Regionalism and External Protection: Market Access Matters *

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Abstract

Most of the literature on the impact of regionalism on external protection focuses on the role played by preferences granted to regional partners. In this paper I explore the role played by the enhanced market access opportunities conferred by regional agreements. Using a parsimonious political economy model with different weights assigned to consumers, producers, and tariff revenues in the government's objective function, I show that the impact of preferential market access (PMA) on external protection is ambiguous. On the one hand, the trade deflection resulting from enhanced market access reduces the benefit from external protection for domestic producers in the home country. On the other hand, if the weight assigned to tariff revenue in the government's objective function is sufficiently high, then the discrete increase in imports caused by trade deflection strengthens the incentives to increase tariffs on imports from the rest of the world. The empirical results strongly support the idea that PMA significantly impacts the multilateral tariff, at least as much as preferences do. Generally, PMA tends to lead to lower tariffs, except in countries which initially exhibit a relatively low level of external protection and whose governments highly value tariff revenue.

Keywords: Regionalism, Preferential Trade Agreements, Market Access, Tariff Revenue, Trade Deflection, External Tariffs, Trade Liberalization
JEL-Classification: F13, F15

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1. Introduction

The parallel development of preferential and multilateral trade agreements has triggered many studies on the desirability of such exceptions to the most-favored nation (MFN) principle of the World Trade Organization (WTO). Most of the literature studying the impact of regionalism on external protection focuses on the role played by preferences granted to regional trading partners (hereinafter *preferences*) on the level of protection towards non-members. This paper revisits the question by shedding light on the role played by the preferential market access (PMA) conferred by Preferential Trade Agreements (PTAs) as a determinant of a country's own multilateral trade liberalization. Indeed, depending on their level of reciprocity, PTAs not only affect imports but also exports by providing countries with a relative advantage in terms of market access. The main contribution of this study is to propose a transmission channel whereby PMA affects the level of external protection, ie. the applied Most-Favored-Nation tariff imposed on imports from non-members of the agreement, and to provide empirical evidence of this effect. First, I show that market access constitutes a relevant determinant of multilateral trade liberalization. Second, I show that the impact is ambiguous depending on the initial level of external protection and the extraneous valuation of tariff revenue by the government. Finally, findings suggest that PMA affects external protection at least as much as preferences do. This paper therefore introduces a new approach to the *regionalism vs. multilateralism* question, filling a gap in an abundant literature that has set aside half of the underlying mechanism linking PTAs to multilateral trade liberalization.

Using a parsimonious political economy model with different weights assigned to consumers, producers, and tariff revenue in the government objective function, I argue that because of trade deflection, market access affects the level of external protection. More precisely, in a country benefiting from a preferential access to the market of its PTA partner, producers arbitrage between prices and therefore sell their production in the partner country whenever the foreign price is higher than the domestic one. As a result, the share of domestic consumption that was previously satisfied by local producers has now to be imported from the rest of the world. Therefore, two opposite effects are at play. On the one hand, the deflection of domestic sales reduces the dependence of local producers' profits on the protection towards non-members of the PTA. This provides incentives for the government to lower the level of external tariff. On the other hand, due to the surge in imports caused by trade deflection, a marginal increase in the external tariff may induce a significant rise in tariff revenue. The total impact is therefore ambiguous and a rise in external protection may be observed in

countries where the government sufficiently values tariff revenue in its objective function.

Empirically, to show that market access matters, I estimate the model of Estevadeordal, Freund and Ornelas (2008) in their sample of ten Latin American countries over ten years but using preferential tariff rates received by – instead of granted to – the partner country, ie. PMA instead of preferences. As Crivelli (2014), I extended the model to capture differences in initial level of external protection, which are used as a proxy for differences in prices. The results strongly support the view according to which market access significantly impacts the degree of post-PTA liberalization, at least as much as preferences do. Generally, reductions in PMA tariffs induce a subsequent fall in MFN tariffs except in countries whose initial MFN tariff is lower than in the partner country granting the preference. Indeed, in low-tariff countries[1] the level of external protection tends to decrease significantly less than in the low-tariff partner or even increase. More precisely, I provide evidence that in those countries, a reduction in the PMA tariff rate by 1 percentage point may trigger up to a 0.37 percentage point increase in MFN tariffs. This finding is consistent with the trade deflection mechanism described by the theoretical model when countries care sufficiently about tariff revenues. This transmission channel is supported by the fact that the effect vanishes in countries where the weights assigned by the government to tariff revenues are low. Finally, this result does not stem from the potential collinearity between PMA and preferences tariffs, as it is robust to the inclusion of the latter in the estimations. Hence, this research introduces a new vision of regionalism in which market access constitutes a relevant determinants of multilateral trade liberalization. Empirical evidence shows that PMA promotes multilateral free trade in relatively high-tariff countries but may act as a *stumbling block* to the multilateral trade liberalization in low-tariff PTA members whose governments highly value tariff revenues.

PTAs have become very popular over the last decades and 354 regional trade agreements were in force as of 10 January 2013[2]. They are used by small countries to access larger economies' markets while the latter benefit from a subsequent decrease in prices of goods imported under the preferential treatment. Hence, under certain conditions they are very likely to be welfare enhancing within the trade block (Kemp and Wan (1976), Panagariya and Krishna (2002)), whereas their potential impact on outsiders is controversial. On the one hand, if the

[1] Throughout the paper, a high-tariff (low-tariff) country refers to an economy where the applied MFN tariff is higher (lower) than in the partner country for a given industry and year. The notion has therefore to be understood in relative terms.

[2] See WTO website for the last statistics on regional trade agreements. Note that this paper does not differentiate between regional trade agreements (RTAs) and preferential trade agreements (PTAs).

PMA triggers a reduction in the level of multilateral protection, non-members may eventually benefit from the agreements. On the other hand, outsiders will be adversely affected if PMA act as a barrier to multilateral trade liberalization (MTL). The existing literature is divided upon the question.

Theoretically, Richardson (1993) showed that because of the fall in external protection, trade diversion resulting from free-trade areas (FTAs) is likely to become trade creation. Bagwell and Staiger (1998) identified three different effects of PTAs on MTL, the *tariff complementarity effect* (fostering MTL), the *punishment effect* and the *tariff discrimination effect* (hindering MTL). They found that the impact on MTL is not clear-cut. However, the most desirable effects of PTAs occur when the degree of multilateral cooperation is low, so when it is the most needed. Thereafter, the *tariff complementarity effect* has been found in several studies such as Freund (2000) and Ornelas (2005*a*,*b*). Their findings contrast sharply with those of Levy (1997), Krishna (1998), Limão (2007) and Karacaovali and Limão (2008) showing that PTAs are likely to restrain multilateral trade liberalization[3].

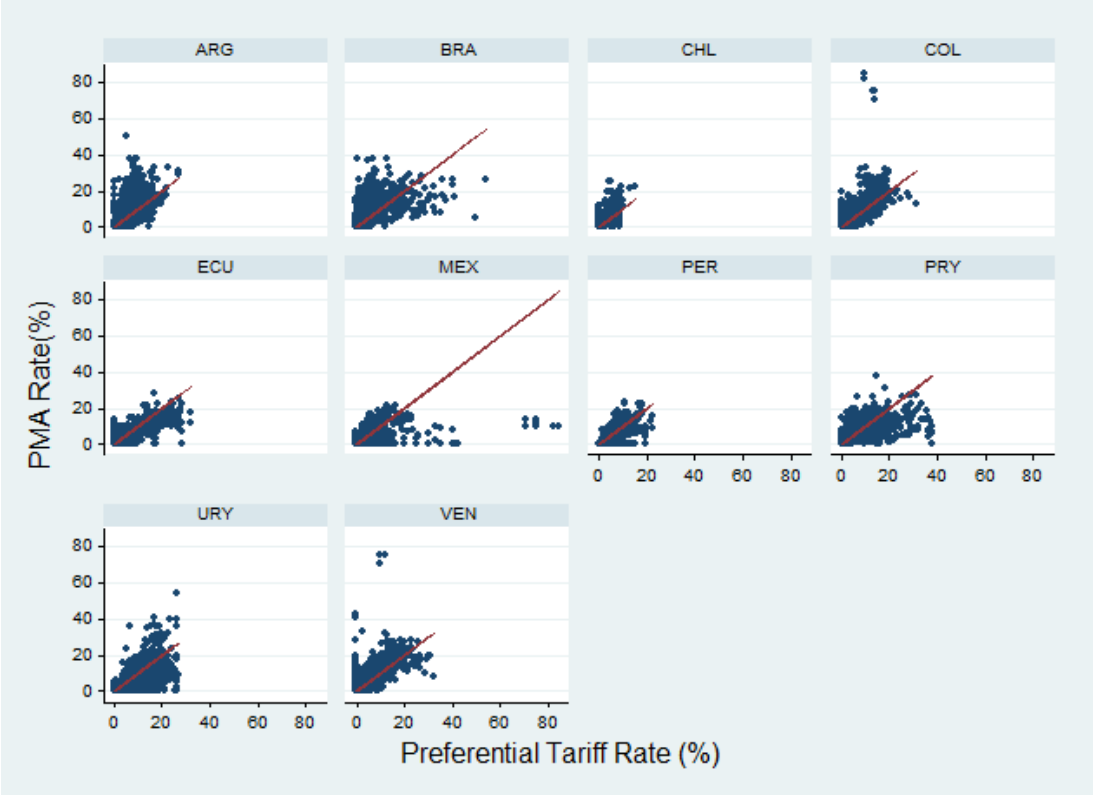
Some other studies have put forward ambiguous results in which PTAs promote MTL only in specific cases. Riezman (1999) performed a simulation exercise based on a general equilibrium model. Free trade turns out to be the equilibrium if there is one large country and two small economies assuming that FTAs and CUs are both allowed. According to Saggi (2006) if countries are asymmetric, there exist circumstances where PTAs facilitate multilateral tariff cooperation. Saggi and Yildiz (2010) put forward that heterogeneity plays an important role in the determination of MTL. They show that under symmetry, free trade is the only stable Nash equilibrium, which is not the case with heterogeneity across countries. Finally Saggi and Yildiz (2011) found out that under certain circumstances, the freedom to pursue bilateral FTA is needed for achieving multilateral free trade.

The lack of consensus in the theoretical literature raised the need for empirical evidence. However, findings are diverging depending on country characteristics or methodologies. Using industry-level data for ten Latin American countries from 1990 to 2001, Estevadeordal, Freund and Ornelas (2008) showed that preferential tariff reduction in a given sector leads to a reduction in the MFN tariff in that sector. On the same sample, in line with Bagwell and Staiger (1998), Crivelli (2014) pointed out that this impact may be significantly stronger in countries where the initial level of external protection is relatively high. Calvo-Pardo, Freund

[3]For an overview of the theoretical literature on regionalism, see Baldwin (2009).

and Ornelas (2009) also provide evidence that preferential and multilateral liberalization are complements in developing countries. Further, combining a gravity model and VAR analysis on an extensive data set of 164 countries, Herz and Wagner (2011) show that preferential trade liberalization Granger-causes MTL. In contrast, other studies based on developed countries such as Limão (2006) and Karacaovali and Limão (2008) suggest the opposite impact, ie. a hindering effect of PTAs on MTL[4]. However, two recent papers by Ketterer, Bernhofen and Milner (2014) and Mai and Stoyanov (2015) evidence that Canadian?US free trade agreement (CUSFTA) has been one of the driving force of the Canadian multilateral tariff reductions.

FIGURE 1
Preferential Market Access and Preferences by country[5]



Note: The figure reports the bilateral preferential tariff and market access rates for goods with a positive PMA/preference margin (ie. preferential tariffs reported are lower than the MFN rates). Preferential tariff rate granted to a specific regional partner for a given product and year are represented on the horizontal axis. The corresponding tariff imposed by the partner on exports of the same product can be read on the vertical axis. The 45 degrees line is depicted in red and data are described in section 3..

Hence, most of the literature has focused on the impact of preferential trade liberalization

[4]Interesting reviews of the theoretical and empirical literature on regionalism are provided in Freund and Ornelas (2010), Maggi (2014), Ornelas (2012, III.) and World Trade Organization (2011).

