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JEL Classification: F15, F13

Keywords: regionalism, Free Trade Agreements, Customs Unions, tariff complementarity, Latin America

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1 Introduction

The history of trade policy in the last thirty years has been, to a large extent, the history of the growth of Preferential Trade Agreements (PTAs). Currently, the 164 members of the World Trade Organization (WTO) have on average about twenty PTA partners, whereas that figure was around five in 1994, when the Uruguay Round—the last finished round of multilateral talks—was concluded.[1] There are also several additional agreements currently under negotiation and in the ratification stage.

In tandem with the increasing prominence of PTAs and their theoretically ambiguous welfare implications—since they yield both lower trade barriers and more discriminatory trade policies—there have been numerous analyses of their causes and consequences. The goal of several theoretical and empirical studies has been to understand how members choose their external tariffs once they form a trading bloc. That is a key issue because, for given intra-bloc tariffs, higher external tariffs are associated with more inefficiency and lower welfare, since they imply both higher trade barriers and more trade discrimination.

Strikingly, empirical and theoretical analyses of intra-bloc ("internal") PTA tariffs and of preferential margins are rare. That is surprising. After all, although PTAs increasingly encompass different policy dimensions, the single policy that is associated with *all* existing PTAs is the reduction of internal tariffs.[2] A likely explanation for the scarcity of research on the topic is a common presumption that internal tariffs are either zero or very close to zero. That presumption has an institutional foundation, since Article XXIV of the General Agreement on Tariffs and Trade, which provides the underpinnings under which members of the WTO can form PTAs, requires that "the duties and other restrictive regulations of commerce [should be] eliminated on substantially all the trade between the constituent territories in products originating in such territories" (https://www.wto.org/english/ tratop_e/region_e/region_art24_e.htm). There are three important caveats to Article XXIV, however. First, its language is vague, as it does not provide a criterion for the definition of "substantially all the trade." Second, the enforcement power of Article XXIV is questionable (the WTO has never ruled that an existing PTA should be reversed). Third, PTAs among developing countries can be notified to the WTO under the *Enabling Clause*, which does not impose such constraints. That is the case with the majority of the agreements in our dataset. And indeed, intra-bloc tariffs are very often nonzero, and there is substantial variation across countries, sectors and time.[3]

In this paper, we start to fill that gap in the literature. First, we develop a political-economy

[1] We obtain that figure from calculations based on the dataset constructed by Scott Baier and Jeffrey Bergstrand, available at https://www3.nd.edu/~jbergstr/ and first used by Baier et al. (2014).

[2] Hofmann, Osnago and Ruta (2019) investigate the prevalence of 52 different provisions in PTAs. As they point out, "all PTAs in force in 2015 include tariff reductions on manufactured goods" (p. 380). That is the only provision present in all of the them, followed closely by tariff reductions on agricultural goods.

[3] The other main restriction of Article XXIV, that "the duties [...] imposed at the institution of [the agreement] in respect of trade with [nonmember countries] shall not on the whole be higher or more restrictive than the general incidence of the duties [...] applicable [...] prior to the formation of [the agreement]," has been studied by other authors; see, for example, Mrázová, Vines and Zissimos (2013).

model to discipline the empirical analysis and help to rationalize its results. The model shows how countries in different types of trading blocs choose their internal tariffs and preferential margins and highlights the factors that shape them. Then, using a dataset that encompasses most preferential trade agreements formed in South America during the 1990s, plus those formed by Mexico, we evaluate the model's predictions empirically.

A central element of our analysis is the institutional design of a PTA—i.e., whether it is organized as a customs unions (CU) or as a free trade area (FTA). The main institutional difference between CUs and FTAs is that, under the former, members coordinate their external trade policies, typically choosing a common external tariff for each good. In contrast, in FTAs members are free to set their external tariffs as they wish. This matters, because the level of external tariffs directly affects the degree of preferential access that each member receives, and hence it also determines the members' extent of gains in each other's markets. Naturally, then, several authors have studied how CUs and FTAs differ in terms of their external trade policies. In contrast, we compare, for the first time, how the two types of PTAs differ in terms of their *internal* trade policies, the missing piece of information needed to fully assess the preferential margins offered by each type of bloc.

We show that, under sufficiently strong tariff complementarity,[4] preferential margins should be systematically higher in CUs than in FTAs. The intuition is simple. Because of tariff complementarity, members of FTAs have an incentive to lower their external tariffs after forming the bloc. That, however, hurts the exporters of the partners, whose margin of preference decreases. Anticipating that, FTA members choose to keep intra-bloc tariffs relatively high, to moderate each other's incentives to subsequently lower external tariffs. This keeps preferential margins in FTAs relatively low. In contrast, such caution in lowering intra-bloc duties is unnecessary in CUs, where members negotiate both internal and external tariffs. As a result, CU members are willing to set intra-bloc tariffs relatively low, knowing that the ensuing preferential margins will not be eroded by subsequent unilateral changes in external tariffs. This yields relatively high preferential margins in CUs.

Our model yields additional predictions. First, preferential margins in CUs should increase with the supply in partner countries, as political-economy objectives in partner countries are internalized. The implication is that industries that are larger within the bloc will enjoy greater preferential treatment. This echoes the result of Grossman and Helpman (1994) that industries that produce larger volumes tend to enjoy greater political clout and, hence, be more protected in a country, except that here the mechanism is applied to preferential access in CUs. That result does not extend automatically to FTAs, however, because in FTAs there is a countervailing force due to the indirect impact of the internal tariffs on the external tariffs. Second, preferential margins in CUs should decrease with the level of intra-bloc imports, to limit the extent of trade diversion. Again, that result does not extend to FTAs. Since members anticipate that external tariffs fall along with

[4] We use the term "tariff complementarity" to refer to situations in which an exogenous reduction of the tariff on one source of imports induces the government to lower its tariff on other sources of imports. This is a slight generalization of the way the term is often used the regionalism literature, which associates it to situations in which the external tariff falls after the intra-bloc tariff is set to zero.

internal tariffs in FTAs, concerns with growing trade diversion as the latter fall are not as pressing.

More generally, we show that, in CUs, external tariffs and preferential margins serve distinct purposes. The external tariff tackles domestic political-economy issues and tariff-induced distortions—exactly what the nondiscriminatory, most-favored-nation (MFN) tariff does in the absence of trade agreements. Those issues (and thus the associated tariff determinants) are defined solely by the importing country-related variables. In turn, the preferential margin addresses the issues created by the formation of the bloc: political-economy issues from the partner countries and distortions due to trade diversion. Those aspects are defined at the bilateral level, bringing an additional dimension into the analysis of tariff determinants after the formation of a trading bloc. By contrast, because in FTAs internal tariffs (endogenously) affect external ones, there is no clear-cut separation between policy instruments and policy targets.

To evaluate those predictions empirically, we study the tariff structure of ten Latin America countries from 1990 to 2001. This period is particularly appropriate for our analysis, as it marks the onset of several bilateral trade relationships in the region. Most agreements are in the form of FTAs, but Mercosur and CAN, formed in 1991 as FTAs, became CUs in 1995. This institutional change is central for our identification. It is also helpful that we consider mostly agreements that involve only developing economies, because the aforementioned constraints due to GATT's Article XXIV are less likely to matter for them. While much of our data is relatively easy to access, data on preferential rates are much less available. For that information, we rely on the data first used by Estevadeordal et al. (2008).

We use a wide set of fixed effects to control for potential unobserved confounding factors. To deal with the endogeneity of the preferential imports, we use either the pre-bloc import levels or an instrumental variable approach. Our main instrument is the partner's exports to the rest of the world (i.e., excluding the PTA importing country) at the industry level.[5] To deal with the endogeneity of the supply of partner countries, we use the average output of the three countries in the sample for which their output is most correlated with the output of the PTA partner, but which are not themselves PTA partners of the importing country during the sample period. We confirm that the instruments are strong. Moreover, according to our model, they do not have a direct effect on intra-bloc tariffs or preferential margins.

We find empirical support for all the theoretical predictions of the model. The results reveal that the tariff-setting process is very different in CUs and FTAs, resulting in preferential margins that differ in levels and that respond to economic conditions differently. We confirm those results also by implementing a falsification exercise whereby we split our sample into two periods, the FTA period (1990-1994) and the CU period (1995-2001), and include a "fake" CU dummy, equal to one when the importer and exporter are Mercosur or CAN members during the FTA period. None of the predictions holds for the placebo exercise.

It is important to stress that the differences in tariff structures that we observe for the two

[5] Alternatively, we use as an instrument exports by the partner to countries that are comparable to the importing country in terms of income. We thank Guido Porto for this suggestion.

types of agreements reflect not only different incentives when setting external tariffs (for which the processes differ by design), but also the internal tariffs (for which the formal process is the same, but the outcome is endogenously different). This makes clear the need to model the latter explicitly, rather than simply assuming that they will drop to zero. Importantly, those findings have implications for the welfare consequences and the social desirability of the two types of agreements, for both members and excluded countries, as we discuss below.

The paper is organized as follows. We discuss below the related literature. In section 2 we develop a political-economy model to guide our empirical analysis. In sections 3 and 4 we describe, respectively, our data and our empirical strategy. In section 5 we present and discuss the empirical results. We conclude in section 6.

1.1 Related literature

The research on the causes and consequences of trading blocs is sizeable. A subset of that literature focuses on the differences between FTAs and CUs, mostly from a theoretical perspective. In particular, the type of agreement has been shown to matter for the central question of whether preferential trade agreements help of hinder the viability of global free trade.[6]

In an early contribution, Bagwell and Staiger (1998) show that PTAs can pose a threat to the multilateral system by undermining the role of reciprocity in delivering an efficient agreement. On the other hand, they may help the enforcement of a multilateral trade agreement. Their net effect depends, among other things, on whether the agreements take the form of FTAs or CUs. Investigating whether PTAs are building blocks or stumbling blocks of multilateral liberalization in a repeated-game setting, Saggi (2006) also finds that the answer depends on whether the agreements are FTAs and CUs. In complementary papers, Saggi and Yildiz (2010) and Saggi, Woodland and Yildiz (2013) study the compatibility of global free trade with, respectively, FTAs and CUs in a dynamic game where both bilateral and multilateral liberalizations are endogenous. The implications of PTAs for global free trade change for FTAs versus CUs, highlighting that the type of PTA matters. Focusing on the flexibility that members of FTAs have to form other FTAs, as opposed to the consensus required from all members of CUs to do so, Missios, Saggi and Yildiz (2016) also find stark differences between the two types of PTAs in terms of facilitating the path to global free trade. In each of those analyses, external tariffs under a PTA are endogenous. However, as in the vast majority of the literature that seeks to understand the compatibility between regionalism and multilateralism, intra-bloc tariffs are assumed to be (counterfactually) set to zero.

Theoretical analyses of intra-bloc policies are rare, but there have been some notable exceptions.[7] One is by Lake and Roy (2017). They study the interplay between FTAs and multilateral tariff negotiations, showing that the timing of the two is critical for the viability of global free trade. In an extension of their main model, Lake and Roy allow FTA members to choose nonzero internal

[6] See Lake and Krishna (2019) for an insightful recent survey of that literature.

[7] A very small theoretical (Grossman and Helpman, 1995) and empirical (Deardoff and Sharma, 2021) literature studies the related question of sector exclusions in PTAs.

tariffs. They show that, for a range of parameters under which FTA members choose sufficiently high internal tariffs, the possibility to set nonzero internal tariffs turns feasible some otherwise unfeasible FTAs, and that may end up promoting global tariff liberalization. Their analysis is restricted to FTAs, however.

More recently, Saggi, Wong and Yildiz (2019) evaluate the desirability of the Article XXIV requirement that intra-PTA tariffs should be reduced "substantially." Their answer is nuanced. Allowing FTA members to set internal tariffs freely would yield strictly positive internal tariffs and higher external tariffs. That would lower global welfare, relative to a situation in which FTA internal tariffs must be eliminated. However, and as in Lake and Roy (2017), allowing for positive internal tariffs would make it easier to achieve global free trade, because an FTA in that case would hurt the nonmember country, who would then become more willing to support global free trade. That would not happen if internal tariffs were zero, because then the external tariffs would be so low that the nonmember would be better off standing outside the FTA than under global free trade.

Those results rely on two main forces: the lack of external tariff coordination between FTA members and a tariff complementarity effect, which induces countries to lower external tariffs as internal tariffs fall. Because of the former, each member does not internalize the loss that low external tariffs generate for its partner; because of the latter, they want to curb the difference between external and internal tariffs. Thus, if internal tariffs have to be eliminated, external tariffs become too low from the perspective of the joint welfare of the FTA members. Now, when they can coordinate internal tariffs (as they do in reality), they take those forces into account and set intra-bloc duties relatively high, inducing each other to set external tariffs relatively high as well. In other words, they set high internal tariffs as a commitment device to induce themselves to keep external tariffs high. In customs unions, where members coordinate their external tariffs, such a commitment is unnecessary.

As the analysis of Saggi et al. (2019) illustrates, conclusions about the compatibility between regionalism and multilateralism can change significantly if one allows for strictly positive internal tariffs. Hence, the findings of the large literature referred to above may need to be reassessed in light of our findings.

We build the analytical framework that guides our empirical analysis on the main premises of Saggi et al.'s (2019) model. Since our goal is distinct, we do not have a game-theoretical analysis of equilibrium trade agreements, as they do. On the other hand, our baseline trade model imposes less structure. Nevertheless, some of our results could be interpreted as an empirical validation of the main pillars of their analysis.

