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Preferential Trade Agreements and MFN Tariffs: Global Evidence*

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Abstract

We study the effects of preferential trade agreements (PTAs) on multilateral liberalization using a new global tariff database that covers the 2001-2010 period. Employing a theoretically motivated empirical approach and instrumental variable strategy, we provide evidence that PTAs induce tariff cuts on non-member countries. Our baseline estimates imply that each 1% point PTA-induced decline in applied tariffs lowers most-favored nation (MFN) tariff rates by 0.42% points. This effect is driven by countries that negotiate deeper preferential trade deals. PTAs that span more policy fields are prone to lead to more inefficient trade diversion, which creates a stronger incentive to subsequently cut MFN tariffs. At the same time, our results are remarkably consistent across other subsamples emphasized in the literature, including high- and low-tariff importers, poorer and richer economies as well as large and small countries.

JEL codes: F13, F14
Keywords: Trade Agreements, GATT/WTO, Tariffs

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1 Introduction

With the collapse of the Doha Round and limited prospects for further WTO negotiations in the near future, preferential trade agreements (PTAs) are the main impetus for further trade liberalization across the world. At the same time, we are witnessing a rise in protectionist sentiment in some countries that is fueling skepticism about the value of both existing and potential future trade deals, as illustrated most notably by the United States' decision to withdraw from the TPP. Given the continuing emergence of new PTAs in some countries and the disinclination or even withdrawal in others, the international trading system faces the risk of becoming increasingly fragmented. Understanding how preferential trade deals affect policies towards non-members is therefore becoming ever more important. Economic theory emphasizes that PTAs could either hinder or help multilateralism.[1] For one, preferential tariff rates are valuable bargaining chips when trade barriers on non-members are high, creating incentives to maintain these barriers in order to gain concessions from partner countries in other policy areas. On the other hand, PTAs could induce lower tariffs on outsiders to attenuate the negative effects of diverting trade from the lowest-cost producers to preferential partners. How PTAs affect multilateral tariffs is then an inherently empirical question.

Our paper quantifies the effect of PTAs on most favored nation (MFN) tariffs at the product level for a global sample of countries using a new empirical strategy that relies on plausibly exogenous variation in the extent to which a sector within a country is exposed to a PTA. We study a diverse sample of countries in the early 2000s, the heyday of PTA formation (see Figure 1), which offers a perfect testing ground for the likely future impact of bilateral trade deals.[2] Existing work on the subject focuses on select countries and/or agreements during various time periods and provides notably mixed answers. Early studies find that PTAs in advanced economies hinder or at least slow liberalization for non-members (Limão 2006, 2007 for the US and Karacaovali and Limão 2008 for the EU), while papers focusing on developing countries report the opposite (Estevadeordal et al. 2008 for South America and Calvo-Pardo et al. 2009 for ASEAN). However, in contrast to this pattern, Ketterer et al. (2014) and Mai and Stoyanov (2015) both report that Canada lowered its tariffs on non-member countries as a result of CUSFTA. Limão (2016) reconciles these disparate

[1] Starting with Viner (1950), there is a large theoretical literature that considers the effects of PTAs on non-member countries. For a comprehensive review, see Baldwin and Freund (2011).

[2] Between the years 2000 and 2010, we register for the countries in our sample a doubling of PTA partners from, on average, 11 to 22 (see Table 1).

results by arguing that the key driver of whether countries increase or decrease tariffs on outsiders is their initial tariff level, and that Canada was a relatively high-tariff country during this period.[3]

By exploring for the first time the relation between preferential and MFN tariffs at the global level, we are able to provide evidence on a wide range of countries during the same time period using a common methodology. Our empirical approach requires information on both MFN and PTA tariff rates for a large sample of countries. To this end, we use the CEPII (2012) tariff database, which provides tariff rates at the HS 6-digit level while exhaustively covering all PTAs that entered into force between 2000 and 2011. This database – which to our knowledge has not been used before in this context – allows us to study a diverse sample of countries and agreements during a time period that witnessed extensive worldwide PTA activity. Prior analyses of the PTA effects on multilateral trade relations have been hampered by the lack of comprehensive product-level data on preferential tariff rates across agreements and countries. Beyond facilitating a global-level analysis, the CEPII (2012) data allows us to account in our empirical analysis for country-year, product-year and country-product fixed effects, so that our estimates can be identified purely off variation at the country-product level over time.