[5]The evolution of the correlation between bilateral PMA and Preferential tariff rates over time is depicted in Figure B.1 in Appendix.

on the preference-giving country's tariffs whereas trade policies (preferential or not) among trading partners might be related in many ways. First, theoretically, Richardson (1995) shows that within FTAs, competition over tariff revenue can trigger a race to the bottom leading to a sharp reduction in external protection, although not necessarily leading to global free trade. Second, building on the protection for sale model by Grossman and Helpman (1994), Krishna and Mitra (2005), show that unilateral liberalization may induce tariff reductions by trading partners. More precisely, the increase in the world price resulting from a the trade liberalization in a large trading partner raises incentives of the domestic exporters to lobby against export taxes, leading therefore to a free trade equilibrium.[6]

The contribution of this paper is therefore to investigate the relationship between preferences and potential adjustments in the external protection of the preference-receiving countries. To my knowledge, among existing empirical studies, none has clearly differentiated the preferential tariff rates that are granted from those that are received, ie. preferences vs. market access conferred by the regional agreement. The reciprocity of most PTA may partly explain this gap in the literature. However, as shown in Figure 1, at the tariff-line level, preferences and market access are correlated but different. Therefore, omitting market access when assessing the impact of regional trade agreements on MTL may lead to an important bias, especially if the significant impact of preferences on MTL evidenced in the literature is mainly due to the correlation of the regressor with the tariff rate set by the regional partner. Moreover, as preferences and market access may have opposite effects on MTL, understanding the underlying mechanism and providing empirical evidence is crucial as it could help explaining the diverging findings of the literature.

The model developed in the next section shows that the impact of PTAs in low-tariff countries is mainly driven by the preferential market access conferred by the agreement and that the latter does not necessarily lead to a fall in external protection. This is consistent with the findings in the United States and the European Union whose MFN tariffs are relatively low and where empirical evidence shows that MFN tariffs do not decrease following regional agreements.

Further, the mechanism described by the model is mainly driven by tariff revenue considerations. The more valuable the tariff revenue to the government, the greater (lower) is

[6] In this framework, the government equally values contributions from both sectors. Hence, when both sectors are organized, the outcome of the game is free trade.

the multilateral tariff reduction in relatively high-tariff (low-tariff) members. As shown in Gawande, Krishna and Olarreaga (2015) the weights assigned by governments to tariff revenue vary considerably across countries. This could also help explaining the different patterns observed between and within the developed and developing countries.

The paper is organized as follows. The next section proposes a mechanism linking preferential market access to the level of external protection. A third section presents the data and empirical strategy. Section four reports the main results as well as various robustness checks and the last section concludes.

2. Market Access and External Protection

The way market access eventually impacts the level of external protection may not appear straightforward as its direct effect is to promote exports and not imports. This section proposes a transmission channel whereby the preferential market access may affect the tariff imposed on imports from non-members of the agreement. We consider two small open economies, H and L, the rest of the world (RoW) and two goods. Each country produces and imports some homogeneous good x_1 from RoW while the second good x_2 is exported to RoW. We assume no transport costs or other kind of non-tariff measures. In the importing sector, each country sets an external tariff t_j ($j = H, L$) that maximises the government's objective function $G_j(t_j)$, defined as the following weighted sum:

$$G_j(t_j) = W_j(\mathbf{p_j}, \mathbf{v_j}) + \alpha_j \Pi_j(\mathbf{p_j}, \mathbf{w_j}) + \gamma_j t_j M_j(p_j) \tag{1}$$

where $\mathbf{p_j}$, $\mathbf{v_j}$ and $\mathbf{w_j}$ represent respectively the vectors of domestic consumption prices, factor endowments and factor prices. The first term $W_j()$ is the national welfare defined as the sum of consumers' surplus, producers' surplus and tariff revenue. α_j and γ_j are additional weights assigned respectively to producers' surplus Π and to tariff revenues, $t_j M_j$, where $M_j()$ denotes the import demand of good x_1. We assume perfect transmission of the tariff to the domestic price of the imported good. The latter is defined as $p_j = 1 + t_j$, where the world price p^* has been normalized to one. We assume $t_H > t_L$ which implies that domestic prices are higher in country H than in L ($p_H > p_L$). Thus, the *high-tariff country* refers to H whereas L is the *low-tariff country*.

In what follows, I first describe the initial and symmetric partial equilibrium based on the optimal tariff theory. Thereafter, I show how this optimal external tariff is affected when a

PTA between the high- and the low-tariff country enters into force.

2.1. Politically Optimal tariff before the PTA

The politically optimal tariff is defined such as to maximize the government's objective function (1). The first order condition (FOC) is given by[7] :

$$\frac{dG(t)}{dt} = \frac{dW(\mathbf{p},\mathbf{v})}{dt} + \alpha\frac{d\Pi(\mathbf{p},\mathbf{w})}{dt} + \gamma\left(M(p) + t\frac{dM(p)}{dt}\right) = 0 \tag{2}$$

To develop the first part of (2), we assume quasi-linear preferences, implying that the marginal utility of income is equal to unity and that $dW() = dU()$, where $U()$ is the social indirect utility function. This allows to use the dual approach equalizing total expenditures $e(\mathbf{p},U)$ to total revenues as follows:

$$e(\mathbf{p},U) = r(\mathbf{p},\mathbf{v}) + t\cdot M(p) \tag{3}$$

where $r()$ stands for the revenue function. Totally differentiating both sides with respect to t, assuming inelastic factor endowments, applying Shephard's lemma and rearranging yields:

$$C(p) + \frac{dU}{dt} = Y(p) + M(p) + tM'(p) \quad \Leftrightarrow \quad \frac{dU}{dt} = tM'(p) \tag{4}$$

where $F'(x) = \frac{\partial F(x,y)}{\partial x}$, and $C(p)$ and $(Y(p))$ stand respectively for the domestic demand and supply functions. Equation (4) can then be substituted into (2). Applying Hotelling's lemma $\left(\frac{\partial\Pi(\mathbf{p},\mathbf{v})}{\partial p} = Y(p)\right)$, assuming an exogenous wage rate and rearranging, equation (2) simplifies to:

$$\frac{dG}{dt} = (1+\gamma)tM'(p) + \alpha Y(p) + \gamma M(p) = 0 \tag{5}$$

Solving for t, the optimal tariff divided by the domestic price is:

$$\frac{t^*}{1+t^*} = \frac{\alpha Y(p)/M(p) + \gamma}{1+\gamma}\cdot\frac{1}{|\varepsilon^M|} \tag{6}$$

where $|\varepsilon^M|$ is the country j's price elasticity of import demand in absolute value. With $\gamma = \alpha = 0$, free trade is optimal. Therefore, additional weights on producers' surplus or tariff revenue in the government's objective function constitute a necessary condition to guarantee a non-zero tariff equilibrium.

[7] As the equilibrium is symmetric, for readability reasons, the j indices are not displayed in this subsection.

2.2. Politically Optimal Tariff under the PTA

Let a PTA under which the high-tariff country H imposes a preferential tariff rate on imports from L of good x_1, t_H^p, such that $t_H - t_H^p > t_L$ implying $p_L^p = p_H - t_H^p > p_L^c$. Without loss of generality, we consider a unilateral preference granted from H to L. The latter generates a gap between p_L^c and p_L^p, standing respectively for the consumers' and producers' prices, leading to the mechanism described in Richardson (1995)[8] according to which producers within the PTA arbitrage between the prices received in the two markets. This generates a rise in the exports from country L to H as the production of country L can now entirely be sold in the high tariff country at price $p_L^p > p_L^c$. Following the terminology defined by Grossman and Helpman (1995), we focus on the *enhanced protection* case in which the export supply of country L is not sufficient to satisfy the total import demand of country H at the initial price level. This insures that p_H is not directly affected by the surge in export supply from L and will not fall under $1 + t_H$.

The deflection of domestic sales from the low- to the high-tariff PTA member nevertheless exerts an indirect effect on prices through the subsequent variations in tariffs applied on imports from non-members. First, less tariff revenue is collected in H due to the preferential imports from L. This creates incentives for the government to reduce external protection. Second, in L, the impact is ambiguous and depends on the intensity of two competing effects. On the one hand, as sales are only made abroad, producer's profit is independent of the domestic price and external protection. On the other hand, because the domestic production is sold in the partner country, the quantity consumed in L is imported from RoW at price $p_L^c = 1 + t_L$. The former effect making the external tariff irrelevant in protecting domestic producers exerts a downward pressure on external protection whereas the latter effect does the opposite. Indeed, following the surge in imports from RoW, the additional tariff revenue triggered by a slight increase in the tariff imposed on these imports will be higher than it would be prior the agreement. As a result, the external protection in L will increase only if the government highly value tariff revenue. In this case, if the politically optimal tariff in country L remains lower than the new value of $t_H - t_H^p$, the PTA results in an equilibrium in which each country sets the external tariff at a non-zero optimal value.

[8] Richardson (1995) investigates the case of an FTA and not of a non-zero preferential tariff unilaterally granted. However, considering an FTA would not alter the current analysis. Indeed, the country granting the preference is assumed to keep a higher external tariff and therefore, a higher domestic price. Hence, even if the preferential tariff was granted bilaterally, the production of country H would never be diverted to country L.

Post-PTA politically optimal tariff in the low-tariff country L

In country L, the introduction of a PTA may trigger either downward or upward adjustments of the external protection. To see this, we start by deriving the politically optimal tariff under the PTA and compare it to equation (6). Because the production of country L is entirely diverted to country H, the producer price no longer depends on the external tariff ($p_L^{p\,\prime}(t_L) = 0$). Hence, applying the same procedure as in the previous section and assuming that t_L remains lower than $t_H - t_H^p$ ($p_L^c < p_L^p$)[9], the FOC of the government's maximization problem becomes:

$$\left.\frac{dG_L}{dt_L}\right|_{p_L^c<p_L^p} = \left.\frac{dW_L(\mathbf{p_L}, p_L^p, \mathbf{v_L})}{dt_L}\right|_{p_L^c<p_L^p} + \gamma_L \left[M_L(p_L) + t_L \frac{dM_L(p_L)}{dt_L}\right]_{p_L^c<p_L^p} = 0 \tag{7}$$

As the import demand corresponds to the consumption, by equalizing total expenditures and total revenues, the first term of (7) can be rewritten as follows:

$$\left.\frac{dU_L}{dt_L}\right|_{p_L^c<p_L^p} = t_L C'(p_L^c)\big|_{p_L^c<p_L^p} < 0 \tag{8}$$

Substituting this result into (7) and solving for the politically optimal tariff yields:

$$t_L^* = \frac{\gamma_L}{1+\gamma_L} C(p_L^c) \left[-C'(p_L^c)\big|_{p_L^c<p_L^p}\right]^{-1} \quad \Leftrightarrow \quad \frac{t_L^*}{1+t_L^*} = \frac{\gamma_L}{1+\gamma_L} \cdot \frac{1}{|\varepsilon_L^d|} \tag{9}$$

The optimal tariff is therefore increasing in γ and inversely related to the import demand price elasticity (here, equivalent to the price elasticity of demand). According to (6) and (9), the tariff set by country L is higher after the agreement if:

$$\frac{t_L^0}{1+t_L^0} = \frac{\alpha_L Y_L(p_L^0)/M_L(p_L^0) + \gamma_L}{1+\gamma_L} \cdot \frac{1}{|\varepsilon_L^{M0}|} \quad < \quad \frac{\gamma_L}{1+\gamma_L} \cdot \frac{1}{|\varepsilon_L^{d1}|} = \frac{t_L^1}{1+t_L^1} \tag{10}$$

where the superscripts "0" and "1" respectively denotes the pre- and post-PTA variables. Assuming isoelastic demand and supply curves[10], $|\varepsilon_L^{d1}| < |\varepsilon_L^{M0}|$. The above inequality can therefore be rewritten as follows:

$$\alpha_L \cdot \frac{|\varepsilon_L^d|}{|\varepsilon_L^d| + \eta^s} = \alpha_L \cdot \frac{|\varepsilon_L^d|}{|\varepsilon_L^M| - |\varepsilon_L^d|} \cdot \frac{Y_L(p_L^0)}{M_L(p_L^0)} \quad < \quad \gamma_L \tag{11}$$

[9] The equilibrium derived in section 2.2. and characterized by equations (9) and (13) holds assuming that the condition $p_L^c < p_L^p$ is satisfied before and after the agreement.

[10] For a given price, the import demand elasticity in absolute value is defined as: $|\varepsilon^M| = |\varepsilon^d| \cdot \frac{C(p)}{M(p)} + \eta^s \cdot \frac{Y(p)}{M^p}$, where η^s is the price elasticity of supply. As $C(p) \geq M(p)$, then $|\varepsilon^d| < |\varepsilon^M|$. Assuming an isoelastic demand curve, the inequality still holds following the post-PTA external tariff adjustments and the associated price variations.

As a result, a low price elasticity of demand combined with a high valuation of tariff revenues by the government and a high price elasticity of supply may provide incentives for high-tariff PTA members enjoying preferential market access to raise the post-PTA external tariff.