We argue that a fundamental reason why internal tariffs vary across types of PTA is their impact on the external tariffs of their members—which are coordinated among CU members but not among FTA members. Several theoretical analyses have showed that, when the main goal of the bloc is to exchange market access, we should observe tariff complementarity, i.e., external tariffs falling as a result of lower internal tariffs.[8] One of the forces behind tariff complementarity is the cost of

[8] The first to show this result was Richardson (1993, 1995), but it has been extended to several different settings

trade diversion. Another reflects the destruction of rents stemming from the preferential access. In contrast, when preferential market access is offered in exchange for nontrade concessions, we may observe tariff substitutability instead, whereby bloc members raise external tariffs after reducing intra-bloc duties (Limao, 2007). The reason is to avoid the erosion of the value of preferences, thus keeping the incentive of the partner to cooperate in nontrade aspects.

Our model, because of its parsimony, allows for both tariff complementarity and tariff substitutability, and some of our theoretical results depend on one of them prevailing over the other. Rather than imposing a theoretical result, we let the data tell us which force prevails. We find strong empirical support for tariff complementarity. This should not be too surprising, because previous research (Estevadeordal et al., 2008, Crivelli, 2016, Tovar, 2019) have shown, with different empirical specifications, evidence consistent with tariff complementarity in the FTAs included in our dataset.[9] However, here we provide a precise test to distinguish between tariff complementarity and tariff substitutability.

Ludema, Mayda and Volpe Martincus (2015) also allow for nonzero internal tariffs in their analysis. They develop a model where members of trading blocs choose both internal and external tariffs jointly. This is the approach we take here, but only for CUs, since in FTAs members are free to choose their external tariffs independently. In fact, that is the essential institutional element that induces different tariff strategies in the two types of blocs, on which we rely in our analysis. In contrast, the goal of Ludema et al. is to investigate how preferential import shares affect *external* tariffs in PTAs. They find that, when internal tariffs are fully flexible, preferential trade shares have no impact on the external tariff, but they do when internal tariffs must be eliminated. This speaks directly to our finding that, in CUs, preferential margins alone (through the fine-tuning of intra-bloc tariffs) address all issues related to preferential trade. Here we explore the role of preferential imports as well, but on the levels of preferential margins, and distinguish between the two types of trading blocs.

There are other authors who seek to explain preferential tariffs, but they generally focus on the *unilateral* decision of the countries offering the preferences. For example, Kee, Olarreaga and Silva (2007) show, theoretically and empirically, that the U.S. preferential tariffs given to exporters in Latin America are affected by the influence of foreign lobbies. Silva (2011) also incorporates lobbying by domestic importers (in addition to foreign exporters). In both papers, it

by Bagwell and Staiger (1999), Bond, Riezman and Syropoulos (2004), Freund (2000) and Ornelas (2005a, 2005b), among others. An exception is Tovar (2014), who shows that if individual preferences exhibit loss aversion or if the government's objective is characterized by diminishing marginal political support, a free-trade area can lead member countries to increase their external tariffs.

[9] Several other authors have found that preferences in FTAs induce lower external tariffs—for example, Bohara, Gawande and Sanguinetti (2004) for Mercosur while it was a free trade area, Calvo-Pardo, Freund and Ornelas (2011) for ASEAN, Ketterer, Bernhofen and Milner (2014) and Mai and Stoyanov (2015) for Canada in the context of CUSTA, Kuenzel and Sharma (2020) for a collection of agreements that entered in force in the first decade of this century. On the other hand, Limao (2006) and Karacaovali and Limao (2008) find that the U.S. and the E.U., respectively, lowered MFN tariffs by less during the Uruguay Round in products where they offered trade preferences. Tovar (2012) finds mixed results, depending on the duration of the agreement, for Central America and Caribbean countries. See Freund and Ornelas (2010) and Maggi (2014) for broader discussions of the theoretical and empirical effects of preferential liberalization on countries' external trade policies.

is the government of the importing country (subject to lobbying) that sets the preferences; neither considers internal tariffs that are jointly optimal for the bloc members, as we do. They do not examine how FTAs differ from CUs either. Fugazza and Robert-Nicoud (2014) find that the U.S. is more likely to offer immediate duty-free access under its PTAs on goods that faced larger tariff cuts by the U.S. during the Uruguay Round. In a similar vein, Joshi (2013) finds that products protected by high U.S. MFN tariffs receive less preferential access to the U.S. in the period 1995-2007. Joshi (2011) finds similar results for the E.U. Blanchard (2007) shows that export-platform investment induces the investment-source country to liberalize its tariffs unilaterally, so a small country can earn preferential tariff treatment from a partner by offering a small positive subsidy to the partner's investment in its export sector. Blanchard and Matschke (2015) empirically examine how offshoring affects preferential market access. They find that an increase in exports by foreign affiliates of American multinationals to the U.S. leads to an increase in the rate of preferential duty-free access. They focus on duty-free access provided under FTAs, special trade initiatives, and the Generalized System of Preferences. Their focus is thus not on FTAs versus CUs.[10]

A limitation of our analysis is that we do not address governments' decisions to form a preferential trade agreement and to choose a specific type of PTA. While it would be desirable to incorporate that decision, this is beyond the scope of this paper, mainly because evaluating it empirically is very difficult. One of the first empirical analysis of the economic determinants of the formation of PTAs is by Baier and Bergstrand (2004), but they do not study how governments choose the type of PTA. Liu (2010) investigates whether income inequality helps to explain the choice between full-fledged or partial-scope PTAs, but does not distinguish between FTAs and CUs either. One of the rare studies that do so is Facchini et al. (2021). They study, theoretically and empirically, the factors that induce countries to form PTAs and, conditional on forming one, whether they form an FTA or a CU. They find that PTAs are formed when inequality and trade imbalances among members are not too high. Moreover, if a PTA is formed, then geographical specialization of production favors FTAs over CUs. Since those factors do not seem related to how intra-bloc tariffs are chosen, we feel comfortable in taking the decision to form a given type of PTA as given.

2 A political-economy model for determining preferential margins

We study how intra-bloc tariffs and preferential margins are determined and vary across different types of preferential trade agreements. The main difference between FTAs and CUs is that, under the former, external trade policies are set independently by each member, whereas under the latter external policies are set jointly by all members. Since a member's external tariffs affect the payoff of its bloc partners, this distinct institutional setting implies that, in FTAs, countries need to consider that externality when choosing their intra-bloc tariffs. By contrast, in CUs the externality is internalized when they negotiate their external tariffs.

[10] There is a sizable, related literature that examines the determinants of trade preferences under the Generalized System of Preferences and other nonreciprocal trade agreements. See Ornelas (2016) for a review.

The direction of the externality is, a priori, undetermined. As discussed in section 1.1, much of the theoretical and empirical literature on the topic has emphasized that "tariff complementarity" forces are likely to be present when external tariffs are chosen in the context of PTAs whose main goal is to exchange market access. In that case, lower intra-PTA tariffs tend to induce lower external tariffs. But all else equal, lower external tariffs in a country hurt the interests of its PTA partners. In an FTA, that is unavoidable. But in CUs such negative externality is internalized by the members. The upshot is that, *for given intra-PTA tariffs*, external tariffs tend to be higher in CUs than in FTAs under tariff complementarity.

Now, as FTA members anticipate their individual incentives to lower external tariffs, they take that into account when deciding the level of intra-bloc liberalization. In particular, this may compel them to agree on a set of internal tariffs that would discourage a subsequent large fall in external tariffs. Since that is not a concern for CU members, it does not affect the choice of intra-CU tariffs.

There is also a theoretical and empirical literature that finds "tariff substitutability" in PTAs. It is often associated with trading blocs between developed and developing economies, where the former offer preferential market access in exchange for gains of a nontrade nature.[11] Since most of the PTAs in our sample involve only developing economies, that may not be a first-order force here. Still, it may be present.

In what follows, we develop a simple but flexible theoretical framework that allows for both tariff complementarity and tariff substitutability, and then let the data discriminate between them. The model also generates additional testable predictions, which we investigate in our empirical analysis.

2.1 A canonical model

As we indicate in section 1.1, a wide variety of theoretical models have been used to study the consequences of preferential liberalization. Absorbing all possible mechanisms and forces in a single model would be virtually impossible, and probably very confusing. Accordingly, we follow what is plausibly the most standard type of model used to study preferential liberalization, recognizing that it does not capture all possible relevant forces. Its main virtues are simplicity and coherence with much of the received literature.

Specifically, we consider a competitive model with quasilinear preferences that are separable in each of the N goods in the economy. This structure shuts down income effects and allows us to treat each sector independently. Accordingly, we focus on a single sector where, under free trade, *Home* is an importer and *Partner* is an exporter, with the understanding that an entirely analogous analysis can be carried out in sectors where *Partner* is the importer and *Home* is the exporter.

We consider that *Home* and *Partner* are small countries, which take world prices as given. This eliminates terms-of-trade motivations for protection against imports from other countries. That assumption simplifies the analysis and seems appropriate in our setting of Latin American

[11] For example, as in the preferences offered unilaterally by the U.S. to the Andean countries in 1991 (under the Andean Trade Preference Act), where the main American goal was to ensure cooperation to fight illegal drugs trade.

countries.[12] The main drawback is that it shuts down the incentives of CU members to increase external tariffs to exploit their joint market power in world markets. However, since this effect has been much discussed in the literature and affects only the bloc's external tariffs, it is worth leaving it aside to concentrate on the forces that shape the bloc's internal tariffs and preference margins. Moreover, since the countries in our sample are relatively small in the world market, its empirical relevance should be limited in our setting.

Governments choose tariffs by maximizing a weighted sum of producer surplus and national welfare, defined as the sum of consumer surplus (CS), tariff revenue (TR) and producer surplus (PS). As is well known, this approach can be interpreted as a reduced-form version of a model where the government exchanges protection for campaign contributions, as in Grossman and Helpman (1994). We leave nontrade issues out of the analysis.

Thus, in the absence of trade agreements, the *Home* government's payoff is given by

$$G(p) = CS(p) + TR(p) + (1+b)PS(p),$$

where p denotes the domestic price of the good and b reflects *Home*'s political-economy bias toward the interests of domestic producers. In equilibrium, $p = p_w + \tau$, where p_w denotes the world (untaxed) price of the good and τ is the MFN (specific) tariff. Since the country is small, p_w is fixed from *Home*'s perspective. The interior solution for *Home*'s politically optimal tariff is such that

$$\frac{dG(p)}{d\tau} = \frac{dCS(p)}{dp} + M(p) + \tau M'(p) + (1+b)\frac{dPS(p)}{dp} = 0,$$

where $M(p)$ represents *Home*'s import demand and " $'$ " indicates a derivative. Using Roy's identity and Hotelling's lemma, this expression can be simplified as

$$\tau^{mfn} M'(p) + bS(p) = 0, \tag{1}$$

where $S(p)$ denotes *Home*'s supply. Equation (1) shows that the politically optimal tariff under no discrimination, τ^{mfn}, trades off the conventional distortions due to lower imports against the political-economy benefit conferred to domestic producers.[13] Clearly, *Home*'s government would choose a free-trade policy if it were not for its political-economy motives ($b > 0$).

Similarly, the *Partner*'s government payoff is given by

$$G^*(p^*) = CS^*(p^*) + (1+b^*)PS^*(p^*),$$

where subscript $*$ denotes *Partner* variables. Note that, since the country exports the good, there is no tariff revenue. In the absence of a PTA, *Partner*'s consumer and producer prices are equal

[12] For a similar model that includes terms-of-trade effects (but assumes that intra-bloc tariffs are eliminated and considers only FTAs), see Ornelas (2005a).

[13] It is straightforward to check that this corresponds to Grossman and Helpman's (1994) formula for the politically optimal tariff when the industry is organized and the fraction of the population that owns capital in politically organized industries is negligible.

to the world price of the good: $p^* = p_w$.[14] Accordingly, without a PTA, *Partner* is unaffected by *Home*'s trade policies.

Let us consider now the situation where *Home* is in a PTA with *Partner*. There are two tariffs that need to be chosen, *Home*'s internal tariff τ_i, which applies to the imports coming from *Partner*, and its external tariff τ_e, which applies to the imports coming from countries outside the bloc. We focus on the case where *Partner*'s supply is unable to fulfill all of *Home*'s import demand at the initial (pre-PTA) level of *Home*'s tariff, even if the PTA internal tariff were eliminated. Using Grossman and Helpman's (1995) taxonomy, this is the case of "enhanced protection," and is arguably the most appropriate in our setting of Latin America countries. The reason is that, in this case, under the PTA *Home* imports from both *Partner* and the rest of the world. In contrast, in the other two cases considered by Grossman and Helpman (1995) *Home*'s import demand is fully satisfied by within-bloc imports, unlike what we observe in our sample (described in the next section), where the share of imports from PTA partners is above 95 percent in only 0.1% of the observations.

When *Home* keeps importing from the rest of the world under the PTA, the equilibrium price for consumers and producers there remains given by the world price added by the tariff on rest-of-the-world imports: $p = p_w + \tau_e$. It follows from this observation that τ_i does not affect the total level of *Home*'s imports, only its composition. In turn, producer price in *Partner* becomes

$$p^* = p_w + \tau_e - \tau_i. \tag{2}$$

That is, the producers from *Partner* are now able to enjoy the higher price in *Home*, moderated by their preferential tariff, regardless of the type of PTA. Clearly, if $\tau_e = \tau_i$, there is no preference and we return to the no-PTA case.

Consumer price in *Partner*, on the other hand, will depend on the type of agreement. Under a CU, consumer and producer prices must be equal in *Partner*, which shares *Home*'s external tariff, τ_e. Furthermore, all demand in *Partner* is fulfilled by its producers, so imports there remain nil. To see that, suppose instead that *Partner*'s producers sold everything in *Home*, obtaining price p^* defined in (2). Then, *Partner*'s consumers would need to import from the rest of the world and pay $p_w + \tau_e$ per unit. Since this is higher than p^*, *Partner*'s producers would have an incentive to shift sales back to *Partner*, pushing consumer prices there down until they reached p^*.[15] Analogously, if consumer price in *Partner* were below p^*, then its producers would shift sales to *Home*, raising consumer prices in *Partner* until they reached p^*. Hence, under a CU, both consumer and producer prices in *Partner* are given by p^*, as defined in (2).