Identifying the causal impact of PTAs on MFN tariffs is challenging because both PTA and MFN policies are government choices that are driven by many of the same economic and political factors, such as the strength of domestic interest groups as well as concerns about government revenue and consumer welfare. These underlying determinants are likely to affect countries' tariff choices but also more discrete aspects of trade agreements, for instance, the decision to exclude a particular good from preferential tariff concessions. Moreover, the potential for tariff reductions on a product under a PTA might depend mechanically on the initial MFN tariff itself. Taken together, there is substantial policy endogeneity, which is clearly a deep and fundamental challenge in understanding how PTAs affect trade policies towards non-members.

We address these issues with an empirical strategy that draws its identifying variation from the extent to which a sector within a country is *exposed* to a country's PTAs rather than from potentially endogenous policy choices. The starting point for our approach is that the effect of a country's PTAs on its MFN tariffs should depend on how important its PTA partners are as exporters of a given product. A PTA is unlikely to affect MFN tariffs when the partner country does not export a product at all or is a relatively insignificant exporter. Conversely, a PTA is likely

[3] Limão's conclusion is also in line with Crivelli (2016) who reexamines the evidence for South America using the sample of Estevadeordal et al. (2008) with a focus on tariff-level heterogeneity.

to have a more substantial impact when the partner is a dominant exporter of the product. In other words, products in a country are differentially exposed to the country's PTAs depending on the propensity of partner countries to export the products. Our basic idea is to track changes in this propensity using information on a country's PTA partners' share of exports to the rest of the world, a measure we call the *predicted PTA share*. This predicted PTA share could adjust both in response to the formation of new PTAs and due to changes in the existing PTA partners' propensities to export a product.

While this predicted PTA share is a natural source of variation in a product's PTA exposure, it is not a measure of the actual exposure, which also depends crucially on the country's MFN and preferential tariff rates. For example, if a country enters into a PTA with a partner that is a dominant exporter of a particular product but the preferential tariff on that product is identical to the MFN tariff, the PTA share may increase significantly but this would not intuitively translate into any real change in a product's PTA exposure. Hence, while the predicted PTA share naturally serves as an instrumental variable in this context, we require an appropriate instrumented treatment variable that also incorporates information about the actual preferential and MFN tariff rates.

We identify a simple and intuitive choice for this treatment variable: changes in the weighted applied tariff rate on a given product. This treatment variable would work as desired in the above example since an increase in the predicted PTA share would not translate into a reduction in the applied tariff rate when the preferential tariffs are the same as the MFN tariffs. On the other hand, if preferential tariffs are lower than the MFN tariff – as is generally the case – an increase in the predicted PTA share would reduce the applied tariff rate by increasing the actual share of imports entering at the lower preferential rates. To complement this intuitive argument, we also show that using the weighted applied tariff rate as the instrumented treatment variable in this manner can be justified by a canonical partial equilibrium trade model. For ease of interpretation, we calculate the weighted applied tariff with a constant MFN rate so that changes in our instrumented variable capture specifically the direct PTA-induced change in the weighted applied tariff.

Using our new methodology and data, we find robust evidence across several alternative specifications that PTAs induce a reduction in MFN tariffs. Our baseline model implies that a 1 percentage point decrease in our weighted applied tariff measure translates into a 0.42 percentage point decrease in a country's MFN tariff. In the language of the literature, our results therefore provide evidence that PTAs serve as *building blocks* rather than *stumbling blocks* towards multilateral free trade. Our estimates are broadly comparable to other papers that find evidence for a building block effect (e.g., Estevadeordal et al. 2008), even though the identifying variation is fundamentally different: our analysis is ultimately based on changes in PTA partners' propensities to export a good rather than on the reciprocal tariff rates set by partner countries as in several past papers.[4]

