Observations	4,716	4,716	4,716	4,716	4,716	4,713	4,713
R-squared	0.21	0.09	0.05	0.09	0.05	0.08	0.04

Notes: Robust standard errors in parentheses with *, **, and *** indicating statistically significant at 10%, 5% and 1% levels, respectively. 1/ Columns 4 and 5 exclude AD measures that are DPU (duty if the price falls under a given level). 2/ Variable is scaled by 10,000. Standard errors are adjusted for clustering at the 3-digit ISIC level in all regressions.

Table 3. IV Estimates of the Effect of Preferential Liberalization on External Import Protection

	Dependent variable:						
	ΔMFN	ΔMFN	ΔMFN	ΔMFN +AD min	ΔMFN +AD max	ΔMFN +AD+SG min	ΔMFN +AD+SG max
Explanatory Variables	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**
L.ΔPref tariff	0.0694*	0.0496***	0.1547***				
	(0.037)	(0.018)	(0.015)				
L.ΔPref tariff + AD min				0.1714***			
				(0.016)			
L.ΔPref tariff + AD max					0.1658***		
					(0.020)		
L.ΔPref tariff + AD + SG min						0.1389***	
						(0.019)	
L.ΔPref tariff + AD + SG max							0.1542***
							(0.021)
L.ΔPref tariff * Δcons [1/]	0.0005**	0.0006***	-0.0003***				
	(0.0002)	(0.0001)	(0.0001)				
L.ΔPref tariff + AD min * Δcons [1/]				-0.0002*			
				(0.0001)			
L.ΔPref tariff + AD max * Δcons [1/]					0.00004		
					(0.0001)		
L.ΔPref tariff + AD + SG min * Δcons [1/]						-0.0002	
						(0.0002)	
L.ΔPref tariff + AD + SG max * Δcons [1/]							0.00001
							(0.0001)
Δcons [1/]	-0.0007	-0.0005**	-0.0007***	-0.0004**	-0.00001	-0.0005*	0.0002
	(0.0008)	(0.0002)	(0.0002)	(0.0002)	(0.0004)	(0.0003)	(0.0004)
L.ΔPref tariff * Δimp_row [1/]	0.0193**	0.0196***	0.0115***				
	(0.009)	(0.002)	(0.003)				
L.ΔPref tariff + AD min * Δimp_row [1/]				0.0172***			
				(0.003)			
L.ΔPref tariff + AD max * Δimp_row [1/]					0.0122*		
					(0.007)		
L.ΔPref tariff + AD +SG min * Δimp_row [1/]						0.0233***	
						(0.003)	
L.ΔPref tariff + AD +SG max * Δimp_row [1/]							0.0307***
							(0.004)
Δimp_row [1/]	0.0325***	0.0337***	0.0122***	0.0225***	0.0336***	0.0254***	0.0247***
	(0.007)	(0.004)	(0.002)	(0.005)	(0.009)	(0.007)	(0.007)
Constant	-0.2145	-0.0878	-0.2667***	-0.3602***	-0.3386***	-0.1538*	-0.2210*
	(0.247)	(0.106)	(0.076)	(0.094)	(0.106)	(0.090)	(0.124)
Observations	4,178	4,178	4,634	4,634	4,634	4,631	4,631
R-squared			0.06	0.02	0.004	0.02	0.004
Hansen J p-value		0.15	0.10	0.06	0.04	0.04	0.055

Notes: Robust standard errors in parentheses with *, **, and *** indicating statistically significant at 10%, 5% and 1% levels, respectively. Column 2 uses 2SLS and columns 2-7 use IV-GMM. Columns 1-2 instrument for all variables, while columns 3-7 treat Δcons as exogenous. 1/ Variable is scaled by 10,000. Standard errors are adjusted for clustering at the 3-digit ISIC level in all regressions.