In contrast, in an FTA, where external tariffs are not coordinated, consumer price in *Partner* depends on its external tariff. However, it is easy to see that *Partner* would not have any incentive to raise its external tariff above zero under the FTA. The reason is that $\tau_e^* > 0$ would distort

[14] To avoid departing from our main points, we rule out export subsidies, which are also generally prohibited by the WTO.

[15] We know that $M^*(p_w + \tau_e - \tau_i) = 0$ because $M^*(p_w) = 0$, since *Partner* exports the good under free trade.

consumption without helping its producers, who enjoy the price given by (2) in *Home*'s market regardless of *Partner*'s own trade policies.[16] As a result, under an FTA, consumer price in *Partner* remains at p_w and demand is fully satisfied by imports from the rest of the world. Meanwhile, all *Partner* suppliers sell their output in *Home*, where they receive a higher price.

We first consider the case when the countries form a customs union, and then turn to the case when they form a free trade area. Since in our empirical analysis we consider mostly agreements notified to the WTO under the Enabling Clause, which imposes virtually no constraint on how members define internal and external tariffs, we impose no such constraints in our theoretical analysis either.

2.2 Customs union

In a customs union, the interests of all members are considered in the choice of internal and external tariffs, with members negotiating both of them. It is therefore natural to think of a single-stage process where members choose simultaneously τ_i and τ_e to maximize the joint payoff of the two governments.[17,18]

For the *Home* government, the difference from (1) is that now tariff revenue also depends on the internal tariff and on the volume of imports that comes from *Partner*.[19] Specifically, $TR_{CU}(p, p^*) = \tau_e \left[M(p) - E^*(p^*)\right] + \tau_i E^*(p^*)$, where $E^*(p^*)$ denotes *Partner*'s export supply function, $E^*(p^*) = S^*(p^*) - D^*(p^*)$, and $D^*(p^*)$ represents *Partner*'s demand for the good.

After some manipulation, we obtain the following first-order necessary condition for the politically optimal external tariff:

$$\begin{aligned} \frac{dG_{cu}(p,p^*)}{d\tau_e} + \frac{dG^*_{cu}(p^*)}{d\tau_e} &= \left[\tau_e M'(p) - (\tau_e - \tau_i)\, E^{*\prime}(p^*) - E^*(p^*) + bS(p)\right] + \left[E^*(p^*) + b^* S^*(p^*)\right] = 0 \\ &\Leftrightarrow \quad \tau_e M'(p) + bS(p) - (\tau_e - \tau_i)\, E^{*\prime}(p^*) + b^* S^*(p^*) = 0. \end{aligned} \tag{3}$$

Equation (3) incorporates the forces present in (1) but also a concern with the cost of increasing trade diversion (the third term of the equation) and with *Partner*'s political-economy motivations (the fourth term). Observe that the term $E^*(p^*)$ appears negatively and positively in the first line of equation (3). It can be thought of as a bilateral terms-of-trade transfer between the two

[16] Observe that *Partner* is unable to induce a price above the one given by (2) through its choice of τ_e^*, because the excess of supply from its producers would push the price down.

[17] We implicitly assume that the distribution of gains between the two countries, which may reflect some measure of bargaining power, can be settled with non-distortionary transfers or other similar nontrade instruments.

[18] It should be noted that the mechanism through which common external tariffs are chosen in CUs is a matter of debate. The most common approach is that of Gnutzmann and Gnutzmann-Mkrtchyan (2019), where a supranational institution sets tariffs to maximize members' joint payoff, in line with earlier analyses of CUs such as Kennan and Riezman (1990) and Ornelas (2007). We follow this more conventional approach, but there are alternatives, as in Facchini, Silva and Willmann (2013) and Melatos and Woodland (2009). For example, Facchini et al. (2013) consider that the population elects a representative to carry out trade policies. A key finding is that the median voter would want to delegate policymaking to a more protectionist type in CUs. Despite the distinct mechanism, the flavor of their main result is similar to what the broader literature argues, i.e., that CUs tend to be more protectionist than FTAs because they coordinate external policies.

[19] Because of that, under both a CU and an FTA, *Home*'s objective function depends explicitly on p^*.

CU members. As τ_e rises, *Partner*'s exporters obtain a higher price and their surplus increases in tandem with $E^*(p^*)$. At the same time, *Home* forgoes tariff revenue of the same amount by importing from *Partner*.

In turn, the politically optimal internal tariff in a CU solves

$$\begin{aligned} \frac{dG_{cu}(p,p^*)}{d\tau_i} + \frac{dG^*_{cu}(p^*)}{d\tau_i} &= \left[(\tau_e - \tau_i)\, E^{*\prime}(p^*) + E^*(p^*)\right] - \left[E^*(p^*) + b^* S^*(p^*)\right] = 0 \\ &\Leftrightarrow \quad (\tau_e - \tau_i)\, E^{*\prime}(p^*) - b^* S^*(p^*) = 0. \end{aligned} \tag{4}$$

Thus, the optimal internal tariff trades off the benefits of reducing the cost of trade diversion against the loss from sacrificing *Partner*'s political-economy goals. Clearly, there would be no reason for offering a preference to *Partner* if it were not for its political-economy motives ($b^* > 0$).

In a CU, both equations (3) and (4) must be satisfied simultaneously to generate the equilibrium external and internal CU tariffs, τ_e^{cu} and τ_i^{cu}. Substituting (4) into (3), we obtain

$$\tau_e^{cu} M'(p) + bS(p) = 0, \tag{5}$$

which is exactly condition (1). Hence, we have that $\tau_e^{cu} = \tau^{mfn}$:

Result 1 *Starting from a nondiscriminatory policy, the external tariff does not change upon the formation of a CU.*

Although this result may appear surprising, the intuition is straightforward. In a CU, members have two instruments at their disposal to maximize a single objective function. One instrument, τ_e, addresses *Home*'s political-economy issues and distortions in the *Home* market driven by total imports, since both issues depend only on the external tariff—just like an MFN tariff does in the absence of a PTA.

In contrast, the other instrument, τ_i—or more precisely, the preferential margin, $\tau_e^{cu} - \tau_i^{cu}$—takes care of the partner country's political-economy issues and of the distortions driven by trade diversion, both of which depend on the degree of tariff preference.[20] To see that, solve (4) for τ_i^{cu} to obtain

$$\tau_i^{cu} = \tau_e^{cu} - \frac{b^* S^*(p^*)}{E^{*\prime}(p^*)}. \tag{6}$$

The first term reflects the fact that equalizing internal and external tariffs neutralizes trade diversion. On the other hand, doing so would eliminate the political-economy gains of *Partner*; the second term takes that consideration into account. We can rewrite (6) as $\tau_e^{cu} - \tau_i^{cu} = \frac{b^* S^*}{E^{*\prime}}$. Expressing the preferential margin in ad valorem terms, defining $\varepsilon_E^* \equiv p^* E^{*\prime}/E^*$ as the elasticity of export supply of *Partner* faced by *Home*, and manipulating, we obtain

$$\frac{\tau_e^{cu} - \tau_i^{cu}}{p^*} = \frac{b^* S^*(p^*)}{\varepsilon_E^* E^*(p^*)}. \tag{7}$$

[20] Ludema et al. (2015) make a similar point in the context of a competing-exporters model where PTA members always choose internal and external tariffs jointly, regardless of the type of PTA.

This yields our second result.

Result 2 *The ad valorem preferential margin of the importing country in a CU increases with the supply of the partner country and, under a constant elasticity of export supply, decreases with the level of intra-bloc exports of the partner country.*

Observe that expression (7) can be interpreted as the analog of the politically optimal margin of preference in a CU of Grossman and Helpman's (1994) unilateral politically optimal tariff, where import demand elasticity is replaced by *Partner*'s export supply elasticity and the inverse import demand penetration ratio is replaced by *Partner*'s supply/exports ratio. This reflects the finding that larger industries are politically more relevant and, therefore, become more protected, where the rationale is applied here to preferential margins.

There are three additional points to notice. First, if political-economy forces in *Partner* are sufficiently large (i.e., b^* is large), then $\tau_i^{cu} = 0$ (assuming import subsidies are not feasible) and the margin of preference is equal to the external tariff. In that case, the relationships in Result 2 become muted in the neighborhood of the equilibrium. Second, the results above are for the intra-bloc tariffs and preferential margins of the bloc's importing country. For the exporting country, τ_i is undetermined, because it is inconsequential. It is plausible, however, that it may follow the same pattern if the countries also harmonize their intra-bloc tariffs. Third, the factors that shape MFN tariffs in the absence of a PTA do not affect CU preferential margins.

2.3 Free trade area

Let us now consider a free trade area. In an FTA, the essence of the agreement is the negotiation of the intra-bloc tariffs. On the other hand, members set their external tariffs independently, so the politically optimal external tariff maximizes the payoff of the *Home* government alone. It is therefore natural to think of a two-stage process where, first, the members choose jointly τ_i and, subsequently, *Home* selects τ_e taking τ_i as given. Recall that, in contrast to the case of a CU, in an FTA the whole supply from *Partner* is sold in *Home*.

Thus, in stage 2, τ_i has already been determined. Therefore, the choice of τ_e satisfies

$$\frac{dG_{fta}(p, p^*)}{d\tau_e} = 0. \tag{8}$$

After some manipulation, we obtain

$$\frac{dG_{fta}(p, p^*)}{d\tau_e} = \tau_e M'(p) + bS(p) - (\tau_e - \tau_i)\, S^{*\prime}(p^*) - S^*(p^*) = 0. \tag{9}$$

This expression defines the FTA external tariff implicitly, as a function of its internal tariff, $\tau_e^{fta}(\tau_i)$.

Comparing equations (9) and (3), one can see that, relative to the forces that shape the external tariff in a CU, there are three differences under an FTA. First, there is a terms-of-trade loss vis-à-vis *Partner* ($-S^*$) that *Home* considers when choosing its external tariff in an FTA, but which is

neutralized in a CU because it corresponds to a simple transfer of surplus between the bloc members. Observe that this bilateral terms-of-trade effect arises despite our assumption that PTA members do not affect world prices. Second, *Partner*'s political-economy motives (b^*S^*) are internalized in a CU, but not in an FTA. Third, since $S^{*\prime} < E^{*\prime}$ for any downward-sloping demand in *Partner*, a given increase in τ_e induces a smaller export response from *Partner* under an FTA than under a CU, because in the former case *Partner*'s domestic demand is not affected by τ_e. That makes the sensitivity of trade diversion to the preferential margin lower in FTAs than in CUs—an observation that, to our knowledge, is novel in the literature.

A similar comparison can be made with the MFN tariff. Comparing equations (9) and (1), it follows that, besides the forces that shape the MFN tariff, there are two additional forces determining the external tariff under an FTA. First, there is *Home*'s terms-of-trade loss vis-à-vis *Partner*, which is not an issue when tariffs are nondiscriminatory. Second, in an FTA there is a concern with the distortions driven by trade diversion, $[-(\tau_e - \tau_i) S^{*\prime}]$. For both reasons, the external tariff in an FTA will be lower than the MFN tariff. Thus, we have that:

Result 3 *Starting from a nondiscriminatory policy, the external tariff falls upon the formation of an FTA.*

In stage 1, *Home* and *Partner* select jointly the level of τ_i. We consider that they do so as to maximize their joint payoff.[21] In this process, FTA members need to take into account how the external tariff will be chosen when defining their intra-bloc tariff. That 'reaction function' is obtained implicitly from the first-order condition (9). Differentiating implicitly that expression, we obtain

$$\frac{\partial \tau_e^{fta}}{\partial \tau_i} = -\frac{1}{SONC_{\tau_e}} \left[2S^{*\prime}(p^*) + (\tau_e - \tau_i) S^{*\prime\prime}(p^*) \right], \tag{10}$$

where $SONC_{\tau_e} < 0$ represents the second-order necessary condition for τ_e^{fta} to be a maximum. When τ_i increases, two elements in equation (9) change. First, *Home*'s terms-of-trade loss vis-à-vis *Partner* is alleviated as S^* falls. This allows for a higher external tariff. Second, the marginal loss from trade diversion also changes. The direct effect of a higher τ_i lowers trade diversion, further inducing an increase in τ_e^{fta}. But if S^* has a curvature, τ_i affects trade diversion also through a change in the slope of S^*. That can make trade diversion more or less severe at the margin, depending on the sign of $S^{*\prime\prime}$. Mathematically, the expression in brackets in (10) is surely positive when the difference between internal and external tariffs is sufficiently small, or when $S^{*\prime\prime}$ is not too negative (as, for example, with a linear supply curve). In those cases, we have tariff complementarity $\left(\frac{\partial \tau_e^{fta}}{\partial \tau_i} > 0 \right)$ for sure. If instead Partner's supply curve were very concave and the difference $(\tau_e - \tau_i)$ were sufficiently large, so that the expression in brackets becomes negative, then we would have tariff substitutability $\left(\frac{\partial \tau_e^{fta}}{\partial \tau_i} < 0 \right)$.

We can now see how the objective function of each government varies with the intra-FTA tariff.

[21] Again, we assume the availability of inter-governmental transfers or equivalent policies to fine tune the distribution of gains between the two governments.