To explore the mechanism that may be driving our result, we go one step further and expand our analysis beyond preferential tariff rates by examining the importance of *PTA depth* in this context, which refers to the extent to which a PTA covers various non-tariff policies. We find that countries which tend to negotiate deeper trade agreements exhibit a substantially stronger building block effect. This result is consistent with the argument that deeper agreements magnify the effects of trade diversion due to increased discrimination against non-members in more policy areas. To our knowledge, this result provides for the first time evidence that links MFN tariff rates to non-tariff characteristics of PTAs. In earlier related work that focuses purely on trade flows, Mattoo et al. (2017) find that deeper trade agreements lead to less trade diversion than shallow deals. Our results indicate that substantial reductions in MFN tariffs in response to deeper trade agreements could in part explain this phenomenon.

Given our diverse sample of countries, we are also in a position to directly test whether there are systematic differences between low- and high-tariff countries, as hypothesized by Baldwin and Freund (2011) and Limão (2016). We do not find a differential impact. Our results indicate a building block effect of extremely similar magnitude for both groups of countries. Cutting the sample differently, we find significant building block effects for both lower and higher income countries and, if anything, our estimates suggest a stronger building block effect for the latter group. Similarly, both smaller and larger importers experience similar building block effects, indicating that the earlier identified stumbling block effects for the US and the EU are not driven by market power considerations alone. Finally, consistent with Estevadeordal et al. (2008), we also detect that the building block effect is concentrated in countries which are not in customs unions, while there is no significant effect for customs union members.

The next section provides the theoretical foundation for our empirical approach. Section 3 introduces our empirical strategy and discusses the data. Section 4 provides our baseline results, and section 5 examines the evidence for the importance of PTA depth as driver of multilateral building block effects. Section 6 reconsiders the evidence for several theory-based extensions of the empirical framework that have been suggested to unify the existing mixed results in the literature.

[4] Furthermore, Crivelli (2016) notes that the results reported in Estevadeordal et al. (2008) are not robust to the inclusion of product-year fixed effects, whereas we include these fixed effects throughout our analysis.

Section 7 concludes.

2 Theoretical Framework

Intuitively, the effect of a PTA on product-specific MFN tariffs should generally depend not only on the preferential tariff rates enjoyed by a country's PTA partners but also on what fraction of the exports of a product are actually accounted for by its PTA partners. For example, we might expect that a low preferential tariff for a country that barely exports a particular product is unlikely to have a substantial effect on the MFN tariff rate that an importer sets on this good. Accounting for the importance of PTA partners in the sourcing of imports becomes ever more relevant in a world that has witnessed the growth of a complicated web of trade agreements, where countries are subject to different tariff rates. In this section, we use a simple theoretical framework to illustrate this point more formally and to motivate the applied tariff measure we use below in the empirical analysis as determinant of MFN tariffs.

Consider a partial equilibrium setting with an importing country – country A – and two exporting countries – countries B and C. Without loss of generality, we assume country B is in a PTA with country A, and country C is subject to MFN tariffs. Country A's welfare is given by the indirect utility function of the representative household:

$$V\left[p, \Pi + t_B X_B\left(p - t_B\right) + t_C X_C\left(p - t_C\right)\right] \quad ,$$

where p is the price in country A, Π is domestic producer surplus, t_i is the specific tariff imposed on country i, and X_i is the exports of country i to country A. We assume throughout an interior solution where both countries B and C export strictly positive quantities to A.

We will derive the optimal MFN tariff rate for country A taking as given the terms of its preferential agreement with B. We therefore assume the government chooses t_C to maximize welfare, taking t_B as predetermined.[5] The first-order condition for the government's problem is:

$$\frac{dV}{dt_C} = -D\frac{dp}{dt_C} + X_A\frac{dp}{dt_C} + t_B\frac{dX_B}{dp}\frac{dp}{dt_C} + t_C\frac{dX_C}{dp}\left(\frac{dp}{dt_C} - 1\right) + X_C = 0 \quad ,$$

where D and X_A are A's consumption and domestic output, respectively. Note that the derivation