Post-PTA politically optimal tariff in the high-tariff country H

In country H, the loss in tariff revenue resulting from the preferential imports cannot be hindered by an increase in external tariff, which would not only reduce the quantity imported from RoW but also intensify the share of preferential imports. Rather, if the government cares about tariff revenue, the post-PTA external tariff will fall to dampen the welfare loss. Following the same procedure as in the previous section, we can easily show that the FOC of the government's maximization problem is:

$$\begin{aligned}\frac{dG_H}{dt_H} =&(1+\gamma_H)\, t_H M'_H(p_H)\big|_{p_L^c<p_L^p} + \alpha_H Y_H(p_H) + \gamma_H M_H(p_H) \\ &- (1+\gamma_H)\left[(t_H - t_H^p)X_L{}'(p_L^p) + X_L(p_L^p)\right]_{p_L^c<p_L^p} = 0\end{aligned} \tag{12}$$

where X_L is the export supply of country L. Solving for t_H and rearranging, the politically optimal tariff is:

$$t_H^* = \left[\frac{\alpha_H Y_H(p_H) + \gamma_H M(p_H)}{(1+\gamma_H)} - X_L(p_L^p) + t_H^p X_L{}'(p_L^p)\right] \frac{1}{X_L{}'(p_L^p) - M'_H(p_H)} \tag{13}$$

Hence, despite the fall in the external tariff, the latter remains positive for any given t_H^p if the sufficient condition $\frac{\alpha_H Y_H(p_H)+\gamma_H M(p_L^p)}{1+\gamma_H} > X_L(p_L^p)$ is satisfied.

Compared to (5), equation (12) contains an additional negative term (second line of (12)) implying that a reduction in the multilateral tariff will lead to an increase in the objective function, providing therefore incentives to the government to increase the level of external protection. As explained in Estevadeordal, Freund and Ornelas (2008), the first part of this negative term captures the cost of trade diversion, ie. the loss in tariff revenue resulting from the shift of imports from RoW to the preferential trading partner. The second part corresponds to a terms of trade loss. More formally, comparing equations (13) and (6) and rearranging, the optimal tariff is lower after the agreement if the following condition is satisfied:

$$\frac{X_L(p_L^{p1})}{-M'(p_H^1)} + \frac{X_L{}'(p_L^{p1})}{-M'(p_H^1)}\left[t_H^0 - t_H^p\right]$$
$$+ \quad t_H^0 + \frac{\alpha_H Y_H(p_H^1) + \gamma_H M(p_H^1)}{1+\gamma_H} \cdot \frac{1}{-M'(p_H^1)} \qquad > 0 \qquad (14)$$

The term in squared brackets is positive and corresponds to the initial preferential margin, ie. the difference between the external tariff before the agreement and the preferential tariff. Since $-M'(p_H^1) > 0$, all terms are positive and the politically optimal tariff maximizing the government objective function in the high-tariff country decreases following the formation of the PTA.

3. Data and Empirical Strategy

This paper exploits the panel data set of Estevadeordal, Freund and Ornelas (2008), which includes disaggregated tariff data at the ISIC four-digit level for 100 industries from 1990 to 2001 in ten Latin American countries, namely Argentina, Brazil, Chile, Colombia, Ecuador, Mexico, Peru, Paraguay, Uruguay and Venezuela. For each country, tariff reduction programs have been converted by the authors into yearly bilateral preferential tariffs[11]. The bilateral structure of the data set allows to estimate the same model as Estevadeordal, Freund and Ornelas (2008) but using market access instead of preferences. We therefore regress variations in applied most-favoured nation (MFN) tariffs[12] on lagged variations of PMA tariff interacted or not with a customs union dummy variable (CU). As in Crivelli (2014), we extend the model to control for the initial level of external protection. The binary variable D^{LOW}, used as a proxy for price differences, indicates whether the MFN tariff of the country receiving the preference is lower than the one applied by the trading partner granting it. The estimated model is the following:

$$\begin{aligned}\Delta MFN_{ijt} =& \beta_1 \cdot \Delta PMA_{ij,t-1} + \beta_2 \cdot \Delta PMA_{ij,t-1} \cdot CU_{jt-1} \\ &+ \beta_3 \cdot \Delta PMA_{ij,t-1} \cdot D^{LOW}_{ij,t-1} + \beta_4 \cdot D^{LOW}_{ij,t-1} + \gamma_{jt} + \gamma_{ij} + u_{ijt} \qquad (15)\end{aligned}$$

where MFN_{ijt} is the applied most-favoured nation tariff set by country j in industry i at time t, γ_{jt} and γ_{ij} are respectively country-year and country-industry fixed effects, and u_{ijt} stands for the error term. Unlike MFN tariffs, PMA tariffs vary by trading partner, creating a need for

[11] Descriptive statistics reported in the Appendix Table B.1. For a complete description of the data set, please refer to Estevadeordal, Freund and Ornelas (2008).

[12] Applied MFN tariffs are made available through the the World Integrated Trade Solution (WITS)

a country-specific measure of preferential market access (PMA). The latter is defined as the minimum PMA tariff rate[13] that a country receives from its partners, for a given sector and year:

$$PMA_{ijt} \equiv \min_{k}\{\tau_{ikjt}\} \qquad \text{with} \qquad \tau_{ikjt} < MFN_{ikt} \tag{16}$$

with τ_{ikjt} being the preferential tariff set by the partner country k on imports from j in sector i at time t. Accordingly, the dummy variable D^{LOW} is defined as follows:

$$D_{ijt}^{LOW} = \begin{cases} 1 & \text{if} \quad MFN_{ijt} < MFN_{ik^Rt} \\ 0 & \text{otherwise} \end{cases} \tag{17}$$

where MFN_{ik^Rt} denotes the (average) MFN tariff rate in sector i at time t of the partner country (countries), k^R, from which country j receives the lowest PMA tariff.

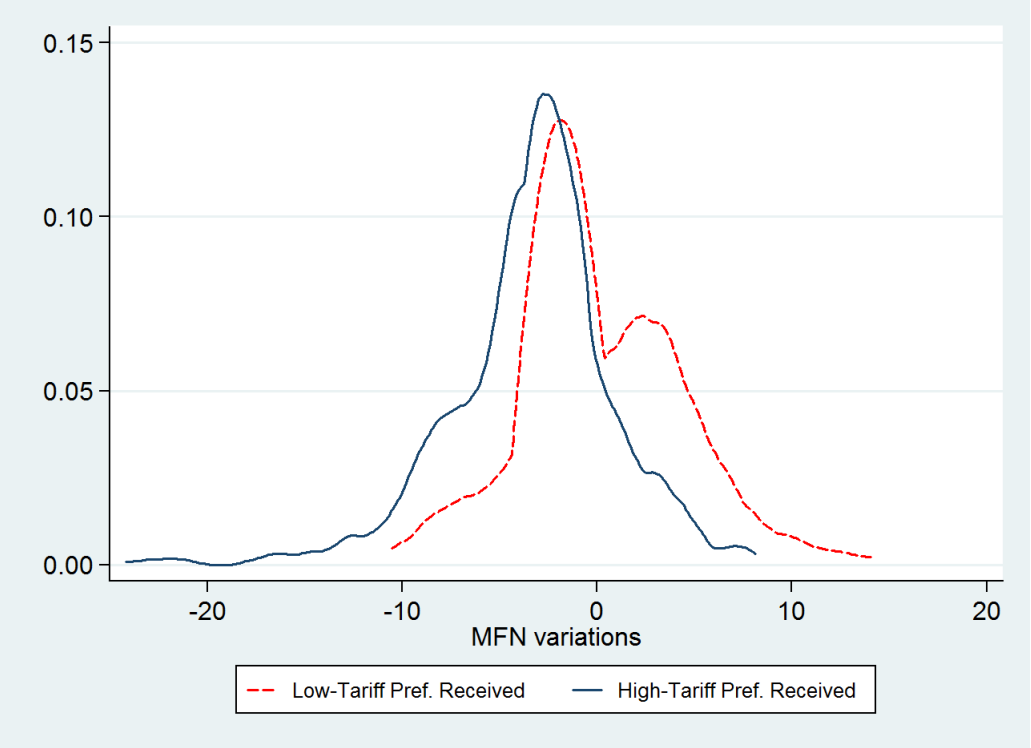
In equation (15), β_1 represents the impact of a change in PMA on the subsequent MFN variation for a country not being part of a CU and whose external tariff is higher than the one of the trading partner granting the preference. If trade deflection is the only mechanism at play, the coefficient β_1 will be insignificant. If other forces apply, in line with the empirical literature on regionalism in developing countries where preferential and multilateral trade liberalization have broadly been acknowledged to be complement, β_1 is likely to be positive.

The distribution of the kernel densities of MFN variations presented in Figure 2 is shifted to the right in low-tariff countries, indicating that these countries experienced a smaller reduction in MFN tariffs over the period 1991-1993 and 1999-2001. This would be consistent with a negative and significant β_3. However, following the theoretical model developed in the previous section, with the deflection of domestic sales, the variation in external protection in low-tariff countries is ambiguous and may be positive in countries where the government sufficiently values tariff revenue. The expected sign of β_3 is therefore ambiguous and will reflect political preferences.

To ensure that the relationship is not driven by any factor different from the preferential market access the country enjoys, country-year (γ_{jt}) and country-industry (γ_{ij}) fixed effects are included in the model. The former captures the macro-economic shocks affecting external tariffs over all industries, for example a national economic crisis or a broad trade liberalization program. The country-industry fixed effects controls for differences in the level of

[13] The minimum preferential tariff has been motivated by Estevadeordal, Freund and Ornelas (2008).

FIGURE 2
Kernel Density of MFN Tariff Changes



Note: Kernel density of MFN tariff changes for goods with a preferential market access margin greater than 2.5 percentage points. The tariff changes are from MFN average tariff in 1991-1993 to the MFN average tariff in 1999-2001.

trade openness across sectors that can be explained by economic, political or historical factors not related to preferential market access. Besides, u_{ijt}, the robust standard errors clustered at the country-industry level, allow for correlation across observations from the same country and sector.

The customs union dummy variable (CU_{jt}) is used as an additional control variable and equals one for Mercosur and CAN members from 1995 onward and zero otherwise. A systematically different impact of regionalism on external protection within customs unions is consistent with the trade deflection channel. Indeed, when the level of external protection reflects domestic prices, the mechanism should not be observed in a customs union as members set their trade policy jointly. Therefore, the total impact of preferential market access within CU ($\beta_1 + \beta 2$) is expected to be insignificant. Indeed, in this framework, if any effect is observed in CUs, then it will reflect the lack of a common external tariff. As MFN tariffs are supposed to be harmonized over CU members, no interaction term between the CU and MFN dummies has been included. The variable CU alone has been dropped because of its

perfect multicollinearity with γ_{jt}.

As the main contribution of this paper is to assess the impact of preferential market access instead of preferences, it is crucial to ensure that the two variables capture different factors. For this reason, equation (15) has been estimated including preferences as additional control:

$$\begin{aligned}\Delta MFN_{ijt} = \quad & \beta_1 \cdot \Delta PMA_{ij,t-1} + \beta_2 \cdot \Delta PMA_{ij,t-1} \cdot CU_{jt-1} \\ + \quad & \beta_3 \cdot \Delta PMA_{ij,t-1} \cdot D^{LOW}_{ij,t-1} + \beta_4 \cdot D^{LOW}_{ij,t-1} \\ + \quad & \beta_5 \Delta PREF_{ij,t-1} + \beta_6 \cdot \Delta PREF_{ijt-1} \cdot CU_{j,t-1} \\ + \quad & \gamma_{jt} + \gamma_{ij} + u_{ijt} \end{aligned} \tag{18}$$

where the country-specific measures of preferential trade liberalization ($PREF$) is defined as the minimum preferential tariff rates that a country grants to its partners, for a given sector and year:

$$PREF_{ijt} \equiv \min_{k}\{\tau_{ijkt}\} \qquad \text{with} \qquad \tau_{ijkt} < MFN_{ijt} \tag{19}$$

with τ_{ijkt} being the preferential tariff set by country j on imports from k in sector i at time t.