Table 4. Estimates of the Effect of Preferential Liberalization on External Import Protection under Enforcement Issues

	Dependent variable:				
	ΔMFN	ΔMFN +AD min	ΔMFN +AD max	ΔMFN +AD+SG min	ΔMFN +AD+SG max
Explanatory Variables	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**
L.ΔPref tariff	0.1311***				
	(0.015)				
L.ΔPref tariff + AD min		0.1242***			
		(0.024)			
L.ΔPref tariff + AD max			0.1241***		
			(0.030)		
L.ΔPref tariff + AD + SG min				0.1279***	
				(0.025)	
L.ΔPref tariff + AD + SG max					0.1279***
					(0.030)
L.ΔPref tariff * Δcons [1/]	-0.0003***				
	(0.0001)				
L.ΔPref tariff + AD min * Δcons [1/]		-0.0003***			
		(0.0001)			
L.ΔPref tariff + AD max * Δcons [1/]			-0.0004***		
			(0.0001)		
L.ΔPref tariff + AD + SG min * Δcons [1/]				-0.0003***	
				(0.0001)	
L.ΔPref tariff + AD + SG max * Δcons [1/]					-0.0004***
					(0.0001)
Δcons [1/]	-0.0006***	-0.0006	-0.0008	-0.0006	-0.0008
	(0.0002)	(0.0004)	(0.001)	(0.0004)	(0.0008)
L.ΔPref tariff * Δimp_row [1/]	0.0062***				
	(0.002)				
L.ΔPref tariff + AD min * Δimp_row [1/]		0.0127**			
		(0.005)			
L.ΔPref tariff + AD max * Δimp_row [1/]			0.0159**		
			(0.006)		
L.ΔPref tariff + AD +SG min * Δimp_row [1/]				0.0124**	
				(0.005)	
L.ΔPref tariff + AD +SG max * Δimp_row [1/]					0.0156**
					(0.006)
Δimp_row [1/]	0.0070***	0.0091*	0.0155	0.0092*	0.0156
	(0.002)	(0.005)	(0.012)	(0.005)	(0.012)
ΔwMFN non_members	0.3007***	0.3691***	0.5301***	0.3842***	0.5454***
	(0.075)	(0.132)	(0.169)	(0.134)	(0.172)
L.wMFN non_members	0.3032***	0.3504***	0.4356***	0.3615***	0.4468***
	(0.047)	(0.084)	(0.102)	(0.086)	(0.103)
Constant	-0.6903***	-0.8199	-1.2130*	-1.2412*	-1.6356*
	(0.249)	(0.576)	(0.709)	(0.692)	(0.828)
Observations	4,716	4,716	4,716	4,713	4,713
R-squared	0.22	0.10	0.05	0.09	0.05

Notes: Robust standard errors in parentheses with *, **, and *** indicating statistically significant at 10%, 5% and 1% levels, respectively. 1/ Variable is scaled by 10,000. Standard errors are adjusted for clustering at the 3-digit ISIC level in all regressions.

Table 5. Estimates of the Effect of Preferential Liberalization on External Import Protection under Enforcement Issues—Interactions

	Dependent variable:		
	ΔMFN	ΔMFN +AD+SG min	ΔMFN +AD+SG max
Explanatory Variables	**(1)**	**(2)**	**(3)**
L.ΔPref tariff	0.2756***		
	(0.021)		
L.ΔPref tariff + AD + SG min		0.2751***	
		(0.023)	
L.ΔPref tariff + AD + SG max			0.2655***
			(0.029)
L.ΔPref tariff * Δcons 1/	-0.0003***		
	(0.0001)		
L.ΔPref tariff + AD + SG min * Δcons 1/		-0.0003***	
		(0.0001)	
L.ΔPref tariff + AD + SG max * Δcons 1/			-0.0004***
			(0.0001)
Δcons 1/	-0.0006***	-0.0007*	-0.0008
	(0.0002)	(0.0004)	(0.001)
L.ΔPref tariff * Δimp_row 1/	0.0061***		
	(0.002)		
L.ΔPref tariff + AD +SG min * Δimp_row 1/		0.0123**	
		(0.005)	
L.ΔPref tariff + AD +SG max * Δimp_row 1/			0.0155**
			(0.006)
Δimp_row 1/	0.0035***	0.0059	0.0126
	(0.001)	(0.005)	(0.011)
L.ΔPref tariff * ΔwMFN non_members	-0.0231***		
	(0.003)		
L.ΔPref tariff + AD +SG min * ΔwMFN non_members		-0.0351**	
		(0.015)	
L.ΔPref tariff + AD +SG max * ΔwMFN non_members			-0.0358**
			(0.017)
ΔwMFN non_members	-0.0619	0.0348	0.2196
	(0.051)	(0.180)	(0.222)
L.ΔPref tariff * *L*.wMFN non_members	-0.0155***		
	(0.001)		
L.ΔPref tariff + AD +SG min * *L*.wMFN non_members		-0.0160***	
		(0.004)	
L.ΔPref tariff + AD +SG max * *L*.wMFN non_members			-0.0152***
			(0.004)
L.wMFN non_members	-0.1592***	-0.0484	0.0745
	(0.033)	(0.144)	(0.174)
Constant	2.2493***	1.3636	0.7232
	(0.238)	(1.045)	(1.161)
Observations	4,716	4,713	4,713
R-squared	0.26	0.10	0.05