[5] While we consider the welfare maximization problem here, introducing an additional parameter that overweights producer surplus to capture political pressures to protect import-competing industries leads to very similar optimal tariff expressions.

of the first term above makes use of Roy's identity and the second of Hotelling's Lemma. We can re-arrange this expression to obtain:

$$\frac{t_C}{p} = \frac{dp}{dt_C}\frac{M}{X_C}\frac{1}{\sigma_C}\left[\sigma_B\frac{t_B}{p}\frac{X_B}{M} + \sigma_C\frac{t_C}{p}\frac{X_C}{M} - 1\right] + \frac{1}{\sigma_C} \quad ,$$

where σ_i is the export supply elasticity for country i and M denotes the total imports of the good in country A. If we further assume that the foreign export supply elasticities are the same for countries B and C, i.e., $\sigma_B = \sigma_C = \sigma$, we get the following:

$$\frac{t_C}{p} = \frac{dp}{dt_C}\frac{M}{X_C}\left[\frac{t_B}{p}\frac{X_B}{M} + \frac{t_C}{p}\frac{X_C}{M} - \frac{1}{\sigma}\right] + \frac{1}{\sigma} \quad . \tag{1}$$

This expression relates the optimal MFN tariff for a good in ad valorem terms to the weighted-average of the tariff rates applied across partners, where the weights are each country's share in country A's total imports of the good in question: X_B/M and X_C/M, respectively. This simple framework therefore suggests that a lower preferential tariff on country B leads to a lower optimal MFN tariff, meaning that there is a building block effect from PTAs toward multilateral tariff liberalization. While there are many potential theoretical reasons for both building block and stumbling block effects (see Baldwin and Freund 2011 for a comprehensive review), the building block effect here reflects the fact that a lower PTA tariff would cause greater trade diversion. The latter would give rise to a stronger incentive to reduce the MFN tariff rate.

Note that the importance of the PTA tariff for adjusting the MFN rate in equation (1) crucially depends on the share of country A's imports coming from the PTA partner country B. If this share is small, then the preferential tariff rate itself will not be particularly important, even when it is substantially lower than the MFN tariff. It is therefore the combination of (i) a low PTA tariff relative to the MFN rate and (ii) a substantial PTA import share that together induce an incentive to reduce the MFN tariff. The next section lays out our empirical strategy to capture these two distinct channels for MFN tariff formation in response to PTAs.

3 Empirical Strategy and Data

3.1 Empirical Strategy

Our empirical specification is motivated by the theoretical model in section 2. Specifically, equation (1) relates the optimal MFN tariff rate to a weighted applied tariff measure that takes into account both preferential tariff rates and the importance of PTA partners as import source.[6] In particular, when more imports of a given product enter a country at a low preferential tariff rate, trade diversion concerns are most serious, implying in turn a greater incentive to subsequently lower the MFN tariff. Our baseline empirical model therefore takes the following form:

$$MFN_{ist} = \alpha_{it} + \alpha_{is} + \alpha_{st} + \beta WT_{ist-1} + \epsilon_{ist} \quad , \tag{2}$$

where $WT_{ist} = \sum_{j=1}^{J} w_{ijst} T_{ijst}$ is the average tariff levied on trading partners $j \in [1, ..., J]$ by country i in sector s in year t, using as weights each exporter's respective share in sectoral imports in country i. To control for a wide range of unobserved heterogeneity and to ensure that our estimates are identified using only variation within products and countries over time, we include importer-year fixed effects, α_{it}, 6-digit HS level importer-product fixed effects, α_{is}, and 6-digit HS level product-year fixed effects, α_{st}.