After some manipulation, we obtain

$$\begin{aligned}\frac{dG_{fta}(p,p^*)}{d\tau_i} &= \frac{\partial \tau_e^{fta}}{\partial \tau_i}\left[\tau_e M'(p) + bS(p)\right] + \left(1 - \frac{\partial \tau_e^{fta}}{\partial \tau_i}\right)\left[S^*(p^*) + (\tau_e - \tau_i)\, S^{*\prime}(p^*)\right] \\ &= S^*(p^*) + (\tau_e - \tau_i)\, S^{*\prime}(p^*) \geq 0,\end{aligned}$$

where we use (9) to go from the first to the second equality, and

$$\frac{dG^*_{fta}(p^*)}{d\tau_i} = -\left(1 - \frac{\partial \tau_e^{fta}}{\partial \tau_i}\right)(1+b^*)\, S^*(p^*) \leq 0.$$

Clearly, for *Home*, higher intra-bloc tariffs are preferable, to avoid trade diversion and terms-of-trade losses. Conversely, for *Partner*, lower intra-bloc tariffs are desirable, for terms-of-trade and political-economy motives, and the more so, the smaller is tariff complementarity, $\frac{\partial \tau_e^{fta}}{\partial \tau_i}$.[22]

Since the two countries choose τ_i jointly, in an interior equilibrium the choice of τ_i in an FTA satisfies

$$\frac{dG_{fta}(p,p^*)}{d\tau_i} + \frac{dG^*_{fta}(p^*)}{d\tau_i} = \frac{\partial \tau_e^{fta}}{\partial \tau_i}(1+b^*)\, S^*(p^*) + (\tau_e - \tau_i)\, E^{*\prime}_{fta}(p^*) - b^* S^*(p^*) = 0, \qquad (11)$$

where we have used the fact that, in FTAs, $E^{*\prime}_{fta}(p^*) = S^{*\prime}(p^*)$. Relative to the first-order necessary condition defining τ_i in a CU, equation (4), the difference is given by the first two terms. The first, which does not play any role in CUs, indicates how the *Partner*'s government valuation of its producer surplus is affected by the changes in τ_e^{fta} that follow an increase in τ_i. The other, $E^{*\prime}_{fta}$, which is smaller than its counterpart under a CU, $E^{*\prime}$, provided that *Partner*'s demand is downward sloped, reflects the lower sensitivity of trade diversion to changes in τ_i in FTAs, relative to CUs.

Therefore, if there is tariff substitutability $\left(\frac{\partial \tau_e^{fta}}{\partial \tau_i} < 0\right)$, intra-FTA tariffs ($\tau_i^{fta}$) will be lower than intra-CU tariffs (τ_i^{cu}) for sure. If instead there is tariff complementarity $\left(\frac{\partial \tau_e^{fta}}{\partial \tau_i} > 0\right)$, and that effect is sufficiently strong, intra-FTA tariffs (τ_i^{fta}) will be higher than intra-CU tariffs (τ_i^{cu}). Rewriting (11) as

$$\frac{\tau_e^{fta} - \tau_i^{fta}}{p^*} = \frac{b^* S^*(p^*)}{p^* E^{*\prime}_{fta}(p^*)} - \frac{\partial \tau_e^{fta}}{\partial \tau_i}\frac{(1+b^*)\, S^*(p^*)}{p^* E^{*\prime}_{fta}(p^*)}, \qquad (12)$$

an analogous conclusion can be reached about the preferential margin of the the two types of blocs. Because $E^{*\prime}_{fta} < E^{*\prime}$, the margin of preference will tend to be greater in FTAs than in CUs. This difference would be reinforced under tariff substitutability. In contrast, the margin of preference will be greater in CUs than in FTAs if there is tariff complementarity and that force is sufficiently strong to offset the difference between $E^{*\prime}_{fta}$ and $E^{*\prime}$. The next result then follows.

Result 4 *If intra-FTA tariffs are higher than intra-CU tariffs, then there must be tariff complementarity. But if intra-FTA tariffs are lower than intra-CU tariffs, then tariff substitutability may*

[22] It is easy to show that $\frac{\partial \tau_e^{fta}}{\partial \tau_i} < 1$. But as $\frac{\partial \tau_e^{fta}}{\partial \tau_i}$ approaches one, the margin of preference in *Home*'s market, which is what *Partner* cares about, becomes less sensitive to changes in τ_i.

be present. Similarly, if the margin of preference is greater in CUs than in FTAs, then there must be tariff complementarity. But if the margin of preference is smaller in CUs than in FTAs, then tariff substitutability may be present.

Furthermore, observe that there is no longer a clear distinction between what each policy instrument targets, as in a CU. In an FTA, the preference margin addresses trade diversion and the political economy interests of *Partner*, as in a CU, but also purely domestic issues through $\frac{\partial \tau_e^{fta}}{\partial \tau_i}$, unlike in a CU. Note, in particular, that $\tau_e M' + bS = (\tau_e - \tau_i) S^{*\prime} + S^* > 0$ from (9), where the left-hand side corresponds to the terms that shape the MFN tariff in the absence of a PTA. Hence, the factors that shape MFN tariffs in the absence of a PTA also affect FTA preferential margins.

On the other hand, the individual roles of *Partner*'s supply and exports on the margin of preference are undetermined in FTAs, since in the enhanced protection case they equal each other. In fact, for that reason (12) can be rewritten as

$$\frac{\tau_e^{fta} - \tau_i^{fta}}{p^*} = \frac{b^*}{\varepsilon^*_{E_{fta}}} - \frac{\partial \tau_e^{fta}}{\partial \tau_i} \frac{1 + b^*}{\varepsilon^*_{E_{fta}}},$$

where ε^*_{Efta} corresponds to the elasticity of export supply of *Partner* under an FTA.

Results 1 and 3 indicate how external tariffs change when a PTA is formed. As discussed in section 1.1, numerous authors have carried out analyses of that issue. On the other hand, our theoretical results about preferential margins are novel. And they can be tested. This is what we do with the data that we describe in the next section.

3 Data

3.1 Latin America's trade liberalization in the 1990s

Most Latin American countries undertook trade liberalization reforms in the late 1980s and early 1990s. Nondiscriminatory tariff levels and their dispersion were reduced. Moreover, and crucially for our objective, numerous preferential trade agreements were negotiated and implemented throughout the 1990s.

The two main agreements in Latin America at that time started out as FTAs but went on to become CUs. First, Argentina, Brazil, Paraguay and Uruguay signed the Treaty of Asunción on March 26, 1991, to create Mercosur. Established as an FTA, the agreement determined successive intra-bloc tariff cuts until the end of 1994 (Annex 1 of the Treaty of Asunción). It also indicated the goal of becoming a common market with a common external tariff by the end of 1994 (Article 1 of the Treaty of Asunción). Indeed, the Protocol of Ouro Preto, signed on December 16, 1994, modified the Treaty of Asunción by changing its institutional structure and converted Mercosur into a customs union via the implementation of the common external tariff from 1995 onwards (Zelicovich, 2015).[23]

[23] Temporary exceptions from the common external tariff were established for some goods. Venezuela (currently under suspension) joined in 2006, and Bolivia's membership is formally in process.

The Protocol of Ouro Preto also created various organizations for the functioning of the CU (Article 1 of the Protocol of Ouro Preto). Among them, the *Comisión de Comercio de Mercosur* was created as the institution in charge of overseeing the application of the common trade policy instruments that were agreed upon for the operation of the CU, as well as all matters related to the common trade policy and international trade among Mercosur members and with third countries (Article 16).

The other main Latin American PTA during the 1990s was the Andean Community (CAN). It was formed much earlier, on May 26, 1969, by Bolivia, Chile, Colombia, Ecuador and Peru under the Cartagena Accord. Venezuela joined in 1973 and Chile withdrew in 1976. The members intended to subsequently form a Latin American common market (Article 1 of the Cartagena Accord) and to start the process to become a CU on December 31, 1976, by moving toward a common external tariff, which would be in full force by December 31, 1980 (Article 3 and Chapter VIII of the Cartagena Accord). However, adjustment policies implemented to solve the macroeconomic and debt crisis in the early 1980s led to unilateral increases in trade barriers and the widespread removal of trade preferences among CAN members. As a result, by the mid-1980s the agreement was essentially moribund, being revived only in 1991.[24] Subsequently, in 1995, the bloc became formally a CU, with its members adopting a common external tariff for most tariff lines, with some exempted products in each country. The exception was Peru, which never adopted the common external tariff.[25] CAN also has an extensive institutional structure, which Xenias (2006) describes as unique in the developing world, and with many similarities to the European Union. Moreover, after the implementation of the common external tariff, the bloc acted as a whole in the negotiations of the extension of the Andean Trade Preference Act with the US, the renewal of the GSP with the EU, and an agreement with Mercosur. Toward the end of the 2000s (after our sample period), individual countries started to sign trade agreements individually as well.

Besides CAN and Mercosur, there were other bilateral agreements signed in the region during the 1990s. Chile formed PTAs with Venezuela (since 1993), Colombia (1994), Peru (1998) and Mexico (1998). Mexico also started agreements with Colombia and Venezuela under the Group of Three (1994), with the United States and Canada under NAFTA (1994), and with Costa Rica (1995). All of these agreements, which are FTAs, are also included in our dataset (discussed in the next subsection). The dataset does not contain information of partial-scope agreements, such as Latin American Integration Association, but these typically offer only small preferences on a narrow set of products.

3.2 Sources and a first glimpse of the data

We use tariff data for ten Latin American countries—Argentina, Brazil, Chile, Colombia, Ecuador, Mexico, Peru, Paraguay, Uruguay and Venezuela—for the period 1990-2001. Preferential tariff data originate from the tariff liberalization schedules from the trade agreements discussed in the previous

[24] See Casas and Correa (2007) and Creamer (2009).

[25] Peru also suspended its regional-integration obligations in August, 1992, but in 1997 it started its re-integration.

subsection, and indicate by how much tariffs should be cut each year for each country and good. Because PTAs had different tariff nomenclatures (e.g., NANDINA, NALADISA, HS), preferential tariffs had to be aggregated into 4-digit ISIC industries to obtain a common nomenclature, since conversion tables were only available for ISIC codes. Aggregation was made by taking simple averages.[26] One limitation of the data on the preferential tariffs is that it does not include departures from the schedule of tariff reductions that may have taken place subsequently. MFN tariff data are from the World Integrated Trade Solution (WITS), also aggregated into 4-digit ISIC sectors using simple averages.

This dataset was first used by Estevadeordal et al. (2008), and subsequently also by Crivelli (2016) and Tovar (2019). However, unlike in those papers, we use it fully. That is, we consider every *bilateral* relationship with a preferential tariff. In contrast, because the previous papers only sought to explain changes in external tariffs, which are defined at the country-sector level, they needed to aggregate the internal tariffs for each country-sector pair. Also, since countries may belong to multiple PTAs at the same time, previous studies had to decide how to measure the preferential rate for a given country, industry and year (e.g., by using the minimum of the preferential tariffs given to different PTA partners in that industry-year). In contrast, we use the actual preferential rate, which is defined at the bilateral level for each industry-year pair.

We include all country-partner-industry-year observations for which a country and partner have a PTA. Since preferential tariff data start in 1991, our estimation sample effectively begins in 1991. If there is a PTA in force but no preference is offered to a certain partner in a given sector and year, the preferential tariff is equal to the MFN tariff, reflecting the countries' decision to exclude that sector. Those observations with zero preferential margin are included in our sample, but represent only 5.6 percent of the sample. We drop the (few) observations where the MFN tariff is zero, since in those cases there is no scope for preferences.

Data on MFN tariff bindings (which we use as robustness in our empirical analysis) are from the WTO, available from WITS. To obtain preferential imports, we use annual bilateral import data for each product from COMTRADE, also available from WITS. We also use COMTRADE trade data to calculate annual product-level exports by each PTA partner of our sample countries to the rest of the world (that is, exports to the world minus exports to each PTA partner in the sample), and to countries that are comparable in terms of income to the importing country. We use these data to construct our instrumental variables for preferential imports, which we describe later. Finally, we use data on output for the PTA partners of our sample countries from the World Bank's Trade and Production database (Nicita and Olarreaga, 2007). Output data is only available at the three-digit ISIC level; therefore, we assign each 3-digit ISIC level value of output to all the 4 digit-ISIC level observations that belong to that 3-digit ISIC industry. For that reason, we adjust the standard errors for clustering at the country-industry (three-digit ISIC) level in all regressions.[27]

[26] See Estevadeordal et al. (2008) for additional details. In particular, the dataset does not contain information on Bolivia.