In an attempt to address the potential endogenity issue, additionally to the use of lagged regressors, equations (15) and (18) have been estimated not only with ordinary least squares (OLS) but also using instrumental variables (IV). For each country j, PMA_{ijt} is instrumented with $PMA_{ikt} \equiv \min_{m}\{\tau_{im_{\neq j}kt}\}$ namely the minimum PMA tariff received by the two main preferential trading partners of country j ($k = 1, 2$) from any other country m excluding j [$m \neq j$]. A similar approach applies to $PREF_{ijt}$ instrumented with $PREF_{ikt} \equiv \min_{m}\{\tau_{ikm_{\neq jt}}\}$, the minimum preference tariff granted by the two main preferential trading partners of country j ($k = 1, 2$)[14] to any other country m excluding j [$m \neq j$]. Thus, similarly to Estevadeordal, Freund and Ornelas (2008), we take advantage of the richness of the bilateral data set. Due to reciprocity in PTAs (see Freund (2003)), the preferential market access (preference) tariff received (granted) by country j from (to) its partners is likely to be related to those received (granted) by the trading partners from (to) other countries. However, to satisfy the exogeneity condition, the instrument of PMA ($PREF$) has to exclude the preference (PMA) tariff granted (received) by country j to (from) the partner country k [$m \neq j$], which is directly linked to its MFN tariff. Furthermore, the methodology is valid if the PMA (preference) tariff received (granted) by country j's trading partners k from (to) a third country m in a given year is not affected by the same factors than those driving country j's own MFN tariffs in the sub-

[14] The main preferential trading partners for PMA and preferences are defined as those receiving from (granting to) country j the lowest average PMA (preferential tariff) rate over the whole time and industry sample.

sequent year. An illustration of the instrumenting strategy is provided in Appendix B2..

While the instrumentation of PMA and $PREF$ follows Estevadeordal, Freund and Ornelas (2008), the one of D^{LOW} is more challenging as it requires to provide an instrument that would be correlated with the MFN tariff difference between country j and its trading partner but independent of the subsequent change in the MFN tariff of j. For this reason, I first estimate equations (15) and (18) instrumenting only the regressor PMA but considering the LOW dummy as exogenous. I then resort to using as an instrument the value of the dummy variable at the first period of the sample, assuming that it is unlikely to be correlated with the error term in equations (15) and (18) in later periods. This instrument is nevertheless partner-varying. Therefore, some variability over time is still observed due to the changes in trading partners from (to) which the lowest preferential tariff rate is received (granted). Further, the validity of the instruments is tested using both, over- and under- identification tests, and first stage regression statistics are reported in Appendix.

4. Results

4.1. Baseline Results

Preferential Market Access

Estimations results are reported in Table 1. The first two columns reproduce Estevadeordal, Freund and Ornelas (2008) methodology but using preferential market access (PMA) instead of preferences granted to the partner country. In column (1), the coefficient on the lagged change in PMA is positive and statistically significant indicating that enhanced market access tend to lead to a fall in MFN tariff. The negative and significant coefficient on the interaction term with the CU dummy indicates that this result does not hold for CU. In the IV specification of column (2), the impact is significant only within CU. However, as argued in the previous section, one cannot expect an homogeneous impact of market access on MFN tariffs over relatively high- and low-tariff PTA members. The last three columns of Table 1 allow for such an heterogeneity. Coefficients are statistically significant in all of them, positive on the lagged change in PMA and negative on the interaction term with the LOW dummy. This indicates that following reductions in PMA tariff, the MFN tariff tends to decrease less sharply in low-tariff PTA members, which is consistent with the trade deflection mechanism when these countries care about tariff revenues. Because the coefficients in high- and low-tariff countries have opposite signs, the absence of significance observed in the aggregate result of column

(2) is not surprising. Thus, controlling for the initial level of external protection is essential, and even more crucial in the case of market access for which two opposite forces are involved.

Column (3) and (4) show that the impact of preferential market access on the subsequent level of MFN tariff reductions is insignificant within customs unions. As for specification (5), the test CU *P*-values only provides weak evidence against the null hypothesis H_0: $\beta_1 + \beta_2 = 0$. Hence the latter cannot be rejected neither.

TABLE 1
Relationship between MFN Tariff Changes (ΔMFN_t) and Lagged Preferential Tariff Changes: Preferential Market Access

	(1) OLS	(2) IV	(3) OLS	(4) IV PMA	(5) IV
ΔPMA_{t-1}	0.135***	0.120	0.191***	0.266***	0.569***
	(6.22)	(1.50)	(7.96)	(3.08)	(4.23)
$(\Delta PMA \cdot CU)_{t-1}$	-0.204***	-0.282***	-0.169***	-0.298***	-0.412***
	(-5.26)	(-3.02)	(-4.38)	(-3.44)	(-4.13)
$(\Delta PMA \cdot D^{LOW})_{t-1}$			-0.195***	-0.295***	-0.951***
			(-6.34)	(-6.23)	(-5.80)
D^{LOW}_{t-1}			0.665***	0.507***	-1.223***
			(6.80)	(4.90)	(-2.73)
Observations	10016	10010	10003	9997	9997
Adjusted R^2	0.641	0.600	0.649	0.608	0.546
N clusters	1001	997	999	995	995
Hansen J *P-value*		0.698		0.977	0.883
Kleibergen-Paap LM *P-value*		0.000		0.000	0.000
Kleibergen-Paap Wald F statistic		47.533		34.793	11.549
Test LOW^R *P-value*			0.907	0.660	0.000
Test CU^R *P-value*	0.024	0.006	0.504	0.591	0.086

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Robust $t(z)$ statistics in parenthesis adjusted for clustering at the country industry level. Country-year and country-industry fixed effects are included in all regressions. In (2), (4) and (5), PMA is instrumented by the minimum preferential tariff rate that the two main preferential trading partners receive from other countries excluding j. In (4), D^{LOW} is considered as exogenous while in (5), it is instrumented by its value at the first period of the sample. The interaction term is instrumented with the product of the two individual instruments. The Test CU^R *P-value* (resp. LOW^R *P-value*) reports the *p*-value of testing the significance of the estimated effect within custom unions (resp. low-tariff countries), ie. $H_0 : \beta_1 + \beta_2 = 0$ ($H_0 : \beta_1 + \beta_3 = 0$).

In (2), (4) and (5), ΔPMA_{t-1} is instrumented by the changes in preferential tariff that the two main partner countries receive from a third preferential trading partner. In column (4), D^{LOW} is considered as exogenous whereas in (5), it is instrumented by its value at the first period of the sample. The interaction term is instrumented with the product of the two in-

dividual instruments. For each IV specification, the Hansen J p-values do not reject the null hypothesis under which the over-identification restrictions are valid. In addition, the validity of the instruments is supported by the rejection of the null hypothesis of the Kleibergen-Paap LM test, which indicates that the model is not underidentified. We furthermore perform the Kleibergen-Paap Wald test for weak instruments in the presence of robust clustered standard errors. The F-statistics of columns (2) and (4) indicate with 95 percent of confidence that the bias of the IV estimator relative to the OLS bias is less than 5 percent. As Stock and Yogo (2005) do not provide critical values for more than three endogenous variables, the last specification could not be formally tested. Thus, as additional evidence that the instruments are not weak, the first-stage regressions' F-statistics and partial R^2 have been reported in the first part of Appendix Table B.2. As the instrumentation of the LOW dummy significantly alters the magnitude of the coefficients, the endogeneity of the variable seems to be an issue. Thus, our preferred specification is the one reported in column (5).

Summing up the first and third coefficients of (5) provides evidence that a one percentage point decrease in the PMA tariff triggers a subsequent 0.38 percentage point increase in MFN tariffs in low-tariff countries. As the P-value of the LOW test clearly rejects the null hypothesis H_0: $\beta_1 + \beta_3 = 0$, this negative relationship is statistically significant. On the other hand, in high-tariff countries, the impact is positive and significant. As compared to Crivelli (2014), who finds that a one percentage point decrease in the preferential tariff granted implies a 0.18 percentage point decrease in the subsequent MFN tariff rate of high-tariff countries, the impact of market access, a 0.57 percentage point decrease, turns out to be three times higher. This strongly supports the idea that market access matters for MTL at least as much as preferences do.

Market Access vs. Preferences

In an attempt to disentangle the impact of preferential market access from preferences granted, we include both of them in the model. Results are reported in Table 2. In column (1) and (2), the coefficients on preferential market access remain significant despite the inclusion of preferences and the absence of control for the level of initial protection. Furthermore, in the IV specification, preferences are not significant.

Disentangling between high- and low-tariff countries, the last three columns display the results of estimating equation (18). Coefficients are still positive on the lagged change in preferential market access, and negative and highly significant on the interaction term with the

TABLE 2
Relationship between MFN Tariff Changes (ΔMFN_t) and Lagged Preferential Tariff Changes: Preferential Market Access and Preferences

	(1) OLS	(2) IV	(3) OLS	(4) IV PMA	(5) IV
Preferential Market Access					
ΔPMA_{t-1}	0.122***	0.144**	0.178***	0.267***	0.513***
	(5.58)	(2.14)	(7.45)	(3.57)	(4.07)
$(\Delta PMA \cdot CU)_{t-1}$	-0.141***	-0.428***	-0.108***	-0.451***	-0.534***
	(-3.49)	(-4.55)	(-2.68)	(-4.87)	(-4.65)
$(\Delta PMA \cdot D^{LOW})_{t-1}$			-0.190***	-0.285***	-0.884***
			(-6.06)	(-6.20)	(-5.30)
D^{LOW}_{t-1}			0.655***	0.524***	-1.105**
			(6.85)	(5.07)	(-2.49)
Preferences					
$\Delta PREF_{t-1}$	0.097***	0.072	0.092***	0.046	0.0293
	(3.86)	(1.61)	(3.73)	(1.01)	(0.55)
$(\Delta PREF \cdot CU)_{t-1}$	-0.172***	0.101	-0.167***	0.149	0.169
	(-4.92)	(1.05)	(-4.81)	(1.52)	(1.49)
Observations	10014	10008	10001	9995	9995
N clusters	1001	997	999	995	995
Adjusted R^2	0.645	0.600	0.653	0.606	0.554
Hansen J *P-value*		0.159		0.657	0.779
Kleibergen-Paap LM *P-value*		0.000		0.000	0.000
Kleibergen-Paap Wald F statistic		13.105		11.308	6.575
Test LOW *P-value*			0.684	0.775	0.000
Test CU *P-value*	0.562	0.000	0.048	0.007	0.837

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Robust $t(z)$ statistics in parenthesis adjusted for clustering at the country industry level. Country-year and country-industry fixed effects are included in all regressions. In (2), (4) and (5), PMA (resp. $PREF$) is instrumented by the minimum preferential tariff rate that the two main preferential trading partners receive from (resp. grant to) other countries excluding j. In (4), D^{LOW} is considered as exogenous while in (5), it is instrumented by its value at the first period of the sample. The interaction term is instrumented with the product of the two individual instruments. The Test CU (resp. LOW) *p*-value reports the *p*-value of testing the significance of the estimated effect within custom unions (resp. low-tariff countries), ie. $H_0 : \beta_1 + \beta_2 = 0$ ($H_0 : \beta_1 + \beta_3 = 0$).

LOW dummy while in both IV specifications (4) and (5), preferences are insignificant. This emphasizes the crucial role played by preferential market access in the determination of MTL.

In (2), (4) and (5), ΔPMA_{t-1} is instrumented in the same way as previously described. Similarly, $\Delta PREF_{t-1}$ is instrumented by the changes in preferential tariffs that the two main partner countries grant to a third preferential trading partner. In column (4), the LOW dummy is considered as exogenous whereas in (5), it is instrumented by its value at the first period of the sample. For each IV specification the validity of the instruments is supported by the *p*-values of the Hansen *J* and the Kleibergen-Paap *LM* tests. As Kleibergen-Paap Wald test critical values are not provided, first-stage regression statistics are reported in the second part of Appendix Table B.2.

Results suggest a differential impact in high- and low-tariff countries. On the one hand, when the level of initial protection is relatively high, PMA tariffs and multilateral tariffs move together. More precisely, specification (5) points out that a reduction in PMA tariff by 1 percentage point triggers a 0.51 percentage points decrease in MFN tariff. On the other hand, the sum of the first and third coefficient shows that a one percentage point decrease in the PMA tariff triggers a subsequent 0.37 percentage point increase in the MFN tariff in low-tariff countries. As evidenced by the LOW *P*-value, the negative relationship is significant at the 1 percent significance level. Except in columns (2), (4) and (5) for preferences, the interaction term with the customs union dummy variable is significant, indicating that different forces apply in these countries where the overall impact of preferential market access may be evaluated using the *P*-value displayed at the end of the table (test CU).