While we discuss below an instrumental variable strategy to deal with several sources of potential endogeneity in this specification, we also make two choices to avoid simultaneity issues that could complicate a causal interpretation of our estimates. First, we use throughout a one-period lag to link the weighted applied tariff measure, WT, to MFN tariffs. From a theoretical perspective, it is likely that PTA tariffs need some time to unfold their full effect on MFN tariff choices.[7] Second, when adding information to the weighted applied tariff measure for non-PTA countries, we use the initial MFN tariff rate for all years rather than allowing the MFN tariff to vary over time. This procedure implies that the variation in our independent variable is based on changes in PTA tariffs and import patterns alone and is not caused by MFN tariffs. Following these steps, our constructed weighted applied tariff measure, WT, then allows for a straightforward interpretation of any estimated coefficient. In particular, $\beta > 0$ implies PTAs are a building block for multilateral tariff liberalization while $\beta < 0$ suggests a stumbling block effect.

Apart from the above described simultaneity issues, there are at least two significant sources of

[6] An alternative approach to ours would be to isolate the MFN tariff rate on the left-hand side of (1) to express it as a function of the PTA tariff instead of the weighted applied tariff. While several papers in the literature follow this strategy, e.g., Estevadeordal et al. (2008), there are at least two advantages to our approach in the present context. First, our IV strategy – as described in detail below – requires the instrumented variable to contain information on both PTA and MFN tariff rates. Second, during our period of investigation in the early 2000s, most countries in the sample already have several PTAs in place (see Table 1), leaving little or no variation in PTA tariffs to be exploited at the importer-year-product level.

[7] Moreover, our worldwide 6-digit HS level preferential tariff data is only available as averages over three-year periods, which means that in a simultaneous specification some of the variation in the dependent variable could otherwise predate the variation in the independent variable.

endogeneity that could distort the estimate of β when implementing equation (1) using standard panel methods. First, as discussed in the introduction, the tariff rates themselves are likely to be endogeneous. Some of the factors that affect a country's choice of preferential tariff rates – including whether to exempt a given product from a PTA – are also likely to have an impact on decisions surrounding MFN tariffs. For example, a strong domestic lobby in a particular industry might press for higher protection against all exporting countries, thereby affecting both MFN and preferential tariff rates. A second source of endogeneity could arise because the tariff rates influence trade patterns and in turn the weights that are used in computing the applied tariff measure on the right hand side in equation (1).

To address these concerns, we use a novel instrumental variable strategy. We instrument the weighted applied tariff measure, WT, by estimating the following first-stage regression:

$$WT_{ist-1} = \alpha_{it-1} + \alpha_{is} + \alpha_{st-1} + \gamma PS_{ist-1} + \mu_{ist-1} \quad , \tag{3}$$

where PS_{ist} is what we call the *predicted PTA share*. This measure captures the share of exports to the rest of the world (i.e., excluding country i) that is accounted for by the PTA partners of country i in product s in year t.[8] This predicted share measures the propensity of country i's partner countries to export a particular product – perhaps due to their patterns of comparative advantage – and thus quantifies the extent to which a given product in i is "exposed" to PTAs. It should not, however, affect the MFN tariff of country i except through its effect via PTAs.

A significant advantage of our empirical strategy is the identification of the PTA effect on multilateral trade policies independent of confounding factors that drive both the choice of PTA and MFN tariffs on a given product. While our instrument does not use any tariff rate information, tariffs are part of the instrumented variable WT. This difference is important because the treatment is not a change in the predicted PTA share per se, but an adjustment in the weighted applied tariff rate that is induced by changes in the exposure to PTA partners. The latter depends on both the PTA import share change and the extent to which the relevant PTA tariffs are lower than the MFN tariff. Hence, even if the preferential tariffs are much below the MFN tariff, a small PTA import share would imply a very limited treatment.

Our instrumental variable strategy is in the spirit of several other papers that also predict

[8] The results below are similar when we constrain the predicted PTA share to exporters with a similar income level to the importer. These results are available upon request.

bilateral imports using the exporting country's trade flows to other locations in the world. For example, Autor et al. (2013) instrument for US imports from China with China's exports to other high-income countries when studying the effect of Chinese competition on local labor markets in the US. Similarly, Hummels et al. (2014) construct an instrument for firm-level offshoring in Denmark by using information on exporting countries' exports to the rest of the world. The key difference in our application is that the predicted shares are a means of generating exogeneous variation in a policy variable, i.e., weighted applied tariffs. In using predicted trade shares as an instrument in a policy context, our approach is also related to Saggi et al. (2018) who employ a sectoral gravity model to generate predicted import shares. Their approach follows Do and Levchenko (2007), which itself is a sectoral adaptation of the geographic instruments from Frankel and Romer (1999). As noted by Do and Levchenko (2007), Frankel and Romer's approach can in practice only generate time-invariant predicted shares, which would not be well-suited for our analysis as we intend to exploit the time variation in predicted PTA shares.