Notes: Robust standard errors in parentheses with *, **, and *** indicating statistically significant at 10%, 5% and 1% levels, respectively. 1/ Variable is scaled by 10,000. Standard errors are adjusted for clustering at the 3-digit ISIC level in all regressions.

Table 6. IV Estimates of the Effect of Preferential Liberalization on External Import Protection under Enforcement Issues

	Dependent variable:					
	ΔMFN	ΔMFN +AD+SG min	ΔMFN +AD+SG max	ΔMFN	ΔMFN +AD+SG min	ΔMFN +AD+SG max
Explanatory Variables	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
L.ΔPref tariff	0.1792***			0.3606***		
	(0.012)			(0.027)		
L.ΔPref tariff + AD + SG		0.1566***			0.1590***	
		(0.019)			(0.044)	
L.ΔPref tariff + AD + SG			0.1666***			0.2083***
			(0.023)			(0.039)
L.ΔPref tariff * Δcons [1/]	-0.0003***			-0.0003***		
	(0.0001)			(0.0001)		
L.ΔPref tariff + AD + SG min * Δcons [1/]		-0.0002*			-0.0003**	
		(0.0001)			(0.0001)	
L.ΔPref tariff + AD + SG max * Δcons [1/]			0.00003			-0.00003
			(0.0001)			(0.0001)
Δcons [1/]	-0.0007***	-0.0006**	-0.0001	-0.0006***	-0.0006**	-0.0001
	(0.0001)	(0.0003)	(0.0005)	(0.0001)	(0.0003)	(0.0003)
L.ΔPref tariff * Δimp_row [1/]	0.0171***			0.0203***		
	(0.003)			(0.003)		
L.ΔPref tariff + AD +SG min * Δimp_row [1/]		0.0362***			0.0440***	
		(0.007)			(0.009)	
L.ΔPref tariff + AD +SG max * Δimp_row [1/]			0.0412***			0.0475***
			(0.0005)			(0.005)
Δimp_row [1/]	0.0193***	0.0360***	0.0364***	0.0100***	0.0358***	0.0336***
	(0.002)	(0.007)	(0.007)	(0.002)	(0.006)	(0.006)
L.ΔPref tariff * ΔwMFN non_members				-0.0859***		
				(0.013)		
L.ΔPref tariff + AD +SG min * ΔwMFN					0.0115	
					(0.014)	
L.ΔPref tariff + AD +SG max * ΔwMFN						-0.0087
						(0.011)
ΔwMFN non_members	0.2149***	0.4404***	0.3720***	0.1803***	0.5723***	0.4414***
	(0.030)	(0.076)	(0.115)	(0.022)	(0.073)	(0.092)
L.ΔPref tariff * *L*.wMFN non_members				-0.0202***		
				(0.003)		
L.ΔPref tariff + AD +SG min * *L*.wMFN					0.0015	
					(0.003)	
L.ΔPref tariff + AD +SG max * *L*.wMFN						-0.0022
						(0.003)
L.wMFN non_members	0.5206***	0.6110***	0.5018***	0.4512***	0.6479***	0.6552***
	(0.025)	(0.058)	(0.095)	(0.024)	(0.079)	(0.060)
Constant	8.2897***	9.8093***	7.9069***	7.056***	10.3236***	10.3548***
	(0.375)	(0.951)	(1.541)	(0.425)	(1.374)	(1.033)
Observations	4,634	4,631	4,631	4,631	4,631	4,631
Hansen J p-value	0.18	0.08	0.103	0.19	0.24	0.20

Notes: Robust standard errors in parentheses with *, **, and *** indicating statistically significant at 10%, 5% and 1% levels, respectively. [1/] Variable is scaled by 10,000. Standard errors adjusted for clustering at the 3-digit ISIC level in all regressions.