4.2. Identification of the Underlying Mechanism: Valuation of Tariff Revenues

As predicted by the model developed in section 2., Tables 1 and 2 have shown that preferential market are a relevant determinant of multilateral trade liberalization and evidence a heterogeneous impact in high and low tariff members. Furthermore previous findings show that MFN tariffs tend to increase in relatively-low tariff countries enjoying preferential market access. Following the theoretical predictions, the impact of preferential market access on external protection is ambiguous and this rise in MFN tariffs should only be observed if the valuation of tariff revenue (γ) by the government is sufficiently high (equation (11)). In this section, I show that this is indeed the case. To do so, I use the weights computed by Gawande,

Krishna and Olarreaga (2015)[15] to divide my dataset into two sub-samples of countries with weights higher or equal (Argentina, Brazil, Mexico, Peru,Venezuela) and lower (Chile, Colombia, Ecuador, Uruguay) than the median valuation of tariff revenue[16]. These values capture the relative difference between the weights assigned to tariff revenues and consumers' surplus. Hence, they constitute a good proxy for the γ parameter defined in the model as the latter does not represent the total weight on tariff revenue but only the additional weight relative to the one on global welfare (W).

Estimating equation (15) on the two sub-samples separately , Table 3 confirms that MFN tariffs increase subsequently to a reduction in the PMA tariff exclusively in low-tariff countries highly valuing tariff revenue. Indeed, in PANEL A (high-valuation of tariff revenue), the β_3 is negative and significant in all specifications and the total effect ($\beta_1 + \beta_3$) is either not significantly different from zero in (1), (3) and (4) or negative at the ten percent significance level in (2) and at one percent in (5) and (6). In contrast, comparing to PANEL B in the bottom part of Table 3, the β_3 loses its significance in specifications (4) and (5) and the total impact in low-tariff countries is either significantly positive implying MFN tariff reductions, as reported by the Test $LOW\ P\text{-}value$ of columns (1), (2) and (4), or insignificant in the IV specification. Finally, in column (3), the negative and significant β_1 most likely captures the impact of preferences.

Hence, results strongly support the idea that trade deflection associated with a surge in imports in low tariff countries receiving preferences is a mechanism at play. IV results should nevertheless be interpreted with caution as some over-identification tests fails to prove the validity of the instruments. This is the case in PANEL B when controlling for preferences and in columns (4) and (5) of the subsample of countries highly valuing tariff revenues.

[15] Gawande, Krishna and Olarreaga (2015) generalize the protection for sale model of Grossman and Helpman (1994) by allowing for different weights placed by the government on tariff revenues, consumer welfare and producer profits. Exploiting cross-sectional variation in tariff data across 28 3-digit ISIC industries over the 1988-2000 period, in forty countries (high-, upper-middle, middle and lower-middle, and low-income countries), the author compute those weights by estimating their model linearly in the import penetration ratio ($\frac{1}{z}$) and recovering the a parameter by linearizing around the z coefficient.

[16] The values of those weights are reported in Appendix Table B.6. No data is available for Paraguay.

TABLE 3
Relationship between MFN Tariff Changes and Variations in Lagged Preferential Market Access in Countries with High and Low Valuation of Tariff Revenue

	(1) OLS	(2) OLS	(3) IV PMA	(4) IV PMA	(5) IV	(6) IV
PANEL A: High Valuation of Tariff Revenue						
ΔPMA_{t-1}	0.074	0.032	0.332***	0.230**	0.531***	0.380***
	(1.54)	(0.77)	(2.83)	(2.48)	(2.92)	(2.60)
$(\Delta PMA \cdot CU)_{t-1}$	-0.101*	0.004	-0.316**	-0.346**	-0.395***	-0.350**
	(-1.68)	(0.07)	(-2.43)	(-2.52)	(-2.65)	(-2.44)
$(\Delta PMA \cdot D^{LOW})_{t-1}$	-0.133***	-0.095**	-0.365***	-0.263***	-0.982***	-0.691***
	(-2.62)	(-2.05)	(-4.20)	(-3.51)	(-3.57)	(-3.06)
D^{LOW}_{t-1}	0.981***	0.961***	0.683***	0.784***	-1.113*	-0.927*
	(5.93)	(6.29)	(4.10)	(4.73)	(-1.92)	(-1.78)
Preferences	NO	YES	NO	YES	NO	YES
Observations	4758	4756	4756	4754	4756	4754
N clusters	496	496	494	494	494	494
Adjusted R^2	0.531	0.559	0.467	0.497	0.406	0.463
Hansen J *P-value*			0.100	0.036	0.028	0.082
Kleibergen-Paap LM *P-value*			0.000	0.000	0.000	0.000
Kleibergen-Paap Wald F statistic			41.384	5.172	8.798	4.328
Test LOW *P-value*	0.109	0.058	0.646	0.598	0.002	0.009
Test CU *P-value*	0.586	0.529	0.867	0.361	0.272	0.854
PANEL B: Low Valuation of Tariff Revenue						
ΔPMA_{t-1}	0.226***	0.236***	-0.402***	0.391***	-0.602**	0.585***
	(10.13)	(9.54)	(-2.67)	(3.94)	(-2.29)	(3.84)
$(\Delta PMA \cdot CU)_{t-1}$	-0.223***	-0.191***	0.130	-0.614***	-0.049	-0.674***
	(-4.34)	(-3.25)	(0.99)	(-4.96)	(-0.26)	(-4.32)
$(\Delta PMA \cdot D^{LOW})_{t-1}$	-0.105***	-0.110***	0.127***	0.041	0.516	-0.685***
	(-3.26)	(-3.71)	(2.61)	(1.00)	(1.52)	(-3.11)
D^{LOW}_{t-1}	0.201*	0.191*	0.559***	0.305**	-4.153***	-1.592*
	(1.84)	(1.72)	(3.68)	(2.32)	(-2.90)	(-1.77)
Preferences	NO	YES	NO	YES	NO	YES
Observations	4212	4212	4209	4209	4209	4209
N clusters	403	403	402	402	402	402
Adjusted R^2	0.763	0.765	0.670	0.728	0.492	0.694
Hansen J *P-value*			0.148	0.004	0.385	0.006
Kleibergen-Paap LM *P-value*			0.000	0.000	0.011	0.000
Kleibergen-Paap Wald F statistic			8.728	3.829	1.934	2.678
Test LOW *P-value*	0.000	0.000	0.020	0.000	0.709	0.543
Test CU *P-value*	0.951	0.387	0.000	0.003	0.003	0.512

$^{*}\ p < 0.10$, $^{**}\ p < 0.05$, $^{***}\ p < 0.01$. Robust $t(z)$ statistics in parenthesis adjusted for clustering at the country industry level. Country-year and country-industry fixed effects are included in all regressions. The Test CU *P-value* (resp. LOW *P-value*) reports the *p*-value of testing the significance of the estimated effect within custom unions (resp. low-tariff countries), ie. $H_0 : \beta_1 + \beta_2 = 0$ ($H_0 : \beta_1 + \beta_3 = 0$).

4.3. Sensitivity

Industry-Year Fixed Effects

Apart from the declining preferential tariffs, the macro-economic shocks affecting external tariffs over all industries and the different levels of trade openness across sectors are assumed to be the major causes of external tariff variations. As in Estevadeordal, Freund and Ornelas (2008), the latter are captured respectively by the country-year and country-industry fixed effects. However, the relationship between preferential and multilateral trade liberalization could also potentially be driven by other macro-economic factors varying at the industry-year level, such as international sectoral agreements, harmonization of standards, sectoral recession or changes in world prices.

Because the number of (excluded and included) instruments would exceed the number of clusters, a model including industry-time varying dummy variables cannot properly be estimated[17]. Indeed, the covariance matrix of moment conditions would be rank deficient (see Baum, Schaffer and Stillman (2003, 2007)). Therefore, to control for the industry-year fixed effects, we apply the following *within transformation* to all variables x individually[18]:

$$\begin{aligned}\widetilde{x_{ijt}} =& x_{ijt} - x_{i..} - x_{.j.} - x_{..j} \\ &+ x_{i.} + x_{i.j} + x_{.jt} - x_{...}\end{aligned} \tag{20}$$

where x includes all the variables of the econometric model,ΔMFN, ΔPMA, CU, D^{LOW} and their interactions. As this transformation eliminates the full array of fixed effects, the estimated equation simplifies to :

$$\widetilde{\Delta MFN_{ijt}} = \beta_1 \cdot \widetilde{X} + \widetilde{u_{ijt}} \tag{21}$$

where $\widetilde{X}$ is the matrix of transformed explanatory variables.

Results reported in Tables 4 demonstrate that the previous findings do not suffer from a bias due to the omission of the country-industry fixed effect. All coefficients of interest are significant and keep the same sign as in Table 2. Differentiating high- and low-tariff coun-

[17] It is nevertheless possible to estimate the model by partialling-out all the exogenous fixed effects dummy variables so that the covariance matrix of moment conditions is of full rank (See Baum, Schaffer and Stillman (2007)). In this case, the values of the dummies are not calculated. The results for this estimation method are not reported since they are of a similar magnitude and significance than those obtained by the demeaning technique.

[18] The *within transformation* also applies to all instrumental variables.

TABLE 4
Relationship between MFN Tariff Changes ($\Delta\widetilde{MFN}_t$) and Lagged Preferential Tariff Changes: Preferential Market Access and Preferences

	(1) OLS	(2) IV	(3) OLS	(4) IV $\widetilde{PMA}$	(5) IV
Preferential Market Access					
$\Delta\widetilde{PMA}_{t-1}$	0.098***	0.517***	0.158***	0.615***	0.740***
	(4.85)	(3.37)	(7.09)	(4.17)	(4.62)
$(\Delta\widetilde{PMA \cdot CU})_{t-1}$	-0.064	-0.404***	-0.054	-0.441***	-0.513***
	(-1.62)	(-3.23)	(-1.36)	(-3.74)	(-3.93)
$(\Delta\widetilde{PMA \cdot D^{LOW}})_{t-1}$			-0.187***	-0.329***	-0.955***
			(-6.44)	(-7.17)	(-6.69)
$\widetilde{D^{LOW}_{t-1}}$			0.573***	0.399***	-1.240**
			(5.96)	(3.77)	(-2.51)
Preferences					
$\Delta\widetilde{PREF}_{t-1}$	0.087***	0.177	0.085***	0.182*	0.120
	(3.43)	(1.54)	(3.45)	(1.70)	(1.16)
$(\Delta\widetilde{PREF \cdot CU})_{t-1}$	-0.162***	-0.009	-0.169***	-0.015	-0.019
	(-4.57)	(-0.07)	(-4.81)	(-0.11)	(-0.14)
Observations	10014	10012	10001	9999	9999
N clusters	1001	1001	999	999	999
Adjusted R^2	0.011	-0.075	0.032	-0.058	-0.190
Hansen J *P-value*		0.145		0.413	0.333
Kleibergen-Paap LM *P-value*		0.000		0.000	0.000
Kleibergen-Paap Wald F statistic		3.249		2.749	3.410
Test LOW *P-value*			0.300	0.045	0.169
Test CU *P-value*	0.292	0.263	0.003	0.077	0.049

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Robust $t(z)$ statistics in parenthesis adjusted for clustering at the country industry level. Within transformation applied to all variables to control for fixed effects in all regressions. In (2), (4) and (5), $\widetilde{PMA}$ (resp. $\widetilde{PREF}$) is instrumented by the minimum PMA rate that the two main preferential trading partners receive from (resp. grant to) other countries excluding j. In (4), $\widetilde{D^{LOW}}$ is considered as exogenous while in (5) the dummy variable is instrumented by its value at the first period of the sample. The interaction term is instrumented with the product of the two individual instruments. The Test CU *P-value* (resp. LOW *P-value*) reports the *p*-value of testing the significance of the estimated effect within custom unions (resp. low-tariff countries), ie. $H_0 : \beta_1 + \beta_2 = 0$ ($H_0 : \beta_1 + \beta_3 = 0$).

tries, the negative and significant β_3 coefficients over all estimation methods still indicate that impact of preferential market access is heterogeneous in high- and low-tariff countries – MFN tariffs decreases less sharply in countries where the level of external protection is initially low. More precisely, using specification (5), for a given one percentage point decrease in the PMA tariff, the magnitude of reduction in the subsequent MFN tariff is about 0.74 percentage points in high-tariff countries whereas it is insignificant in low-tariff countries.