In addition to the baseline level fixed effects model in equation (2), we also consider alternative specifications that control for unobserved importer-product characteristics by first differencing. We explore two options. First, we use a first difference between subsequent periods to exploit the short-run changes in the weighted applied tariff measure to identify effects on MFN tariffs:

$$\Delta MFN_{ist} = \alpha_{it} + \alpha_{st} + \beta_{SD} \Delta WT_{ist-1} + \epsilon_{ist} \quad , \tag{4}$$

where Δ indicates one-period changes, and α_{it} and α_{st} are again importer-year and product-year fixed effects.

Second, we consider a "long" first-difference specification that focuses on the change between the first and last period in our dataset, i.e., between 2001 and 2010:

$$\Delta_9 MFN_{ist} = \alpha_i + \alpha_s + \beta_{LD} \Delta_9 WT_{ist-1} + \epsilon_{ist} \quad , \tag{5}$$

where Δ_9 indicates the 9-year difference between the last and first periods in our data. α_i and α_s are importer and HS 6-digit product fixed effects, respectively. Consistent with our baseline specification, we continue to use a one-year lag for the weighted applied tariff measure. While the long first-difference approach has to contend with a smaller sample size, it has the advantage of capturing long-term tariff trends instead of period-to-period changes.

3.2 Data

Previous analyses of the effect of PTAs on multilateral trade relations have been hampered by the lack of comprehensive product-level data on preferential tariff rates across agreements and countries. Limão (2006, 2007) focuses on US tariffs around the Uruguay Round. Karacaovali and Limão (2008) conduct a similar analysis for the European Union and its PTAs during the same time frame. Estevadeordal et al. (2008) and Crivelli (2016) examine instead 10 Latin American countries for the period 1990-2001. Calvo-Pardo et al. (2009) consider ASEAN members and their policies toward nonmember countries during 1992-2007, while Ketterer et al. (2014) and Mai and Stoyanov (2015) both focus on the effects of CUSFTA during 1989-1998.

We examine for the first time the relation between preferential and MFN tariffs for a global set of countries and agreements. Our analysis is conducted at the HS 6-digit level, which constitutes the most detailed degree of internationally comparable products. The main source of tariff information that makes our study possible is the unique MacMap HS-6 database from the International Trade Center and CEPII (CEPII 2012). This data contains ad valorem tariff rates (or their equivalents) for a large number of countries while exhaustively taking into account each importer's preferential trade agreements and is available to us in the form of three-year averages for 2000-2002, 2003-2005, 2006-2008 and 2009-2011.[9] While the standard sources such as TRAINS and WTO-IDB in principle take into account preferential tariffs, the coverage is in practice often spotty and MFN tariffs are frequently reported as applied tariffs even when separate preferential tariffs are applicable. The MacMap data therefore allows us to go beyond country- and/or agreement-specific data that previous inquiries were limited to.

Data on PTA formation dates and member countries come from Mario Larch's updated Regional Trade Agreements Database used in Egger and Larch (2008). Our analysis focuses on WTO member countries that entered into at least one new PTA during the sample period, i.e., between 2001-2010. While the latter requirement is not essential for our empirical identification strategy, we are likely to get more relevant and substantial variation by focusing on countries with new PTAs, in particular with regard to the explosive growth of trade agreements during the early 2000s. In addition, to minimize the influence of potential outliers, we drop very small countries from our sample, defined as those with a population of less than 1 million in any of the sample years. To further purge outliers from the analysis that follows, we also remove the top 1% of observations that experienced

[9] We thank Houssein Guimbard of CEPII for providing us with the 2009-2011 data. Note that we use the middle year to refer to each respective period, e.g., 2001 for the period 2000-2002.

the largest MFN tariff changes over the sample period. Our final sample contains 51 countries and 95,466 country-product observations over the period 2001-2010.[10] Table 1 provides the list of countries in our data and their respective count of PTA memberships prior to the start (pre-2001) and at the end (2010) of the sample period. We discuss more descriptive statistics in passing below.