[27] Output data for Brazil are missing for many industries and there is no data for Paraguay. Thus, we do not include those two countries as exporters (*Partner* countries) in our analysis. Nonetheless, they are included as importers

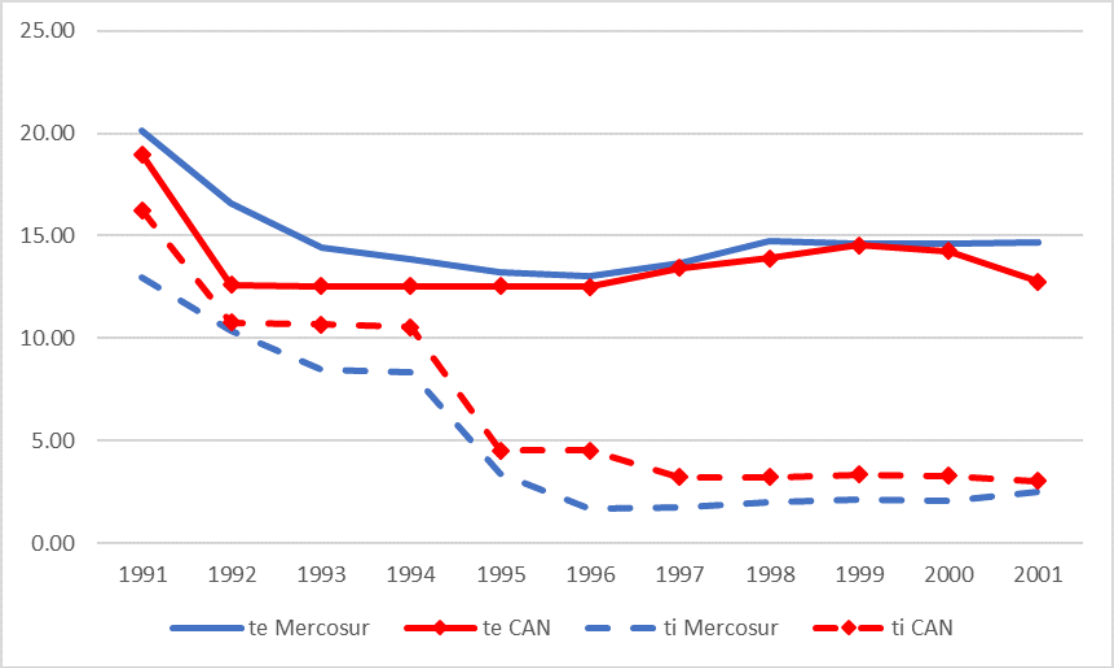

Fig. 1: External and Internal Tariffs: From FTAs to CUs

Figure 1 shows average external and internal tariffs for Mercosur (i.e., for Argentina, Brazil, Uruguay and Paraguay) and the Andean Community (Colombia, Ecuador and Venezuela), the two Latin American PTAs that started out as FTAs and went on to become CUs, from 1991-2001.[28] First, focusing on external tariffs, for both trade agreements the external tariffs fall during the FTA period (1991-1994) and increase slightly during the CU period (1995-2001), consistent with our theoretical framework (Result 3 and Result 1, respectively). Second, internal tariffs are lower when the agreements take the form of CUs than when they are FTAs, consistent with the theoretical model under tariff complementarity (Result 4). Specifically, the average internal tariff in Mercosur went from 13 percentage points (p.p.) in 1991 to 8.3 p.p. in 1994 (i.e., a decrease of 36 percent during the FTA period), and then it fell further to 3.4 p.p. in 1995, during the first year of the CU (a decrease of 59 percent in only one year), with further moderate decreases thereafter. In turn, the average internal tariff in the Andean Community fell from 16.3 p.p. in 1991 to 10.6 p.p. in 1994 (a decrease of 35 percent during the FTA years), and then further to 4.5 p.p. in 1995 (a 58 percent fall in the first year of the CU), followed by additional cuts, reaching 3 p.p. in 2001.

Because of those differences in the behavior of external and internal tariffs, preferential margins are significantly higher during the CU period than during the FTA period for both trade agreements, as shown in Figure 2. Furthermore, considering all the PTAs in our sample, we find that the average preference margin for FTAs during the sample period is 6.6 p.p., while the average preference margin for CUs is 10.8 p.p., with the difference in the means being statistically significant at the 1% level.

(*Home* countries).

[28] We do not include Peru in the Andean Community series because, as explained above, it never adopted the common external tariff and it suspended its PTA obligations from 1992 to 1997.

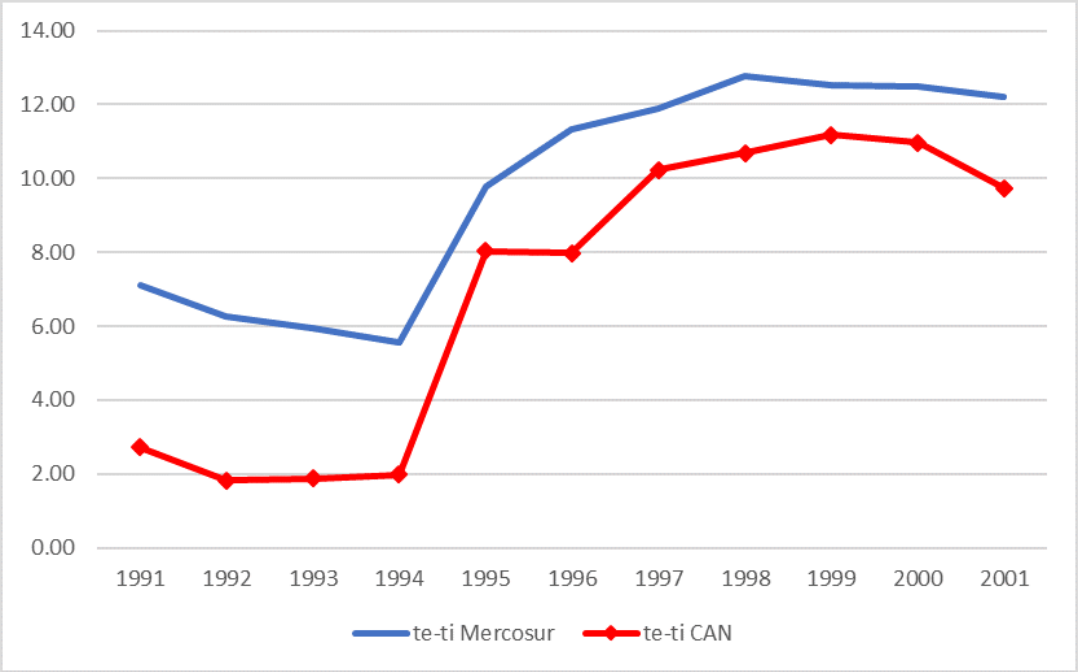

Fig. 2: Preferential Margins: From FTAs to CUs

This initial look at the data indicates, first, that the institutional design of PTAs can matter considerably for the levels of internal and external tariffs and, thus, of preference margins. An implication is that tariffs do not appear to be simply responding to general "liberalization shocks" that would induce lower tariffs across the board, within and outside trading blocs, but rather that the type of PTA seems to matter for how external and intra-bloc tariffs change over time. Second, it is broadly consistent with our theoretical framework under tariff complementarity. We now proceed to the formal empirical analysis.

4 Empirical strategy

Our goal is to understand the main sources of variation of preference margins and how they differ across different types of preferential trade agreements. We do so by testing the specific predictions from our theoretical framework.

Our model has two results (1 and 3) that are specific about *external* tariffs in PTAs. As discussed in the literature review, there is ample support for the prediction that external tariffs fall upon the formation of FTAs (Result 3) among developing economies.[29] By contrast, Estevadeordal et al. (2008) find no evidence that preferential liberalization leads to lower external tariffs in Latin American CUs[30] (in line with Result 1). Since those results have already been established, here we concentrate on testing the predictions that are novel and untested about preferential margins.

[29] For the Latin American countries in our sample, in particular, Estevadeordal et al. (2008), Crivelli (2016) and Tovar (2019) confirm that result using different empirical specifications.

[30] That result is also confirmed by Crivelli (2016) and Tovar (2019).

The model provides two types of predictions about preferential margins in PTAs: (i) how they vary with the institutional design of PTAs; and (ii) how they are affected by the supply and the intra-bloc exports of the partner country; these also vary across types of PTAs. The first prediction depends on whether there is tariff complementarity or tariff substitutability. The findings of the literature in similar settings suggest the prevalence of tariff complementarity, but here we do not need to take a stance. Instead, we can *test* for tariff complementarity. Specifically, Result 4 provides an indirect but clear test for the prevalence of tariff complementarity:

Prediction 1 *If preferential margins are higher in CUs than in FTAs, then there must be tariff complementarity.*

In contrast, the other two testable predictions hold, according to our model (Result 2), regardless of how external tariffs react to internal tariffs in FTAs:

Prediction 2 *In CUs, but not necessarily in FTAs, the margin of preference increases with the supply of partner countries.*

Prediction 3 *In CUs, but not necessarily in FTAs, the margin of preference decreases with the level of intra-bloc imports.*

To test those predictions, our baseline empirical specification has the following form:

$$\begin{aligned} MRG_{jmxt} &= \beta_1 CU_{mxt} + \delta_1 S^*90_{jx} + \delta_2 \left(S^*90_{jx} \times CU_{mxt}\right) + \gamma_1 E^*90_{jmx} \\ &\quad + \gamma_2 \left(E^*90_{jmx} \times CU_{mxt}\right) + \varepsilon_{jmxt}, \end{aligned} \tag{13}$$

where MRG_{jmxt} denotes the difference between the ad valorem external and internal tariff on industry j offered by importer m to its PTA partner x in year t; CU_{mxt} is a dummy variable equal to one when both the importer m and the exporter x belong to a CU in year t (i.e., when both belong to either Mercosur or CAN from 1995 onwards) and equal to zero when m and x belong instead to an FTA in year t; S^*90_{jx} is the log of the production value in sector j of PTA partner x in 1990; and E^*90_{jmx} denotes the log of imports of country m in sector j coming from PTA partner x in 1990. Recall that 1990 is the first year of our sample, and the agreements in our sample start to be implemented in the subsequent year.

Prediction 3 relies on the level of preferential imports, which is clearly endogenous to the preferential tariffs. Prediction 2 depends on the supply of the PTA partner in the sector, which could be endogenous as well, although the problem is likely to be less severe because PTA partner's output is measured at a greater level of aggregation. We deal with those issues in two different ways. First, as already indicated in equation (13), we use the pre-agreement log of preferential imports and of partner supply, which by design are unaffected by the tariff changes implemented by the agreements. While pre-agreement variables are not completely immune to endogeneity, they avoid the problem of reverse causality, which we believe is, by some distance, the first-order endogeneity problem in this type of analysis. A drawback is that the value does not change over time.

Second, we run a similar specification using instead the lagged value of preferential imports and of partner supply. Using lagged variables is likely to attenuate the endogeneity due to reverse causality. However, it is unlikely to fully solve the problem, especially if there is persistence over time. To address that problem, we use an instrumental variables strategy, whereby we instrument for the log of lagged preferential imports (with and without the CU interaction) using the lagged PTA-partner log of exports to the rest of the world.[31] Specifically, the instrument $E^*_{jr(m)xt}$ is defined as the exports to the rest of the world (i.e., excluding the importing country m) of country m's PTA partner x in product j in year t.[32] This instrumental variables strategy follows the approach of Autor et al. (2013) and subsequent studies that also predict bilateral imports using the exporting country's exports to other countries in the world.

The rationale for the instrument is that higher exports of a product by a PTA partner of country m to the rest of the world should be positively correlated with its exports of that product to country m, both being at least partially driven by the country's comparative advantage. This is confirmed by the first-stage regressions in Table A1 in the Appendix, where the coefficient of lagged exports by the partner to the rest of the world is positive and significant in columns 5 and 6.[33] Furthermore, to satisfy the exclusion restriction, the level of a product's exports to the rest of the world by a PTA partner should not affect that country's intra-bloc tariff choice. Indeed, in our model intra-PTA tariffs are not affected by PTA-partners' exports to the rest of the world, and the same applies to other models of endogenous intra-PTA tariffs (discussed in section 1.1). We also use, as an alternative instrument, the exports by the PTA partner to countries that are income-comparable to country m (instead of exports to the rest of the world), as explained in more detail below.

We instrument for the supply of the PTA partner with the average output of the three countries in the sample that have their output most correlated with the output of the PTA partner, but which are *not* PTA-partners of country m at any point during the sample period, $S^{avother}_{jxt}$. We use non-PTA partners because preferences given to different PTA-partners could be correlated. Again, we use the log of its lagged value to instrument for the log of the lagged output of the PTA partner. We also obtain data for other Latin American countries for which data on output is available (Bolivia, Guatemala and Honduras), to strengthen the correlation of the instrument with the endogenous variable. The instrument (and its interaction with CU_{mxt}) is a statistically significant predictor of output of the PTA partner (and of its interaction with CU_{mxt}), as shown by the positive and statistically significant coefficients in columns 1 and 2 (respectively, 3 and 4) of Table A1. Moreover, according to our model, the output of non-PTA partners of a country is not expected to affect that

[31] This instrument is inspired by a variable used by Kuenzel and Sharma (2020) as part of a measure of the extent to which a product in a country is exposed to a country's PTAs (which, in turn, depends on the importance of its PTA partners as exporters of the product). The main difference is that we define the variable at the bilateral level, while theirs is at the importing-country level.

[32] The availability of export data from the Harmonized System nomenclature for some countries starts one or a few years after 1990. In those cases, we replace the values for the instrument in the missing years with their values from the earliest available year.

[33] Similarly, the coefficient of the instrument interacted with CU_{mxt} is positive and significant when the endogenous variable is interacted with the CU dummy (columns 7 and 8).

country's preferential margin toward its PTA partner.

In the IV specification, the estimating equation is then

$$\begin{aligned} MRG_{jmxt} &= \beta_1 CU_{mxt} + \delta_1 S^*_{jx,t-1} + \delta_2 \left(S^*_{jx,t-1} \times CU_{mxt}\right) + \gamma_1 E^*_{jmx,t-1} \\ &\quad + \gamma_2 \left(E^*_{jmx,t-1} \times CU_{mxt}\right) + \varepsilon_{jmxt}, \end{aligned} \tag{14}$$

with $E^*_{jmx,t-1}$ and $\left(E^*_{jmx,t-1} \times CU_{mxt}\right)$ instrumented by $E^*_{jr(m)x,t-1}$ and $\left(E^*_{jr(m)x,t-1} \times CU_{mxt}\right)$, respectively, where $E^*_{jr(m)x,t-1}$ is as explained above. Similarly, $S^*_{jx,t-1}$ and $\left(S^*_{jx,t-1} \times CU_{mxt}\right)$ are instrumented using $S^{avother}_{jx,t-1}$ and $\left(S^{avother}_{jx,t-1} \times CU_{mxt}\right)$, respectively.