Regarding the IV procedure, although both, the Kleibergen-Paap *LM* and Hansen *J* tests confirm the validity of the instruments over all specifications, the low value of the *F-statistics* requires to interpret results with caution.[19]

Market access and Preference Margins

The PMA tariff is not sufficient to measure the relative advantage in terms of market that a country gains by enforcing a PTA. The magnitude of the preferential treatment is directly related to the MFN applied by the partner country on imports from non-member of the trade bloc. Hence, if the PMA and MFN tariffs of the trading partner are reduced by a same amount, a subsequent reduction in the level of external protection will not be due to any improvement in the preferential treatment as the preferential market access margin, i.e. the difference between the MFN and the PMA tariff remains constant. To capture the importance of preferential market access, equations (15) and (18) are estimated replacing the PMA (preference) tariff rates with the maximum PMA (preference) margins, respectively $PMA\ Margin_{ijt} = \max_k\{MFN_{ikt} - \tau_{ikjt}\}$ and $PREFMargin_{ijt} = MFN_{ijt} - PREF_{ijt}$.

As compared to Table 2, the change in signs of coefficients reported in Table 5 is due to the fact that the lower the preferential tariff, the higher the preference margin.

As the Kleibergen-Paap *LM* test of specification (5) shed doubts on the relevance of excluded instruments, we rely more on specification (4) in which the under-identification restrictions are valid at 1% significance level and the Hansen J test p-value lies between 5% and 10%.[20]. The positive and significant β_3 coefficient tends to confirm that the positive relationship between preferential and multilateral trade liberalization is significantly reduced in low-tariff countries. In high-tariff countries, an increase in the PMA margin received implies a reduction in the external tariff whereas it has no significant impact in low-tariff countries.

Nonetheless, in contrast to previous results, both PMA and preference margins matter.

[19] The quality of instruments can be evaluated by the first stage statistics displayed in Appendix Table B.3.
[20] The first-stage regressions' F-statistics and partial R^2 are reported in Appendix Table B.4.

TABLE 5
Relationship between MFN Tariff Changes (ΔMFN_t) and Lagged Changes in Preferential Market Access and Preference Margins

	(1) OLS	(2) IV	(3) OLS	(4) IV PMA	(5) IV
Preferential Market Access Margin					
$\Delta PMA\ Margin_{t-1}$	-0.001	-0.016	-0.116***	-0.153***	-0.518
	(-0.05)	(-0.49)	(-4.08)	(-2.99)	(-1.53)
$(\Delta PMA\ Margin \cdot CU)_{t-1}$	0.026	0.024	0.032	0.019	0.112
	(1.11)	(0.51)	(1.29)	(0.44)	(1.62)
$(\Delta PMA\ Margin \cdot D^{LOWmarg})_{t-1}$			0.111***	0.147***	0.485
			(4.47)	(4.59)	(1.54)
$D_{t-1}^{LOWmarg}$			1.197***	0.940***	-0.420
			(11.41)	(10.27)	(-0.25)
Preference Margin					
$\Delta PREF\ Margin_{t-1}$	-0.297***	-0.121	-0.268***	-0.261***	-0.089
	(-13.27)	(-1.31)	(-12.87)	(-3.20)	(-0.61)
$(\Delta PREF\ Margin \cdot CU)_{t-1}$	0.206***	0.077	0.210***	0.272***	0.201*
	(3.57)	(0.78)	(3.42)	(3.46)	(1.95)
Observations	9918	9042	9918	9042	9042
N clusters	1001	997	1001	997	997
Adjusted R^2	0.655	0.496	0.666	0.530	0.460
Hansen J *P-value*		0.370		0.091	0.062
Kleibergen-Paap LM *P-value*		0.003		0.000	0.116
Kleibergen-Paap Wald F statistic		2.637		3.376	0.969
Test LOW_{Marg} *P-value*			0.710	0.805	0.387
Test CU *P-value*	0.174	0.818	0.009	0.012	0.168

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Robust $t(z)$ statistics in parenthesis adjusted for clustering at the country industry level. Country-year and country-industry fixed effects are included in all regressions. In (2), (4) and (5), PMA (resp. $PREF$) $Margin$ is instrumented by the maximum preference margin that the two main preferential trading partners receive from (resp. grant to) other countries excluding j. The dummy variable $D^{LOWmarg}$ is considered as exogenous in (4) and is instrumented by its value at the first period of the sample in (5). The interaction term is instrumented with the product of the two individual instruments. The Test CU *P-value* (resp. LOW_{Marg} *P-value*) reports the *p*-value of testing the significance of the estimated effect within custom unions (resp. low-tariff countries), ie. $H_0 : \beta_1 + \beta_2 = 0$ ($H_0 : \beta_1 + \beta_3 = 0$).

Within CU, preference margin has no significant impact on MTL whereas a rise in the PMA margin triggers a reduction in the external tariff of the same magnitude as the one observed in FTAs (β_2 is insignificant).

Estimates of Convergence in Tariffs

By fully exploiting the bilateral structure of the data set, it is possible to provide estimates of convergence in MFN tariffs. To do so, the dependent variable of the empirical strategy has to be redefined such as to vary across trading partners. Replacing the change in MFN tariff of country j by the change in the gap between the MFN tariffs set by the two regional partners j and k, the estimated equation becomes:

$$\begin{aligned}\Delta(MFN_{ijt} - MFN_{ikt}) =& \beta_1 \cdot \Delta\tau_{ikjt-1} + \beta_2(\Delta\tau_{ikjt-1} \cdot CU_{jt-1}) \qquad (22)\\ &+\beta_3(\Delta\tau_{ikjt-1} \cdot D^{LOW}_{ijkt-1}) + \beta_4 \cdot D^{LOW}_{ijkt-1}\\ &+\beta_5 \cdot \Delta\tau_{ijkt-1} + \beta_6(\Delta\tau^{G}_{ijkt-1} \cdot CU_{jt-1}) \qquad (23)\\ &+\gamma_{jt} + \gamma_{kt} + \gamma_{ijk} + u_{ijkt}\end{aligned}$$

where γ_{jt} and γ_{kt} are respectively reporter-year and partner-year fixed effects controlling for factors, other than the bilateral preferential tariff, that could impact the respective levels of external protection in both countries (MFN_{ijt} and MFN_{ikt}), and γ_{ijk} captures the industry-varying country-pair fixed effects. The dummy variable D^{LOW}_{ijkt} is equal to one if the MFN tariff for a given product i and year t is lower than in the partner country k, ie. if $MFN_{ijt} < MFN_{ikt}$, and zero otherwise. The error term u_{ijkt} is clustered at the country-pair industry level.

In previous section, the MFN dummies were instrumented by their values at the first period of the sample. Because the instrument was partner-varying, variability over time was still observed. As this is not the case when performing bilateral estimations, the instrumentation has been slightly modified. For a given product and year, D^{LOW} is instrumented by a binary variable equals to one if the MFN of country j is lower than the average MFN in the partner countries excluding country k from which the preferential market access is received. Formally, the instruments for D^{LOW} is:

$$IVD^{LOW}_{ijkt} = \begin{cases} 1 & \text{if} \quad MFN_{ijt} < \frac{1}{n-1}\sum_{m=1}^{n-1} MFN_{imt} \quad \text{with} \quad m \neq k \\ 0 & \text{otherwise} \end{cases} \qquad (24)$$

Estimates of the bilateral approach are reported in Table 6 and the IV first stage's F-statistics

TABLE 6
Bilateral Relationship between Changes in MFN Tariff Gap ($\Delta(MFN_{jt} - MFN_{kt})$) and Lagged Preferential Tariff Changes: Preferential Market Access and Preferences

	(1) OLS	(2) IV	(3) OLS	(4) IV τ	(5) IV
Preferential Market Access					
$\Delta\tau_{kj,t-1}$	-0.041**	-0.193	0.122***	0.587***	0.821**
	(-2.16)	(-0.57)	(8.62)	(4.96)	(2.33)
$(\Delta\tau_{kj} \cdot CU)_{t-1}$	0.132***	0.330	0.100***	-0.292	-0.598
	(5.30)	(0.94)	(4.09)	(-1.11)	(-1.36)
$(\Delta\tau_{kj} \cdot D^{LOW})_{t-1}$			-0.276***	-0.664***	-0.600***
			(-19.38)	(-18.27)	(-3.73)
D^{LOW}_{t-1}			2.374***	1.073***	7.163***
			(25.13)	(7.42)	(6.25)
Preferences					
$\Delta\tau_{jk,t-1}$	0.042**	0.203	0.022	-0.402***	-0.642*
	(2.21)	(0.60)	(1.30)	(-3.71)	(-1.87)
$(\Delta\tau_{jk} \cdot CU)_{t-1}$	-0.140***	-0.361	-0.130***	0.556**	0.900*
	(-5.48)	(-0.92)	(-5.34)	(2.12)	(1.95)
Observations	33237	23639	33237	23639	23639
N clusters	3586	2509	3586	2509	2509
Adjusted R^2	0.505	0.397	0.554	0.324	-0.079
Hansen J *P-value*		0.036		0.943	0.956
Kleibergen-Paap LM *P-value*		0.221		0.003	0.177
Kleibergen-Paap Wald F statistic		0.730		2.065	0.697
Test LOW *P-value*			0.000	0.535	0.566
Test CU *P-value*	0.000	0.444	0.000	0.184	0.383

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Robust $t(z)$ statistics in parenthesis adjusted for clustering at the country-pair industry level. Reporter-year, partner-year and country-pair-industry fixed effects are included in all regressions. In (2), (4) and (5), τ_{kj} (resp. τ_{jk}) is instrumented by the preferential tariff rate that the two other preferential trading partners of country j receive from (resp. grant to) other countries excluding j and k. The variable D^{LOW} is considered as exogenous in (4) and is instrumented by a dummy indicating if the MFN of country j is lower than the average MFN in the partner countries excluding k in (5). The interaction term is instrumented with the product of the two individual instruments. The Test CU *P-value* (resp. LOW *P-value*) reports the *p*-value of testing the significance of the estimated effect within custom unions (resp. low-tariff countries), ie. $H_0 : \beta_1 + \beta_2 = 0$ ($H_0 : \beta_1 + \beta_3 = 0$).

in Appendix Table B.5. Since the instruments of the IV specification (5) do not satisfy the over-identification restrictions, we rely more on specification (4) in which D^{LOW} is considered as exogenous but where instruments are valid according to the *p*-values of the Hansen *J* and the Kleibergen-Paap *LM* tests which do not reject the null hypothesis with 99 percent of confidence.

Results suggest that the MFN tariff gap between country j and k tends to decrease when

country j gains preferential access to the market of country k, given that the MFN tariff is initially higher in j. In contrast, the sum of β_1 and β_3 being insignificant as evidenced by the LOW test failing to reject the null hypothesis that the overall impact within low-tariff countries is zero, the MFN tariff gap is not affected when the MFN of country j is initially lower than in k. More specifically, a one percentage point decrease in the PMA tariff rate reduces the MFN gap in high-tariff countries ($MFN_j > MFN_k$) by 0.59 percentage point. On the other hand, in low-tariff countries ($MFN_j < MFN_k$), the estimated 0.077 percentage point decrease is statistically insignificant at 10%. Hence, when the MFN tariff is initially higher than in the partner country, the preferential market access lead to a reduction in the MFN tariff gap.

Finally, consistently with the harmonization of MFN tariff within customs unions, the CU P-values of columns (4) and (5) do not reject the null hypothesis that the overall impact is zero.

4.4. Alternative empirical strategy

In this section, I provide a first attempt of an alternative empirical strategy whose objective is to reflect more closely the predictions stemming from theory. The estimated equation is the following:

$$\begin{aligned}\Delta MFN_{ijt} = \quad & \beta_1 \cdot D^{PMA}_{ij,t-1} + \beta_2 \Delta PREF_{ij,t-1} + \beta_3 \cdot \Delta PREF_{ijt-1} \cdot CU_{j,t-1} \\ & + \gamma_{jt} + \gamma_{ij} + u_{ijt}\end{aligned} \tag{25}$$

where the D^{PMA} is a dummy variable taking the value of one if the preferential market access margin is sufficiently high to trigger the trade deflection mechanism presented in the model of section 2.. More precisely:

$$D^{PMA}_{ijt} = \begin{cases} 1 & \text{if} \quad \max_k \{MFN_{ikt} - \tau_{ikjt}\} > MFN_{ijt} \\ 0 & \text{otherwise} \end{cases} \tag{26}$$

where τ_{ikjt} is the preferential tariff set by the partner country k on imports from j in sector i at time t. The dummy variable therefore indicates whether country j's producers receive a higher price in the partner country granting the maximum PMA margin than the one they

receive at home.[21]

The use of this specification is motivated by the theoretical prediction and in particular equation 9 which shows that the value of the PMA rate does not impact the level of external protection. Indeed, only the existence of a meaningful PMA margin induces the country to adjust its external protection. I therefore estimate the same equation as 18 replacing the first four variables by the dummy defined above.