In addition to information on product-specific tariffs, we also require trade data at the 6-digit level. We use CEPII's version of Comtrade data (CEPII 2016), which applies a statistical procedure to give more weight to either importer- or exporter-reported data depending on the estimated reliability of the importer and exporter in question (including adjustments for f.o.b. and c.i.f. differences). Having a systematic procedure to account for mirror data is an advantage for our analysis, which involves a wide variety of countries, including many developing economies. Table 2 provides detailed summary statistics and definitions for all variables that we use in the empirical analysis. Appendix A lays out in more detail the data sources and construction of all variables. Between 2001 and 2010, the average MFN tariff decreased by 3.8 percentage points. During the same time frame, our weighted tariff measure, which accounts for import shares and PTA preferences, dropped by about 1.9 percentage points. We investigate next to what extent the latter has contributed to or halted the decrease in MFN tariff rates.

4 Baseline Results

4.1 IV Regressions

We first focus on the estimation of the level regression corresponding to equation (2). In line with the earlier discussion, we regress the sectoral MFN tariff rate on our lagged weighted applied tariff measure, which we instrument with the predicted PTA import share outlined in equation (3). To control for a host of unobservable factors, both the first- and second-stage regressions include importer-year, importer-product and product-year fixed effects. The standard errors are clustered throughout at the importer/6-digit HS level to account for potential serial correlation at the importer-product-year level.[11] The first column of Table 3 reports the second-stage regression results along with the first-stage F statistic, which is very large relative to conventional benchmarks, suggesting that the predicted PTA share does remarkably well in explaining the variation in the

[10] We treat the European Union as a single entity as for all purposes the member countries pursue a unified external trade policy.

[11] To account for the possible correlation of tariff rates within customs unions, the reported standard errors also treat countries in the same customs union as a single importer for the purpose of clustering.

weighted applied tariff measure.[12] The coefficient estimate for the WeightedTariff variable is positive and statistically significant, implying that PTA-induced applied tariff reductions also put downward pressure on the corresponding MFN tariff. This result supports the building block theory of PTAs with regard to multilateral trade policy. The point estimate of 0.419 indicates that a 1% point drop in the weighted applied tariff on a product through PTA concessions leads to a .419% point decrease in the MFN tariff. Thus, PTAs lower MFN tariffs but the magnitude of the effect is slightly less than half of the initial reduction in the importing countries applied tariff rate.

Instead of focusing on level regressions, columns (2) and (3) in Table 3 repeat the analysis using the difference approaches outlined in section 3.1. Specification (2) focuses on the first-difference model laid out in equation (4), which considers differences between two consecutive periods over the sample period. Column (3) uses instead the long first-difference specifications in equation (5) that differences between the first and last periods in the sample, i.e., between 2000-2002 and 2009-2011. Both specifications account again for importer-year and product-year fixed effects but do not consider importer-product fixed effects as these are eliminated through the differencing procedure. The full sample results from both the first- and long-difference specifications are very similar to our level regression in column (1) and suggest a statistically significant building block effect of PTAs toward multilateral free trade of a comparable magnitude.