In terms of identification, our underlying hypothesis is that countries decide between forming an FTA or a CU partially based on unrelated, and unmodeled, factors. In turn, the tariff structure of each type of bloc responds to the institutional constraints that they impose. Specifically, in both cases members coordinate the intra-bloc tariffs, but they set common external trade policies only if the bloc takes the form of a CU.[34] An alternative hypothesis is that the institutional design does not affect the bloc's internal tariffs but there are shocks, of either economic or political-economy nature, that determine both the institutional design of the bloc and its tariff structure. We disentangle the two hypotheses by introducing a large set of fixed effects. If we find a correlation between preferential margins and the type of bloc after adding those fixed effects, it would support the first hypothesis, that the institutional design of the PTA leads to different tariff structures.

Thus, we expand equation (13)—and proceed analogously with the IV specification, equation (14)—to include a wide set of fixed effects. In our preferred specification, it takes the following form:

$$\begin{aligned} MRG_{jmxt} &= \beta_1 CU_{mxt} + \delta_1 S^*90_{jx} + \delta_2 \left(S^*90_{jx} \times CU_{mxt}\right) + \gamma_1 E^*90_{jmx} \\ &\quad + \gamma_2 \left(E^*90_{jmx} \times CU_{mxt}\right) + \alpha_{mt} + \alpha_{mj} + \alpha_{jt} + \varepsilon_{jmxt}. \end{aligned} \tag{15}$$

In equation (15), α_{mt} is a country-year fixed effect (for the importing country setting the policy); α_{mj} denotes a country-industry fixed effect; and α_{jt} is an industry-year fixed effect. The country-year fixed effect is included to account for macroeconomic shocks and broad trade reforms that could influence tariffs in all industries in a given year in a country. The country-industry fixed effects account for a variety of factors that can make some industries more protected than others in a given country. The industry-year fixed effects pick up forces affecting general industry-specific liberalization trends, driven by factors such as technological shocks, changes in world prices,

[34] Naturally, the choice of which type of PTA to form has other implications in addition to the incentives for the tariff structure. For example, because external tariffs differ in FTAs, members need to craft the requirements to satisfy "rules of origin" when importing a product from a member of the bloc, and compliance with those rules can be costly to exporters. That is not needed in CUs, where members adopt common external tariffs. On the other hand, as Lake (2019) emphasizes, FTAs have the advantage of providing flexibility to its members in case they want to form FTAs with other countries, whereas in CUs all members of the bloc must agree on the establishment of additional trade agreement links. This has implications for the geographical structure of the two types of blocs, as Lake and Yildiz (2016) and Facchini, Silva and Willmann (2021) point out.

industry-specific recessions and expansions, as well as changes in political-economy tariff determinants such as changes in lobbying strength across the region. We also use alternative sets of fixed effects (such as country-pair) in some specifications, as we describe later.

One may also argue that the formation of a CU may be endogenously affected by the bloc's internal tariffs. Yet that possibility is diminished in our sample because in the CUs we study (Mercosur and CAN), the decisions to subsequently become a CU were already made in the original treaties (as discussed in section 3.1). Nonetheless, another concern is that, since the decision to transition from an FTA into a CU was planned in advance, it could have affected the levels of internal tariffs during the FTA period. If so, intra-FTA duties in the pre-CU period could have incorporated tariff-related aspects of the expected future CUs. Note, however, that if tariffs were already incorporating expected "CU aspects" during the FTA period, that would tend to *reduce* the probability that we find any effect in our baseline regressions for the whole period, since it would work towards making our CU interaction variables, which are "active" from 1995 onwards, not significant if their effects had started materializing earlier.

Still, we can address this concern explicitly. To do so, we implement a falsification test whereby we split our sample into two periods, the "FTA period" (1990-1994) and the "CU period" (1995-2001), and include a "placebo" CU dummy, equal to one when both the importer and the exporter are Mercosur or CAN members during the FTA period. If tariffs and preference margins were not behaving as in an FTA but instead as in a CU, the placebo CU dummy (and its interactions) would have an effect during the FTA period. But if we find that the CU dummy is only positive and significant (as predicted by our model) during the CU period, and the other predictions of the model for CUs also hold only during that period, it would provide additional support for our theoretical claim that the type of trade agreement is inducing those differential effects.

According to the model, we should find that $\delta_1 + \delta_2 > 0$ (Prediction 2) and $\gamma_1 + \gamma_2 < 0$ (Prediction 3). Furthermore, finding that $\beta_1 > 0$ (Prediction 1) would show evidence of the prevalence of tariff complementarity in our sample.

Now, our simple framework has nothing to say about the *timing* of the changes in the intra-bloc tariffs. One interpretation is that they happen immediately after the formation of the bloc. However, that would be naïve—and counterfactual. In reality, most agreements establish a formal schedule of progressive tariff reductions, rather than cutting all intra-bloc tariffs at once. Furthermore, external tariffs change over time as well. To incorporate the gradual nature of the internal liberalization and the possible accompanying effects in external tariffs, we augment our previous specification by adding the variable AGE_{mxt} into equation (15) to measure the number of years the agreement between m and x has been in place.[35] Once again, we allow for different effects in

[35] Note that, when an FTA transitions into a CU, we *do not* restart *AGE* from one, but instead keep counting. If we did not do that, and given that the expected coefficient on *AGE* is positive (since the schedule is almost always of intra-bloc tariff *reductions*), we would produce an upward bias in the coefficient of *CU*.

FTAs and in CUs by including the interaction between AGE_{mxt} and CU_{mxt}:

$$\begin{aligned} MRG_{jmxt} &= \beta_1 CU_{mxt} + \delta_1 S^*90_{jx} + \delta_2 \left(S^*90_{jx} \times CU_{mxt}\right) + \gamma_1 E^*90_{jmx} \\ &\quad + \gamma_2 \left(E^*90_{jmx} \times CU_{mxt}\right) + \theta_1 AGE_{mxt} + \theta_2 \left(AGE_{mxt} \times CU_{mxt}\right) \\ &\quad + \alpha_{mt} + \alpha_{mj} + \alpha_{jt} + \varepsilon_{jmxt}. \end{aligned} \tag{16}$$

In addition to understanding how the speed of internal liberalization varies across types of PTAs, which is interesting by itself and has not been studied before, this specification also ensures that the effect of the type of PTA on internal tariffs, and thus on preference margins, is not driven by the gradualism of tariff reductions in trade agreements. We do the same with the IV specification:

$$\begin{aligned} MRG_{jmxt} &= \beta_1 CU_{mxt} + \delta_1 S^*_{jx,t-1} + \delta_2 \left(S^*_{jx,t-1} \times CU_{mxt}\right) + \gamma_1 E^*_{jmx,t-1} \\ &\quad + \gamma_2 \left(E^*_{jmx,t-1} \times CU_{mxt}\right) + \theta_1 AGE_{mxt} + \theta_2 \left(AGE_{mxt} \times CU_{mxt}\right) \\ &\quad + \alpha_{mt} + \alpha_{mj} + \alpha_{jt} + \varepsilon_{jmxt}, \end{aligned} \tag{17}$$

where we instrument for $E^*_{jmx,t-1}$, $\left(E^*_{jmx,t-1} \times CU_{mxt}\right)$, $S^*_{jx.t-1}$ and $\left(S^*_{jx,t-1} \times CU_{mxt}\right)$ as before.

In all regressions, we cluster standard errors at the country-industry (ISIC-3) level, to account for the possibility that trade liberalization may be correlated within an industry in a given country.

5 Results

We begin by estimating a simple specification that is a shorter version of equation (15), where the only explanatory variable (in addition to the fixed effects) is the CU dummy, CU_{mxt}. The goal is to see whether the gross correlation implied by Figure 2 is robust to a battery of shocks captured by fixed effects.

The results are reported in Table 1. The dependent variable is the preferential margin. In column 1, we use an "economical" specification with country, industry and year fixed effects. In column 2, we use country-year and country-industry fixed effects; the fixed effects in that specification follow Estevadeordal et al.'s (2008). In column 3, we change the specification of column 2 by replacing the country-industry fixed effects with industry-year fixed effects, focusing on absorbing shocks that may affect the protection levels of specific industries across the whole region over time. Finally, in column 4 we use the full set of fixed effects. That specification follows Crivelli's (2016).

We find a positive and highly significant coefficient on CU, indicating that preferential margins are higher in CUs than in FTAs, in line with Prediction 1 under tariff complementarity. Reassuringly, the results are robust to the use of a variety of fixed effects, and the magnitudes hardly change across the specifications. The intuition for why preferential margins are higher in CUs than in FTAs is that, under the latter type of arrangement, tariff complementarity provides an incentive for bloc members to keep internal tariffs higher than they would be otherwise, to avoid a subsequent large fall in external tariffs that would hurt the FTA exporting partner. That does not happen in

CUs, because the external tariffs are negotiated (and common).

We now proceed to test the predictions of the model as a whole. In Table 2, we estimate equation (16) with the different sets of fixed effects used in Table 1. The coefficient on CU remains positive and statistically significant at the 1 percent level, as indicated by Prediction 1 under tariff complementarity. It is also larger than the specification with only fixed effects in Table 1 suggests. Depending on the specification, the estimated coefficient implies that moving from an FTA to a CU leads to an increase between 5.1 and 7.4 percentage points in the preferential margin. This corresponds to an increase between 64 and 93 percent of the median preferential margin in the sample (which is 7.95 percentage points).

Prediction 2 states that preferential margins in CUs are increasing in the output level of the partner. The intuition is that larger industries have more political clout and are thus able to obtain higher preferential margins. We find support for this prediction, as the sum of the coefficients on S^*90 and $S^*90 \times CU$ is positive and statistically significant in all specifications.

In turn, Prediction 3 states that preferential margins in CUs are decreasing in the level of intra-bloc exports. The reason is that they increase trade diversion. We find strong support for this prediction as well, since the sum of the coefficients on E^*90 and $E^*90 \times CU$ is negative and highly statistically significant in all specifications.

Finally, in all specifications, the coefficient of AGE is positive and statistically significant, indicating that preferential margins increase over time in FTAs. That is probably unsurprising, since schedules of tariff reductions are a staple of trading blocs. However, this is not observed in CUs, and the sum of the coefficients on AGE, with and without the interaction with CU, suggests that the opposite may happen in CUs. Those results reflect a message already illustrated in Figure 1, where internal tariffs decrease steadily during the FTAs years, fall abruptly when a CU is formed, but not afterwards. Thus, we find evidence of steep gradualism in preferential margins in FTAs but not in CUs. Although this is not a prediction derived from our model, it is a novel result.[36]

As explained in the previous section, we perform a falsification exercise by which we split the sample into an FTA period (1991-1994) and a CU period (1995-2001), and include a "placebo" CU dummy that equals one when both the importing and the exporting countries belong to Mercosur or CAN during their FTA periods. Table 3 replicates the specifications of columns 2 and 4 from Table 2, but splitting the sample into the two periods. We find that CU is positive and statistically significant only during the CU period (columns 2 and 4). Moreover, the sum of the coefficients of S^*90 and $S^*90 \times CU$ and of E^*90 and $E^*90 \times CU$ are only statistically significant (with their predicted signs) in the CU period as well. This provides reassuring support for our predictions and for the distinct behavior of preference margins during both time periods. Furthermore, it helps to rule out the possibilities that, first, the fact that the decision to transition the FTAs into CUs

[36] There are theoretical explanations for gradualism in trade agreements (e.g., Staiger, 1995; Bond and Park, 2002), but we are unaware of any theoretical explanation for different degrees of gradualism in different types of PTAs. A partial explanation may be that, as Gnutzmann and Gnutzmann-Mkrtchyan (2019) point out, in several cases a trading bloc becomes a CU after starting out as an FTA. That is also what happens with the CUs in our dataset. Still, it is unclear why the gradual reduction of intra-bloc tariffs would have to run its full course before blocs turn into CUs.

was planned in advance could have affected the levels of preferential margins already in the FTA period and, second, that the CU differential effects that we find in the later period are generated by idiosyncratic characteristics of Mercosur and CAN members.

Some preferential liberalization from before the FTAs were converted into CUs was scheduled to take place at the end of 1994 (for example, the Treaty of Asunción specifies that some internal tariff reductions under Mercosur must be in place by the end of December of 1994). Hence, those changes may not be reflected in the 1994 preferential tariff data, but rather in the 1995 tariff data. To account for this, we let the FTA period for CAN and Mercosur run until 1995 (instead of 1994) as a robustness check. Thus, in columns 1 and 2 of Table 4 we replicate the specifications from columns 2 and 4 of Table 2, but redefining the CU dummy to be equal to one when both the importing and the exporting countries belong to a CU from 1996 onwards. Although the coefficient of the CU dummy falls somewhat in magnitude, all of our theoretical predictions continue to hold.