To deal with the potential endogeneity of D^{PMA}, I use the asymptotically efficient and consistent IV estimator suggested by Wooldridge (2002, Ch.18)[22]. Assuming that $\mathbf{z}$ is a vector of excluded instruments for D^{PMA}, I apply the following three-stage procedure:

(i) Estimate a Probit model of D^{PMA} on a vector of exogenous instruments $\mathbf{z}$ for and other exogenous control variables $\mathbf{x}$. More precisely, I estimate $P(D^{PMA} = 1 \mid \mathbf{x}, \mathbf{z}) = \Phi(\gamma_0 + \gamma_1'\mathbf{x} + \gamma_2'\mathbf{z})$ where Φ is the standard normal cumulative distribution function (STAGE 1)

(ii) Compute the predicted probabilities $\hat{\Phi}^{PMA}$ that country j receives a meaningful PMA margin.

(iii) Estimate equation (25) by instrumental variables using instruments $\hat{\Phi}^{PMA}$ and $\mathbf{x}$. This entails the two stages below:

  (a) Estimate a linear regression for each endogenous regressor including D^{PMA} on $\hat{\Phi}^{PMA}$ and $\mathbf{x}$, and compute predicted values (STAGE 2)

  (b) Estimate (25) substituting the actual values of endogenous variables by the predicted values computed in the previous stage (STAGE 3)

This methodology is suitable since it takes the binary nature of the endogenous regressor D^{PMA} into account and $P(D^{PMA} = 1 \mid \mathbf{x}, \mathbf{z})$ does not have to be correctly specified (Wooldridge (2002), Adams, Almeida and Ferreira (2009)).

In the first stage, to compute the predicted probabilities that country j receive a meaningful PMA margin, the following instruments are used (i) the minimum preferential tariff rate received from m $[m \neq j]$ by the partner country k granting to j the maximum PMA margin, and (ii) the MFN tariff of country k. Since the endogenous dummy variable is equal to one

[21] In contrast to the model including only 3 countries, H, L and ROW, the empirical strategy has to account for the multiplicity of trading partners. In line with the literature using the minimum (best) preferential tariff rate, I use the maximum PMA margin received among all trading partners.

[22] This procedure is used in Baier and Bergstrand (2007, 2002) and Adams, Almeida and Ferreira (2009).

TABLE 7
Relationship between MFN Tariff Changes (ΔMFN_t) and the existence of a meaningful PMA margin

	(1) OLS	(2) OLS	(3) IV	(4) IV
D_{t-1}^{PMA}	0.772***	0.983***	0.761	0.925
	(7.34)	(8.46)	(1.28)	(0.96)
$\Delta PREF_{t-1}$	0.102***	0.064**	0.163***	-0.053
	(4.09)	(2.31)	(4.00)	(-0.67)
$(\Delta PREF \cdot CU)_{t-1}$	-0.183***	-0.139***	-0.174**	0.186
	(-5.54)	(-3.75)	(-2.25)	(1.29)
Observations	10016	10016	9959	9959
N clusters	1001	1001	994	994
Adjusted R^2	0.646	0.689	0.608	-0.266
Industry-year FE	No	Yes	No	Yes
Hansen J *P-value*			0.323	0.138
Kleibergen-Paap LM *P-value*			0.000	0.000
Kleibergen-Paap Wald F statistic			39.519	14.503

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Robust $t(z)$ statistics in parenthesis adjusted for clustering at the country industry level. Country-year and country-industry fixed effects are included in all regressions. In (2) and (4) D^{PMA} is instrumented using the predicted probability to receive a meaningful preference margin computed from a Probit estimation on (i) the MFN tariff of country k granting to country j the maximum preferential margin, (ii) the minimum preferential tariff rate received by k from partners m with $m \neq j$, and (iii) other exogenous regressors. $PREF$ is instrumented by the minimum preferential tariff rate that the two main preferential trading partners grant to other countries excluding j.

if $\underset{k}{max}\{MFN_{ikt} - \tau_{ikjt} - MFN_{ijt} > 0\}$, it directly depends on the MFN tariff of the partner country k, the latter affecting the MFN of country j through preferences. However, the MFN of country k is assumed to be exogenous it seems unlikely that the change in MFN tariff in country j would affect the lagged level of the MFN tariff in k. On the other hand, the tariff τ_{ikjt} granted by k to j is assumed to be endogenous, which would hold particularly true in the case of forward looking actors. As PMA and Preferences are correlated, and because the best PMA rate received by k from a partner country m excluding j is assumed to be exogenous, it can be used as an instrument for τ_{ikjt}. Results of the first stage Probit estimation are provided in appendix Table B.7 and confirm the correlation between the endogenous regressors and the instruments.

The $PREF$ variable is instrumented in the same way as in previous sections using the minimum preference tariff granted by the two main preferential trading partners of country j ($k = 1, 2$) to any other country m excluding j [$m \neq j$]. Hence, when estimating specification (25) using the 3-stage procedure described above, the vector $\mathbf{x}$ includes these two instruments interacted or not with the CU dummy, and the fixed effects.

Results are reported in Table 7. The OLS estimations show that the existence of a PMA margin has a positive impact on MFN, supporting the tariff substitutability hypothesis. However, in the IV specifications of columns (3) and (4), the significance vanishes. When including industry-year fixed effects consistently with the robustness test provided in section 4.3., none of the coefficient remains significant. This result is most likely due to a lack of variability in the data. Instruments are valid in all specifications and the negative adjusted R^2 in (4) is due to the fact that the full set of fixed effects has been partialled-out from the covariates.

In the theory developed in section 2., PMA affects external protection through two competing forces applies. Hence, the absence of a significant impact of the PMA dummy in the present empirical specification is not necessarily inconsistent with the theoretical prediction. On the one hand, the surge in imports following deflection of domestic sales implies that a rise in external protection generates additional tariff revenue. On the other hand, a reduction in external protection will benefit consumers without affecting producers who receive a price independent from the domestic MFN tariff. If the two effects exactly offset each other, the overall impact might be zero. To try to disentangle between the two forces and test if the insignificant results of Table 7 are driven by such a mechanism, I estimate the following

equation:

$$\begin{aligned}\Delta MFN_{ijt} = \quad & \beta_1 \quad \cdot D^{PMA}_{ij,t-1} + \beta_2 \cdot (D^{PMA}_{ij,t-1} \cdot D^{VTR}_{j}) \\ & + \quad \beta_3 \cdot \Delta PREF_{ij,t-1} + \beta_4 \cdot \Delta PREF_{ijt-1} \cdot CU_{j,t-1} + \gamma_{jt} + \gamma_{ij} + u_{ijt}\end{aligned} \tag{27}$$

Where D^{VTR}_{j} is a dummy variable equal to one for countries with a high valuation of tariff revenue (VTR) defined according to the extraneous weights computed by Gawande, Krishna and Olarreaga (2015) and reported in appendix B4. The IV results presented in column (3) of Table 8 show that the existence of a preferential market access margin triggers an average increase in MFN tariff of 2.37 percentage points in countries with high VTR. In contrast, it has no significant effect in countries where the weight assigned by the government on tariff revenue is relatively low. As in the previous table, instruments are valid in all specifications with a second stage[23] F-statistic above ten.

Columns (2) and (4), provide a robustness test including industry-year fixed effects[24] as in section 4.3.. Similarly to findings of Table 7, these fixed effects capture most of the variability in the data. However, the second coefficient remain significant suggesting that PMA may still significantly impact MFN tariffs when the VTR is high.

[23] In this section, because a 3-stage IV estimator is used, the second stage is similar to the first stage of a 2SLS methodology

[24] Fixed effects are partialled-out from the covariates in (4), explaining the negative adjusted R^2

TABLE 8
Relationship between MFN Tariff Changes (ΔMFN_t) and the existence of a meaningful PMA margin: Valuation of Tariff Revenue

	(1) OLS	(2) OLS	(3) IV	(4) IV
D^{PMA}_{t-1}	0.190*	0.263**	-0.843	-1.280
	(1.77)	(2.14)	(-1.08)	(-1.33)
$(D^{PMA} \cdot D^{VTR})_{t-1}$	0.586***	0.765***	3.210**	3.020**
	(2.65)	(3.44)	(2.40)	(2.54)
$\Delta PREF_{t-1}$	0.111***	0.076***	0.177***	-0.048
	(4.27)	(2.70)	(4.51)	(-0.61)
$(\Delta PREF \cdot CU)_{t-1}$	-0.203***	-0.169***	-0.197**	0.133
	(-5.11)	(-3.75)	(-2.32)	(1.01)
Observations	8983	8983	8927	8927
N clusters	901	901	895	895
Adjusted R^2	0.663	0.708	0.619	-0.309
Industry-year FE	No	Yes	No	Yes
Hansen J *P-value*			0.326	0.125
Kleibergen-Paap LM *P-value*			0.000	0.000
Kleibergen-Paap Wald F statistic			20.766	10.708
Test $HighVTR$ *P-value*	0.000	0.000	0.026	0.126

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Robust $t(z)$ statistics in parenthesis adjusted for clustering at the country industry level. Country-year and country-industry fixed effects are included in all regressions. In (2) and (4) D^{PMA} is instrumented using the predicted probability $\hat{\Phi}^{PMA}$ to receive a meaningful preference margin computed from a Probit estimation on (i) the MFN tariff of country k granting to country j the maximum preferential margin, (ii) the minimum preferential tariff rate received by k from partners m with $m \neq j$, and (iii) other exogenous regressors. $PREF$ is instrumented by the minimum preferential tariff rate that the two main preferential trading partners grant to other countries excluding j. The Test $HighVTR$ reports the *p*-value of testing the significance of the estimated effect of PMA in countries where the valuation of tariff revenue is high ($D^{VTR} = 1$), ie. $H_0 : \beta_1 + \beta_2 = 0$.

5. Conclusion

The literature studying the so-called "stumbling bloc" vs. "building bloc" effect of regionalism has focused on preferences granted to partner countries. This paper revisits the question by demonstrating theoretically and empirically that preferential market access is a relevant determinant of MTL. Controlling for the initial level of external protection, the empirical results show that the impact of market access on the multilateral tariff, both in terms of size and significance, is at least as important as the one of preferences.

I first develop a simple political economy model in which the government assigns different weights on tariff revenues than on consumer and producer surpluses. Because producers arbitrage between prices, trade deflection generates a rise in imports receiving MFN treatment in the low-tariff country enjoying preferential market access. This discrete increase in imports reduces the incentives for governments to lower the level of external protection as it would imply an important loss of tariff revenue. This mechanism dampens the fall in MFN tariff in low-tariff countries and can potentially result in a rise in external protection if governments sufficiently care about tariff revenues.

Empirically, the paper provides evidence that in countries where the level of initial protection is relatively low, a reduction in the preferential market access tariff of 1 percentage point triggers up to a 0.37 percentage point increase in MFN tariffs whereas the overall impact of preferences turns out to be insignificant. This rise in MFN resulting from the preferential market access is absent in countries where tariff revenues are not sufficiently valued by the government, which is consistent with the trade deflection mechanism.

In the case of high-tariff countries, enhanced market access lead up to a 0.51 percentage points decrease in MFN tariffs. As trade deflection resulting from preferential market access should apply only in low tariff countries, their fostering impact on MTL indicates that other forces are at play. The falling external protection resulting from preferences is nevertheless consistent with previous findings in developing countries by Calvo-Pardo, Freund and Ornelas (2009), Estevadeordal, Freund and Ornelas (2008) and Bohara, Gawande and Sanguinetti (2004). Overall results are therefore encouraging as they show that in most cases, PTAs promote MTL. Thus, in line with the bilateral estimations shedding light on a potential MFN tariff equalization among PTA members, it is likely that such harmonization occurs for a relatively low level of external tariff.

Finally, if market access has been a major concern for policy makers of developing countries in their export promotion efforts, to my knowledge, the potential impact on imports has never been raised. Therefore, by linking preferential market access and MTL, this paper could serve as a starting point for further research, in particular in the field of unilateral schemes of preferences including such as the generalized system of preferences. Although developed countries' tariff are usually low, MFN tariffs may remain relatively high in specific sectors, in particular for selected agricultural products. Hence, the impact of the preferential market access granted unilaterally to developing countries on their external trade policy could therefore be analyzed in the context provided in this paper or using a related framework.