Table A1. First Stage Regressions

Dependent variable is	*L*.ΔPref tariff **(1)**	Δimp_row [1/] **(2)**	ΔwMFN non_members **(3)**	*L*.wMFN non_members **(4)**
Δcons [1/]	-0.0013***	-0.0033	-0.00002	-0.00001
	(0.001)	(0.002)	(0.00003)	(0.0001)
L.ΔPref tariff partner 1	0.4530***	0.2418**	0.0230***	-0.0775***
	(0.028)	(0.111)	(0.003)	(0.008)
L.ΔPref tariff partner 2	0.3422***	0.1482	-0.0485***	0.0889***
	(0.029)	(0.108)	(0.003)	(0.006)
L.ΔPref tariff partner 3	-0.0992***	0.0459	0.0389***	-0.0118
	(0.032)	(0.553)	(0.004)	(0.007)
L.ΔPref tariff partner 1* Δcons [1/]	0.00002	0.0001	-0.0001***	0.0001**
	(0.0001)	(0.0005)	(0.00001)	(0.00003)
L.ΔPref tariff partner 2* Δcons [1/]	-0.0003***	-0.0002	0.0001***	-0.0001***
	(0.0001)	(0.0001)	(0.00001)	(0.00002)
L.ΔPref tariff partner 3* Δcons [1/]	-0.0001**	-0.0001	-0.0001***	0.0001***
	(0.00004)	(0.0006)	(0.00001)	(0.00001)
Δimp_row partner 1 [1/]	0.0008	0.1243***	0.0062***	-0.0223***
	(0.005)	(0.040)	(0.0017)	(0.0068)
Δimp_row partner 2 [1/]	-0.0090	0.1861***	-0.0016	0.0075
	(0.007)	(0.041)	(0.0023)	(0.0046)
Δimp_row partner 3 [1/]	0.0044	0.2007***	-0.0030**	0.0063***
	(0.003)	(0.048)	(0.0013)	(0.0023)
L.ΔPref tariff * Δimp_row partner 1 [1/]	0.0012	-0.0291***	0.0005	-0.0117**
	(0.003)	(0.005)	(0.0005)	(0.0049)
L.ΔPref tariff * Δimp_row partner 2 [1/]	-0.0026**	-0.0108*	-0.0001	0.0013***
	(0.001)	(0.006)	(0.0002)	(0.0004)
L.ΔPref tariff * Δimp_row partner 3 [1/]	-0.0019***	0.0135**	-0.0003	-0.0001
	(0.001)	(0.006)	(0.0002)	(0.0004)
ΔRCA_row	-8.9139**	98.7836***	-0.5628	-0.8182
	(3.683)	(37.132)	(0.7697)	(1.3244)
L.ΔPref tariff partner 1* ΔRCA_row	-2.5816**	-19.8585*	0.1637	0.7743*
	(1.224)	(11.432)	(0.1816)	(0.4085)
L.ΔPref tariff partner 2* ΔRCA_row	-1.8338	18.6796***	0.2186	-0.3525
	(1.726)	(5.421)	(0.2829)	(0.4216)
L.ΔPref tariff partner 3* ΔRCA_row	1.7784	-3.5103	-0.1922	0.2049
	(1.341)	(7.643)	(0.1780)	(0.3271)
ΔwRCA non_members			10.9781***	-13.3620***
			(0.1147)	(0.2153)
L.wRCA non_members			13.9268***	-10.9698***
			(0.1551)	(0.2161)
Constant	1.1465***	-4.0823**	32.3467***	-42.1054***
	(0.295)	(1.901)	(0.3647)	(0.5154)
Observations	4,634	4,634	4,634	4,634
R-squared	0.36	0.16	0.47	0.33
Shea Partial R-squared	0.34	0.14	0.25	0.17

Notes: Robust standard errors in parentheses with *, **, and *** indicating statistically significant at 10%, 5% and 1% levels, respectively. 1/ Variable is scaled by 10,000.

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