Now, in general, countries may adjust preferential margins by changing τ_e, τ_i, or both. However, the countries we study are members of the WTO and, as such, they have bindings imposed on many of their tariffs. If the MFN tariff in an industry is close to the WTO binding and the country wishes to offer a higher preference margin to a PTA partner in that industry, it would have to do so by lowering τ_i, because raising τ_e would not be an option. Such lower flexibility may affect the margins actually chosen. We allow for the possibility that tariff bindings may affect our estimates by including in equation (16) a dummy variable that is equal to one when the difference between the bound rate and the applied MFN rate (the "tariff overhang") is small (less than or equal to three percentage points), $BIND_{jmt}$.[37] We also interact this variable with CU_{mxt} to allow for the possibility that its impact may vary with the type of trade agreement. We thus arrive at the following estimating equation:

$$\begin{aligned} MRG_{jmxt} &= \beta_1 CU_{mxt} + \delta_1 S^*90_{jx} + \delta_2 \left(S^*90_{jx} \times CU_{mxt}\right) + \gamma_1 E^*90_{jmx} \\ &\quad + \gamma_2 \left(E^*90_{jmx} \times CU_{mxt}\right) + \theta_1 AGE_{mxt} + \theta_2 \left(AGE_{mxt} \times CU_{mxt}\right) \\ &\quad + \phi_1 BIND_{jmt} + \phi_2 \left(BIND_{jmt} \times CU_{mxt}\right) + \alpha_{mt} + \alpha_{mj} + \alpha_{jt} + \varepsilon_{jmxt}. \end{aligned} \quad (18)$$

Columns 3 and 4 of Table 4 show the results from estimating equation (18), expanding the specifications from columns 2 and 4 of Table 2. We find that including the tariff binding indicator has little effect on our previous results. Interestingly, the coefficient of $BIND$ is positive and significant at the 1 percent level, which may be due to the fact that the industries with MFN tariffs close to their bound levels are sensitive or politically powerful industries that are receiving high external protection, and hence the scope for high preferential margins is larger under FTAs.[38]

In columns 5 and 6, we run a different robustness specification, using country-pair fixed effects. Specifically, we add them to the specifications from columns 3 and 4, respectively. The motivation to include country-pair fixed effects is to capture time-invariant factors that can affect trade relations

[37] This cutoff level follows Estevadeordal et al. (2008).

[38] The mean MFN tariff for products where the binding indicator is equal to 1 is 29.4 percentage points, while the mean MFN tariff for the whole sample is 14.7 percentage points.

between a pair of countries, such as distance, a common border, etc.[39] The cost of using them in our context is that most of the variation in our key explanatory variables (the CU dummy and its interactions with S^* and E^*) is across countries and partners. Hence, country-partner fixed effects take away that important variation. Still, as columns 5 and 6 show, the results remain qualitatively similar even with those demanding specifications. The main difference is that the magnitude of the coefficient on the CU dummy falls by around 25 percent.

In Table 5, we then turn to the instrumental variables estimation. In columns 1 and 2, we modify the specifications from columns 1-2 of Table 4 by using the lagged log of preferential imports instead of the log from 1990, as in equation (17), while instrumenting for preferential imports and for the output of the PTA partner, as discussed in the previous section. We find strong support for all our predictions, and the Kleibergen-Paap F-statistic (reported at the bottom of the table) confirms that our instruments are strong. The magnitudes of the key coefficients are also somewhat larger than in the non-IV specifications using pre-shock variables. Finally, in columns 3 and 4, we perform a robustness test whereby we use an alternative instrument for preferential imports. Instead of using exports by the PTA-partner to the rest of the world, we use exports by the PTA-partner to countries that are GDP-comparable with the importing country, where GDP-comparable countries are other countries that belong to the same income group, as classified by the World Bank (e.g., to the high income, or to the upper-middle income category). This may help capture only the exports that change due to technological conditions of the partner country. We find that our predictions continue to hold, except that the sum of coefficients on partner exports, although negative, is not statistically significant in the specification with the full set of fixed effects.

In Table 6, we take into account some features of the model that we have not yet considered explicitly. As we mentioned in section 2.2, Result 2—and hence Predictions 2 and 3—is obtained when intra-bloc tariffs are strictly positive. In our sample there are very few cases of zero tariffs, both because many internal tariffs are in fact different from zero and because of aggregation, since as long as one product has a nonzero tariff, the industry average will be greater than zero as well. Therefore, to incorporate that restriction, in columns 1 and 2 we replicate the specifications from columns 1 and 2 of Table 5 while excluding from the sample observations where the preferential tariff is smaller than 1 p.p. (which constitute 14 percent of the sample). We find that Predictions 2 and 3 hold just as before, with the relevant sums of coefficients displaying (slightly) larger magnitudes, as expected. All other results continue to hold as well.

Moreover, our theoretical results are derived for the preferential margins of the importing country (see the discussion in section 2.2). Since our data is at the industry level, there are positive imports in most industries at the bilateral level in most years. Nonetheless, the predictions may not apply as well in industries in which exports substantially exceed imports, for which the model would not apply directly. Accordingly, in columns 3 and 4 of Table 6 we exclude from the sample all observations in which exports from a country to the partner are larger than four-times the im-

[39] Moreover, as argued by Baier and Bergstrand (2007), they can also be useful to address potential endogeneity due to unobserved time-invariant bilateral variables in the context of gravity analyses of the trade effect of PTAs.

ports by the country originating from the same partner. We find that the estimates are remarkably similar to those with the full sample, indicating that the observations where the country setting tariffs is mostly an exporter play indeed a very limited role in the estimations.

Finally, in column 5 we perform one last robustness test, where we modify the specification from column 2 of Table 5 by replacing the country-industry fixed effects with country-partner-industry fixed effects. These may help control for aspects related to comparative advantage, for example.[40] Although most of the variation in our main explanatory variables is across countries and partners, we find that the results remain qualitatively similar.

Overall, then, we find robust support for the predictions that preferential margins are higher in CUs than in FTAs, which is evidence of tariff complementarity. We also find strong evidence that greater supply in partner countries and lower intra-bloc imports are associated with higher preferential margins in CUs, but not in FTAs. More generally, we confirm that preferential margins differ in statistically and economically significant ways depending on the institutional design of the trade agreement.

6 Conclusion

We study the choice of intra-bloc and external tariffs in preferential trade agreements. First, we develop a political-economy model that shows how countries choose their internal tariffs and preferential margins when they form different types of trade agreements. The model implies that the institutional design of the PTA—that is, whether it is structured as a customs union or as a free trade area—matters substantially for its tariff structure. More specifically, we show that intra-bloc tariffs are higher and preferential margins are lower in FTAs than in CUs under tariff complementarity (which is present in our data). The explanation is that, under an FTA, members anticipate that a lower internal tariff would lead to a lower external tariff, which would hurt the exporters of the other member countries. This compels them to keep intra-bloc duties relatively high. Under a CU, in contrast, such an externality is internalized, since its members choose their internal and external tariffs jointly. Accordingly, they can set preferential tariffs at the level that is jointly optimal for them, without worrying about the future erosion of preferences.

A second result from our model is that preferential margins in CUs increase with the supply of partner countries. The reason is that larger industries in the partner country have more political clout and are thus able to obtain higher margins. In FTAs, there is a countervailing force due to an indirect effect of the internal tariff on the external tariff, rendering the net effect ambiguous. A third result from our model is that preferential margins in CUs decrease with intra-bloc imports to limit trade diversion. Again, the net effect is ambiguous in FTAs because of the indirect effect of the internal tariff on the external tariff.

We test those predictions using tariff data at the bilateral level from the 1990s in Latin America,

[40] We thank Woan Foong Wong and James Lake for this suggestion. We do not use these fixed effects in the regressions that use the variables from 1990 because there would be no variation left in the partner output and preferential import variables.

when and where numerous PTAs were implemented. Using different approaches, a wide set of fixed effects to control for unobserved shocks that could determine both the institutional design of a bloc and its tariffs, and instrumental variables for intra-bloc imports and partner supply, we find broad support for our model's predictions. We also find that there is gradualism in the setting of preferential margins in FTAs but not in CUs; we are unaware of any theory that explains that difference in the speed of liberalization in the two types of blocs.

Our results imply that the type of PTA has important consequences for its members' choice of internal tariffs and preference margins. This has potentially important implications for the welfare effects of the two types of trade agreements, for both members and non-members. For example, high preferential margins (as we find to be the case in CUs) tend to induce high levels of welfare-reducing trade diversion. On the other hand, high intra-bloc tariffs (as we find to be the case in FTAs) tend to induce low levels of welfare-enhancing trade creation. An explicit welfare analysis is beyond the scope of this paper, but our findings make clear that a full assessment of the social desirability of different types of PTAs should incorporate members' endogenous choices of internal tariffs and preferential margins.

As this is one of the first papers investigating theoretically and empirically the formation of intra-bloc tariffs, we consider it an initial step in the direction of understanding how governments determine the structure of intra-PTA duties and of preferential margins, and in particular how they vary across different types of PTAs. Accordingly, several extensions are highly desirable. First, and most obviously, it is important to find out whether our results extend to PTAs formed by other countries and in other time periods. Second, we use a conventional model to guide our theoretical and empirical analyses. While simple and transparent, it leaves aside issues that could be potentially important, such as increasing returns to scale, terms-of-trade effects vis-à-vis excluded countries, and heterogeneity across firms and products. Theoretical extensions in those directions could yield additional insights about the tariff structure of PTA members.

Third, although countries, both in our sample and more generally, participate in multiple PTAs, we develop our model (and design our empirical strategy) abstracting from the potential effects that a PTA between two countries could have on the structure of tariffs of a PTA between one of them and a third country. Such a model, with multiple countries and overlapping trade agreements, would make it possible to study the implications of the growing web of agreements on the structure of tariffs of the participating countries. Finally, a full-fledged analysis of the process by which intra-bloc tariffs and preferential margins are chosen would require modeling the formation of the PTA and the choice of its type, and the empirical analysis would take those bloc formation decisions into account. Such an analysis would represent a major welcome addition to the current analysis. We look forward to future research in those directions.

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Table 1: The Effect of the Type of PTA on Preferential Margins

	Dependent variable: Preferential Margin			
	(1)	(2)	(3)	(4)
CU	2.542***	2.451***	2.451***	2.451***
	(0.320)	(0.373)	(0.374)	(0.379)
Fixed effects	ctry ind year	ctry-year ctry-ind	ctry-year ind-year	ctry-year ctry-ind ind-year
Observations	33,275	33,275	33,275	33,275
R-squared	0.51	0.76	0.60	0.79

Notes: Coefficients obtained from OLS regressions of the preferential margin on a CU dummy and different sets of fixed effects. Standard errors, in parentheses, are adjusted for clustering at the country-industry (ISIC3) level in all regressions, with *, **, and *** indicating statistically significant at 10%, 5% and 1% levels, respectively.

Table 2: The Determinants of Preference Margins by Type of PTA

	Dependent variable: Preferential Margin			
	(1)	**(2)**	**(3)**	**(4)**
CU	5.103***	6.089***	7.412***	7.186***
	(1.826)	(1.351)	(2.087)	(1.458)
*ln_S*90*	0.104	0.121*	0.101	0.148**
	(0.091)	(0.063)	(0.092)	(0.066)
*ln_S*90xCU*	0.277**	0.244**	0.137	0.128
	(0.134)	(0.103)	(0.150)	(0.115)
*ln_E*90*	0.099*	0.029	0.116**	0.018
	(0.057)	(0.033)	(0.056)	(0.034)
*ln_E*90xCU*	-0.461***	-0.309***	-0.345***	-0.246***
	(0.086)	(0.070)	(0.101)	(0.074)
AGE	0.361***	0.299***	0.305***	0.295***
	(0.088)	(0.091)	(0.095)	(0.094)
AGExCU	-0.467***	-0.747***	-0.741***	-0.749***
	(0.085)	(0.076)	(0.080)	(0.082)
Fixed Effects	ctry, ind, year	c-y, c-i	c-y, i-y	c-y, c-i, i-y
Sums of Coefficients:				
*ln_S*90 + ln_S*90xCU*	0.381***	0.365***	0.238*	0.276***
	(0.119)	(0.082)	(0.129)	(0.091)
*ln_E*90 + ln_E*90xCU*	-0.362***	-0.280***	-0.229***	-0.228***
	(0.075)	(0.064)	(0.086)	(0.068)
Observations	15,107	15,107	15,107	15,107
R-squared	0.54	0.82	0.62	0.84

Notes: Coefficients obtained from OLS regressions of the preferential margin on the variables defined in equation (16) and different sets of fixed effects. Standard errors, in parentheses, are adjusted for clustering at the country-industry (ISIC3) level in all regressions, with *, **, and *** indicating statistically significant at 10%, 5% and 1% levels, respectively.

Table 3: Falsification Tests for the Determinants of Preference Margins by Type of PTA

	Dependent variable: Preferential Margin			
	1990-1994 (1)	1995-2001 (2)	1990-1994 (3)	1995-2001 (4)
CU		7.512***		7.548***
		(1.600)		(1.655)
CU_placebo	-5.676**		-5.754**	
	(2.279)		(2.387)	
*ln_S*90*	-0.625***	0.216**	-0.630***	0.217**
	(0.132)	(0.088)	(0.139)	(0.091)
*ln_S*90xCU*		0.085		0.084
		(0.155)		(0.159)
*ln_S*90xCU_placebo*	0.745***		0.750***	
	(0.165)		(0.173)	
*ln_E*90*	0.082	-0.015	0.083	-0.016
	(0.058)	(0.045)	(0.061)	(0.047)
*ln_E*90xCU*		-0.190*		-0.189
		(0.115)		(0.118)
*ln_E*90xCU_placebo*	-0.159*		-0.160*	
	(0.082)		(0.086)	
AGE	-0.817***	0.300***	-0.803***	0.301***
	(0.181)	(0.092)	(0.189)	(0.094)
AGExCU		-0.747***	-0.238***	
		(0.076)	(0.071)	
AGExCU_placebo	-0.246***			-0.751***
	(0.062)			(0.082)
Fixed Effects	c-y, c-i	c-y, c-i	c-y, c-i, i-y	c-y, c-i, i-y
Sums of Coefficients:				
*ln_S*90 + ln_S*90xCU*		0.301***		0.301***
		(0.107)		(0.110)
*ln_S*90 + ln_S*90xCU_placebo*	0.120		0.120	
	(0.103)		(0.106)	
*ln_E*90 + ln_E*90xCU*		-0.205**		-0.205**
		(0.089)		(0.091)
*ln_E*90 + ln_E*90xCU_placebo*	-0.077		-0.076	
	(0.077)		(0.080)	
Observations	4,119	10,988	4,119	10,988
R-squared	0.85	0.87	0.86	0.88

Notes: Coefficients in columns 1 and 3 obtained from OLS regressions (with different sets of fixed effects) with the sample restricted to 1990-1994 and where we include a placebo CU dummy that is set to one when both the importing and the exporting countries belong to Mercosur or CAN during their FTA periods (1991-1994). Coefficients in columns 2 and 4 obtained from OLS regressions (with different sets of fixed effects) that follow equation (16) but with the sample restricted to 1995-2001. Standard errors, in parentheses, are adjusted for clustering at the country-industry (ISIC3) level in all regressions, with *, **, and *** indicating statistically significant at 10%, 5% and 1% levels, respectively.