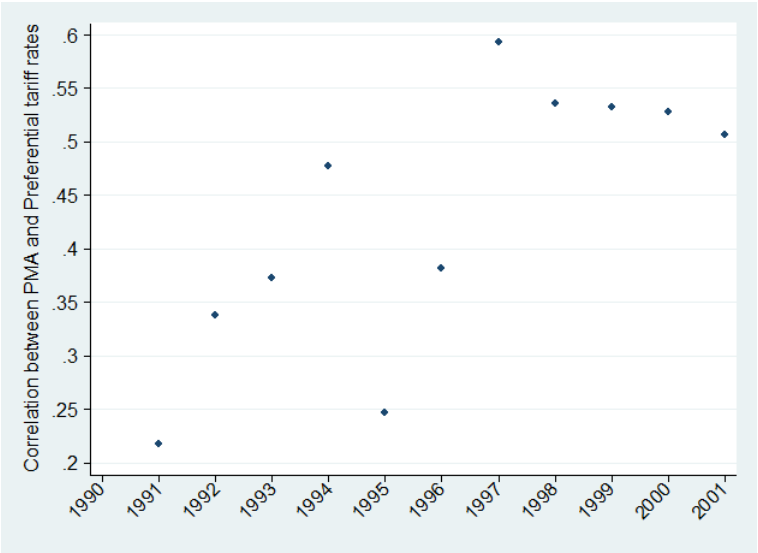
Appendix B

B1. Descriptive Statistics

TABLE B.1
Summary Statistics 1990-2001

Variable	NOB	Mean	Standard Error	Min	Median	Max
			Full sample			
MFN_{ijt}	11,001	15.33	8.50	0.18	14.30	117.33
ΔMFN_{ijt}	10,018	−1.19	4.48	−53.00	0.00	39.83
PMA_{ijt}	11,531	5.07	5.92	0.00	2.63	63.00
ΔPMA_{ijt}	10,549	−1.38	3.47	−50.00	0.00	11.00
$PMA\ Margin_{ijt}$	11,507	9.50	7.64	0.00	9.10	91.52
$\Delta PMA\ Margin_{ijt}$	10,525	1.24	4.58	−35.00	0.00	77.28
D_{ijt}^{LOW}	10,978	0.35	0.48	0.00	0.00	1.00
τ_{kjt}	40,914	8.08	9.08	0.00	5.00	85.00
$\Delta\tau_{kjt}$	3,7429	−1.62	4.78	0.00–85.00		34.32
$PREF_{ijt}$	11,124	6.60	8.78	0.00	3.23	85.00
$\Delta PREF_{ijt}$	10,141	−2.21	5.71	−85.00	−0.01	9.30
$PREF\ Margin_{ijt}$	11,001	8.70	7.17	0.00	7.75	117.33
$\Delta PREF\ Margin_{ijt}$	10,018	1.03	3.72	−35.00	0.00	75.00
τ_{jkt}	40,914	8.08	9.08	0.00	5.00	85.00
$\Delta\tau_{jkt}$	37,443	−1.63	4.76	−85.00	0.00	34.32
			Low-tariffs ($D^{LOW} = 1$)			
MFN_{ijt}	3,816	12.09	4.96	0.18	11.00	40.00
ΔMFN_{ijt}	3590	−0.89	3.16	−53.00	0.00	9.03
PMA_{ijt}	3,816	5.08	6.91	0.00	2.33	63.00
ΔPMA_{ijt}	3,595	−1.47	3.78	−38.00	0.00	9.16
$PMA\ Margin_{ijt}$	3,816	12.48	8.29	0.00	12.14	91.52
$\Delta PMA\ Margin_{ijt}$	3,595	1.44	5.30	−35.00	0.00	77.28
τ_{kjt}	17,737	9.69	10.64	6.13	0.00	85.00
$\Delta\tau_{kjt}$	16,079	−1.83	5.27	−85.00	0.00	30.00
	Bilateral tariffs with positive preference margin (represented in Figure 1)					
$\tau_{kjt}(PMA)$	29,153	4.69	5.09	0.00	2.93	84.48
$\tau_{jkt}(PREF)$	29,155	4.76	5.08	0.00	3.00	84.48

FIGURE B.1
Correlation between bilateral PMA and PREF tariff rates

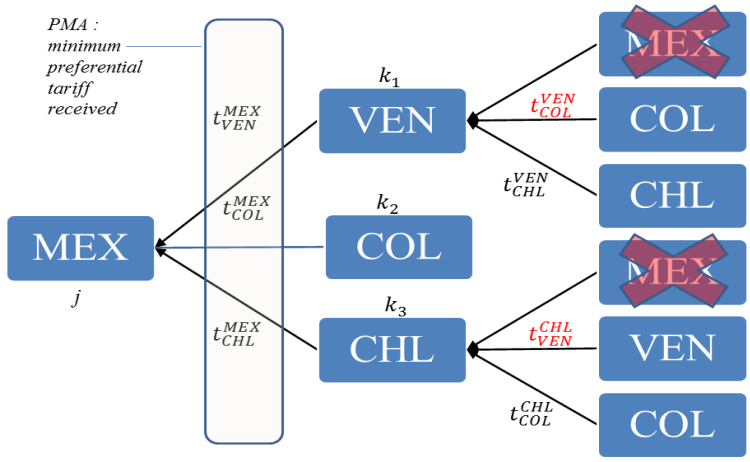


Note: The figure reports the correlation between τ_{jkt} and τ_{kjt}, the bilateral preferential tariff and market access rates over years for goods with a positive PMA/preference margin (ie. preferential tariffs are lower than the MFN rates). The correlation over the full sample is 0.636. All coefficients are significant at the 1% confidence level.

B2. Illustration of the Instrumenting Strategy

Imagine that Mexico receives a preferential market access tariff from Venezuela, Colombia and Chile. To instrument the PMA tariff of Mexico, we first identify the two trading partners that grant to Mexico the lowest preferential tariff rates in average. If those two countries are Venezuela and Chile, the two instruments will be the minimum PMA tariff rates that Venezuela and Chile receive from their trading partners, excluding Mexico – in the example, Colombia and Venezuela. The idea is that, on average, the preferential market access tariffs of Venezuela and Chile are correlated to the preferential tariff granted by those two countries to Mexico because of the partially reciprocal structure of the PTA. They are nevertheless not necessarily identical for a given year at the product-line level.

FIGURE B.2
Illustration of the Instrumenting Strategy



B3. IV First Stage Regression F Statistics and Partial R^2

TABLE B.2
MFN Tariff Changes and Lagged Preferential Tariff Changes
First Stage Statistics

Specification:	IV(2)			IV PREF (2)			IV(5)		
Statistic:	SP.R^2	P.R^2	F	SP.R^2	P.R^2	F	SP.R^2	P.R^2	F
Preferential Market Access									
ΔPMA	0.096	0.132	143.799	0.103	0.142	99.355	0.051	0.147	100.986
$\Delta PMA \cdot CU$	0.305	0.420	166.114	0.308	0.419	122.100	0.294	0.420	111.708
$\Delta PMA \cdot D^{LOW}$	-	-	-	0.369	0.463	121.169	0.021	0.137	13.179
D^{LOW}	-	-	-	-	-	-	0.051	0.049	24.192
Preferential Market Access and Preferences									
ΔPMA	0.125	0.175	90.572	0.134	0.181	73.697	0.068	0.187	73.756
$\Delta PMA \cdot CU$	0.169	0.443	100.912	0.171	0.442	87.230	0.169	0.443	90.538
$\Delta PMA \cdot D^{LOW}$	-	-	-	0.444	0.463	141.881	0.055	0.128	15.464
D^{LOW}	-	-	-	-	-	-	0.051	0.051	17.380
$\Delta PREF$	0.104	0.138	26.308	0.110	0.147	21.706	0.102	0.165	24.488
$\Delta PREF \cdot CU$	0.115	0.302	24.898	0.116	0.302	19.072	0.110	0.303	22.902

SP.=Shea partial, P.=Partial. The endogenous regressors are displayed in the first column.

TABLE B.3
MFN Tariff Changes and Lagged Preferential Tariff Changes: Industry-Year Fixed Effects
First Stage Statistics

Specification:	IV(2)			IV PREF (2)			IV(5)		
Statistic:	SP.R^2	P.R^2	F	SP.R^2	P.R^2	F	SP.R^2	P.R^2	F
Preferential Market Access and Preferences									
$\Delta\widetilde{PMA}$	0.032	0.087	29.467	0.037	0.095	26.973	0.034	0.115	32.003
$\Delta\widetilde{PMA \cdot CU}$	0.149	0.284	85.332	0.149	0.282	69.925	0.151	0.283	69.036
$\Delta\widetilde{PMA \cdot D^{LOW}}$	-	-	-	0.463	0.465	163.442	0.071	0.112	11.697
$\widetilde{D^{LOW}}$	-	-	-	-	-	-	0.038	0.043	15.277
$\Delta\widetilde{PREF}$	0.024	0.076	22.113	0.024	0.086	21.643	0.028	0.098	25.376
$\Delta\widetilde{PREF \cdot CU}$	0.065	0.149	26.503	0.065	0.148	22.069	0.070	0.148	21.158

SP.=Shea partial, P.=Partial. The endogenous regressors are displayed in the first column.

TABLE B.4
MFN Tariff Changes and Lagged Changes in Preference Margins
First Stage Statistics

Specification:	IV(2)			IV PREF (2)			IV(5)		
Statistic:	SP.R^2	P.R^2	F	SP.R^2	P.R^2	F	SP.R^2	P.R^2	F
Preferential Market Access and Preferences Margins									
$\Delta PMA\,Marg$	0.223	0.414	98.218	0.167	0.416	89.201	0.006	0.433	107.230
$\Delta PMA\,Marg \cdot CU$	0.229	0.543	79.590	0.236	0.545	67.762	0.124	0.572	127.519
$\Delta PMA\,Marg \cdot D^{LOW}_{marg}$	-	-	-	0.255	0.500	130.458	0.005	0.385	47.414
D^{LOW}_{marg}	-	-	-	-	-	-	0.004	0.022	12.010
$\Delta PREF\,Marg$	0.029	0.118	41.244	0.046	0.156	42.832	0.014	0.129	31.791
$\Delta PREF\,Marg \cdot CU$	0.068	0.296	44.251	0.089	0.303	42.007	0.072	0.299	33.786

SP.=Shea partial, P.=Partial. The endogenous regressors are displayed in the first column.

TABLE B.5
Bilateral Changes in MFN Tariff Gap and Lagged Preferential Tariff Changes
First Stage Statistics

Specification:	IV(2)			IV PREF (2)			IV(5)		
Statistic:	SP.R^2	P.R^2	F	SP.R^2	P.R^2	F	SP.R^2	P.R^2	F
PMA and Preferences bilateral tariff rates									
$\Delta\tau_{kj}$	0.002	0.070	61.033	0.018	0.071	46.185	0.004	0.073	42.137
$\Delta\tau_{kj} \cdot CU$	0.005	0.039	35.638	0.006	0.039	28.549	0.005	0.040	30.972
$\Delta\tau_{kj} \cdot D^{LOW}$	-	-	-	0.195	0.140	109.174	0.015	0.031	24.404
D^{LOW}	-	-	-	-	-	-	0.014	0.031	34.513
$\Delta\tau_{jk}$	0.002	0.072	60.527	0.014	0.077	50.365	0.003	0.077	44.888
$\Delta\tau_{jk} \cdot CU$	0.005	0.037	44.798	0.006	0.037	34.109	0.005	0.038	31.302

SP.=Shea partial, P.=Partial. The endogenous regressors are displayed in the first column.

B4. Valuation of tariff revenues

TABLE B.6
Valuation of tariff revenues: weights

$\frac{c-a}{c} < 0.184$				$\frac{c-a}{c} > 0.184$				
COL	CHL	URY	ECU	VEN	ARG	PER	MEX	BRA
0.09	0.10	0.13	0.14	0.15	0.17	0.17	0.20	0.29

c, a: weights on tariff revenues and consumer's surplus. Median=0.15. Source: Gawande, Krishna and Olarreaga (2015)

It results that the dummy variable D^{VTR} of section 4.4. indicating if a country highly values tariff revenue is equal to one for Argentina, Brazil, Mexico, Peru and Venezuela.

B5. Alternative Empirical Strategy: First Stage Regression

TABLE B.7
Probability to receive a meaningful PMA margin:
Probit estimation of $D^{PMA}_{ij,t-1}$ on **z**

	D^{PMA}_{t-1}
$PMA_{ik,t-1}$	-0.154***
	(-19.55)
$MFN_{ik,t-1}$	0.070***
	(16.00)
Observations	9978
N clusters	999

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.
Robust $t(z)$ statistics in parenthesis adjusted for clustering at the country industry level. Additional controls **x** included.

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