Table 4: Robustness Tests for the Determinants of Preference Margins by Type of PTA

	Dependent variable: Preferential Margin					
	CUs start in 1996		Bindings		Bindings and c-p FEs	
	(1)	(2)	(3)	(4)	(5)	(6)
CU	4.676***	6.034***	6.248***	7.289***	4.497**	5.605***
	(1.193)	(1.360)	(1.357)	(1.425)	(1.745)	(1.863)
*ln_S*90*	0.095	0.125**	0.118*	0.147**	0.184*	0.210*
	(0.059)	(0.062)	(0.063)	(0.066)	(0.105)	(0.116)
*ln_S*90xCU*	0.222**	0.077	0.238**	0.121	0.336**	0.210
	(0.091)	(0.111)	(0.103)	(0.113)	(0.133)	(0.147)
*ln_E*90*	0.039	0.026	0.030	0.017	0.043	0.031
	(0.032)	(0.033)	(0.032)	(0.034)	(0.030)	(0.030)
*ln_E*90xCU*	-0.287***	-0.197***	-0.316***	-0.241***	-0.289***	-0.196***
	(0.063)	(0.070)	(0.070)	(0.074)	(0.070)	(0.070)
AGE	0.341***	0.336***	0.303***	0.298***	0.372***	-0.682***
	(0.086)	(0.088)	(0.091)	(0.093)	(0.039)	(0.147)
AGExCU	-0.599***	-0.602***	-0.760***	-0.758***	-0.759***	-0.756***
	(0.063)	(0.069)	(0.075)	(0.081)	(0.075)	(0.081)
BIND			3.717***	4.134***	3.731***	4.185***
			(1.260)	(1.185)	(1.259)	(1.180)
BINDxCU			1.689	1.108	1.494	0.850
			(1.356)	(1.250)	(1.399)	(1.236)
Fixed Effects	c-y, c-i	c-y, c-i, i-y	c-y, c-i	c-y, c-i, i-y	c-y, c-i, c-p	c-y, c-i, i-y, c-p
Sums of Coefficients:						
*ln_S*90 + ln_S*90xCU*	0.317***	0.201**	0.356***	0.268***	0.520***	0.420**
	(0.076)	(0.092)	(0.082)	(0.089)	(0.163)	(0.173)
*ln_E*90 + ln_E*90xCU*	-0.248***	-0.172***	-0.286***	-0.224***	-0.246***	-0.165**
	(0.059)	(0.066)	(0.063)	(0.067)	(0.063)	(0.067)
Observations	15,107	15,107	15,107	15,107	15,107	15,107
R-squared	0.81	0.84	0.82	0.85	0.84	0.87

Notes: Coefficients in columns 1 and 2 obtained from OLS regressions of the preferential margin on the variables defined in equation (16) but with the CU dummy redefined to be equal to one when both the importing and the exporting countries belong to a CU from 1996 onwards, and different sets of fixed effects. Coefficients in columns 3-6 obtained from OLS regressions of the preferential margin on the variables defined in equation (18) and different sets of fixed effects. Standard errors, in parentheses, are adjusted for clustering at the country-industry (ISIC3) level in all regressions, with *, **, and *** indicating statistically significant at 10%, 5% and 1% levels, respectively.

Table 5: Instrumental Variable Estimates of the Determinants of Preference Margins by Type of PTA

	Dependent variable: Preferential Margin			
	IV: Exports to ROW		IV: Exports to Comparable-GDP Countries	
	(1)	(2)	(3)	(4)
CU	9.554***	11.219***	9.123***	11.561***
	(1.917)	(1.863)	(1.957)	(1.938)
*ln_S*_lag*	0.749***	0.475***	0.697***	0.509***
	(0.203)	(0.093)	(0.201)	(0.095)
*ln_S*_lagxCU*	0.100	-0.091	0.023	-0.232
	(0.180)	(0.189)	(0.177)	(0.188)
*ln_E*_lag*	-0.124	0.030	-0.050	-0.052
	(0.130)	(0.064)	(0.135)	(0.064)
*ln_E*_lagxCU*	-0.327***	-0.243**	-0.163*	-0.025
	(0.108)	(0.115)	(0.095)	(0.107)
AGE	0.112	0.101	0.123	0.097
	(0.103)	(0.106)	(0.104)	(0.105)
AGExCU	-0.675***	-0.681***	-0.651***	-0.662***
	(0.093)	(0.090)	(0.094)	(0.093)
BIND	3.220***	8.394***	3.309***	8.377***
	(1.155)	(1.310)	(1.160)	(1.315)
BINDxCU	2.648*	0.483	2.499*	0.470
	(1.425)	(1.424)	(1.410)	(1.407)
Fixed Effects	c-y, c-i	c-y, c-i, i-y	c-y, c-i	c-y, c-i, i-y
Sums of Coefficients:				
*ln_S*_lag + ln_S*_lagxCU*	0.849***	0.384**	0.720***	0.277*
	(0.191)	(0.156)	(0.183)	(0.151)
*ln_E*_lag + ln_E*_lagxCU*	-0.451***	-0.213**	-0.213*	-0.077
	(0.140)	(0.097)	(0.129)	(0.087)
Observations	16,251	16,251	15,982	15,982
R-squared	0.53	0.32	0.54	0.33
Kleibergen-Paap F-stat	37.02	862.34	37.26	924.67

Notes: Coefficients obtained from IV regressions of the preferential margin on the variables defined in equation (18), instrumenting for preferential imports and for the output of the PTA partner, and with different sets of fixed effects. The instrument for the supply of the PTA partner is the average output of the three countries in the sample that have their output most correlated with the output of the PTA partner, but which are not PTA-partners of country m at any point during the sample period. The instrument for preferential imports varies in the table. In columns 1-2, the instrument is exports by the PTA-partner to the rest of the world. In columns 3-4, the instrument is exports by the PTA-partner to countries that are GDP-comparable with the importing country (i.e., other countries that belong to the same income group, as classified by the World Bank). Standard errors, in parentheses, are adjusted for clustering at the country-industry (ISIC3) level in all regressions, with *, **, and *** indicating statistically significant at 10%, 5% and 1% levels, respectively.

Table 6: Instrumental Variable Estimates of the Determinants of Preference Margins by Type of PTA—Restricted Samples and Additional Fixed Effects

	Dependent variable: Preferential Margin				
	Exclude if Internal Tariff < 1 p.p.		Exclude if Exports >> Imports		Country-partner-industry FEs
	(1)	(2)	(3)	(4)	(5)
CU	10.708***	12.371***	8.477***	11.142***	10.573***
	(1.553)	(1.340)	(2.127)	(2.185)	(1.891)
*ln_S*_lag*	1.077***	0.511***	0.814***	0.530***	0.428***
	(0.209)	(0.070)	(0.196)	(0.097)	(0.087)
*ln_S*_lagxCU*	0.068	-0.095	0.132	-0.144	-0.138
	(0.148)	(0.135)	(0.194)	(0.213)	(0.166)
*ln_E*_lag*	-0.254*	0.122**	-0.089	0.167***	-0.187**
	(0.139)	(0.053)	(0.145)	(0.065)	(0.075)
*ln_E*_lagxCU*	-0.398***	-0.427***	-0.507***	-0.419***	-0.058
	(0.097)	(0.094)	(0.141)	(0.140)	(0.120)
AGE	0.101	0.128	0.224**	0.224**	-0.163
	(0.117)	(0.119)	(0.108)	(0.109)	(0.245)
AGExCU	-0.657***	-0.701***	-0.496***	-0.516***	-0.799***
	(0.091)	(0.088)	(0.118)	(0.115)	(0.087)
BIND	3.035***	5.457***	1.659**	3.833***	8.758***
	(0.760)	(0.826)	(0.746)	(0.799)	(1.230)
BINDxCU	2.425*	1.593	2.687*	2.742**	-1.339
	(1.410)	(1.323)	(1.374)	(1.375)	(1.264)
Fixed Effects	c-y, c-i	c-y, c-i, i-y	c-y, c-i	c-y, c-i, i-y	c-y, c-p-i, i-y
Sums of Coefficients:					
*ln_S*_lag + ln_S*_lagxCU*	1.145***	0.416***	0.947***	0.386**	0.290*
	(0.201)	(0.112)	(0.211)	(0.168)	(0.157)
*ln_E*_lag + ln_E*_lagxCU*	--0.652***	--0.305***	-0.597***	-0.252**	-0.245**
	(0.154)	(0.083)	(0.188)	(0.118)	(0.112)
Observations	13,904	13,904	11,192	11,192	16,251
R-squared	0.53	0.38	0.57	0.34	0.38
Kleibergen-Paap F-stat	30.93	610.41	37.82	492.59	465.83

Notes: Coefficients obtained from IV regressions of the preferential margin on the variables defined in equation (18), instrumenting for preferential imports and for the output of the PTA partner, with different sets of fixed effects, and for different subsamples. The instrument for the supply of the PTA partner is the average output of the three countries in the sample that have their output most correlated with the output of the PTA partner, but which are not PTA-partners of country m at any point during the sample period. The instrument for preferential imports is exports by the PTA-partner to the rest of the world. In columns 1-2, we exclude from the sample observations where the intra-bloc tariff is smaller than 1 p.p. In columns 3-4, we exclude from the sample all observations in which exports from the home country to the partner are more than four times the imports of the home country originating from the same partner. Standard errors, in parentheses, are adjusted for clustering at the country-industry (ISIC3) level in all regressions, with *, **, and *** indicating statistically significant at 10%, 5% and 1% levels, respectively.

Table A1: First-Stage Regressions

	Dependent variable:							
	*ln_S*_lag*		*ln_S*_lagxCU*		*ln_E*_lag*		*ln_E*_lagxCU*	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
ln_S^{avother}_lag	0.204***	0.595***	-0.062***	0.006	-0.214***	-0.101***	-0.009	0.005
	(0.028)	(0.034)	(0.014)	(0.007)	(0.039)	(0.029)	(0.015)	(0.006)
ln_S^{avother}_lagxCU	0.207***	0.380***	0.912***	0.890***	0.113	0.218**	0.080	0.087***
	(0.033)	(0.072)	(0.042)	(0.044)	(0.074)	(0.085)	(0.090)	(0.015)
ln_E$_{ROW}$_lag*	0.475***	0.285***	0.046***	-0.005**	0.772***	0.789***	-0.010	0.004
	(0.034)	(0.037)	(0.007)	(0.002)	(0.043)	(0.031)	(0.007)	(0.004)
ln_E$_{ROW}$_lagxCU*	-0.067***	-0.121***	0.176***	0.201***	-0.099**	-0.123***	0.679***	0.665***
	(0.026)	(0.047)	(0.021)	(0.021)	(0.038)	(0.042)	(0.033)	(0.008)
CU	-2.187***	-3.829***	-0.481	-0.393	1.572*	0.322	-0.261	-0.225
	(0.509)	(0.910)	(0.591)	(0.623)	(0.816)	(0.961)	(0.953)	(0.219)
AGE	0.129***	0.151***	-0.004	-0.004	0.064	0.098**	0.016***	0.024***
	(0.033)	(0.042)	(0.005)	(0.003)	(0.040)	(0.041)	(0.006)	(0.006)
*AGE*CU*	-0.030**	-0.052***	-0.028**	-0.030**	-0.042	-0.030	-0.014	-0.011
	(0.014)	(0.015)	(0.013)	(0.013)	(0.029)	(0.029)	(0.030)	(0.014)
BIND	0.099*	0.136	-0.088**	-0.068**	0.066	-0.064	0.031	0.110
	(0.055)	(0.085)	(0.038)	(0.033)	(0.104)	(0.140)	(0.091)	(0.071)
*BIND*CU*	-0.181*	-0.035	0.025	0.075	-0.174	-0.044	-0.090	-0.160
	(0.097)	(0.125)	(0.071)	(0.067)	(0.183)	(0.219)	(0.223)	(0.105)
Fixed Effects	c-y, c-i	c-y, c-i, i-y	c-y, c-i	c-y, c-i, i-y	c-y, c-i	c-y, c-i, i-y	c-y, c-i	c-y, c-i, i-y
Observations	16,251	16,251	16,251	16,251	16,251	16,251	16,251	16,251
R-squared	0.61	0.67	0.99	0.99	0.44	0.52	0.90	0.86
F-test of excluded instruments	98.82 [0.00]	341.92 [0.00]	206.66 [0.00]	415.67 [0.00]	122.69 [0.00]	303.37 [0.00]	185.08 [0.00]	243.66 [0.00]

Notes: Coefficients obtained from the first-stage of the IV regressions from columns 1 and 2 of Table 5, where the endogenous variables are the output of the PTA partner (columns 1-2) and preferential imports (columns 5-6), and their respective interactions with the CU dummy (columns 3-4 and 7-8). The instrument for the supply of the PTA partner is the average output of the three countries in the sample that have their output most correlated with the output of the PTA partner, but which are not PTA-partners of country *m* at any point during the sample period. The instrument for preferential imports is exports by the PTA-partner to the rest of the world. Standard errors, in parentheses, are adjusted for clustering at the country-industry (ISIC3) level in all regressions, with *, **, and *** indicating statistically significant at 10%, 5% and 1% levels, respectively. *P*-values in brackets.