4.2 OLS Regressions

To offer a baseline comparison, Table 4 reports the OLS counterparts to our instrumental variable estimates from Table 3. We see from column (4) of Table 4 that the OLS level results also point to a significant building block effect but with a coefficient size that is only about a quarter of the corresponding IV estimate. Hence, the endogeneity of MFN tariffs with respect to PTAs leads to a substantial underestimation of the building block effect. Moreover, columns (5) and (6) show that the attenuation of the OLS point estimate relative to the IV specification is even more pronounced for the two difference specifications. This pattern is consistent with the presence of measurement error, which generally causes more severe attenuation bias in first-difference vs. level fixed effects regressions (Griliches and Hausman 1986). In the IV specifications, the measurement error would be addressed by the use of our instrumental variable, accounting for the greater similarity between

[12] Table B1 in the Appendix B presents the full first-stage regression results of the weighted applied tariff measure, WT, on the predicted PTA trade share variable, PS. In all three specifications, PS is a highly significant predictor of a country's weighted applied tariff. As expected, an increase in the predicted trade share of its PTA partners results in a lower applied tariff in the importing country.

the three IV estimates. The most likely source of measurement error in the weighted applied tariff measure is the inclusion of import share weights, which are calculated from bilateral trade flows that are known to contain various potential statistical discrepancies (Kellenberg and Levinson 2019). Since our instrumental variable is based on what are effectively global export shares for each exporter, this more aggregated variable is likely to be less noisy than the bilateral export shares, addressing in turn the measurement error.

5 PTA Depth and MFN Tariffs

For the longest time, the literature on the effects of PTAs focused its attention on broad aggregate binary classifications of these trade deals. More recent work on PTAs has started to emphasize instead the actual content differences across agreements. In particular, there is an increased interest in understanding how the impact of trade agreements depends on their respective "depth," i.e., the extent to which they cover various non-tariff policy areas. Interestingly, investigations of this kind have so far been mostly confined to studying the effects of PTA depth on trade flows, whereas the potential impact of PTA design on MFN tariffs remains unexplored. In this section, we fill this gap by examining how the depth of a country's trade agreements affects its tariff policies towards nonmembers.

The standard explanation for a building block effect is that countries reduce MFN tariffs after providing preferential tariff cuts to PTA partners in order to attenuate the welfare losses from inefficient trade diversion. It follows naturally from this argument that non-tariff provisions in trade agreements should be judged by the same token. Deeper PTA ties between countries are likely to increase trade diversion from non-partner countries, incentivizing in turn MFN tariff cuts to alleviate potential welfare losses from discrimination and tariff revenue decreases in the importing country.[13] On the other hand, as pointed out by Baldwin et al. (2009) and Mattoo et al. (2017), deeper agreements could also include more provisions that facilitate trade with all exporters, resulting in trade creation also for non-PTA members.

To shed light on the question how PTA depth affects MFN tariff choices, we obtain detailed data on trade agreement provisions from Hofmann et al. (2017). Their data maps, in a binary fashion, 52 provisions for all PTAs notified to the WTO that were signed since 1958. We follow the standard

[13] In a simple partial equilibrium trade model, a deeper agreement will cause more trade diversion as long as the foreign export supply for the PTA partner is upward sloping and we are at an interior solution where the importing country imports both from the PTA partner and a non-partner.

approach in the literature (e.g., Mattoo et al. 2017) and simply add up the number of included agreement provisions to obtain a PTA depth measure at the importer-exporter level. In some cases, when a pair of countries is covered by more than one agreement, we take the maximum depth count among the available agreements. Next, we compute a weighted average PTA depth measure for each importer, using as weights each PTA partner's share in the importing country's aggregate imports from all PTA partners. Hofmann et al. (2017) also report whether each of the provisions included in a PTA is legally enforceable. For robustness purposes, we also construct a second depth measure that only focuses on legally enforceable provisions rather than all included provisions.

Table 5 presents results when differentiating between the top and bottom half of countries in terms of their PTA depth. The level specifications in columns (7) and (8) reveal that while there is a statistically significant building block effect for both groups of countries, the impact is substantially larger for countries with trade deals that cover more non-tariff policy areas. The difference between the two coefficients is statistically significant at the 5% level. Columns (9) and (10) reveal a comparable pattern – though with less precision – when employing the first-difference specification. The difference between both coefficients is again significant at the 5% level. Columns (11) to (14) report results when focusing only on legally enforceable provisions to capture PTA depth. The estimates paint the same picture, although the difference between importers with shallower and deeper PTA is slightly more pronounced when focusing on legally enforceable PTA rules. In any case, countries that negotiate PTAs touching on more non-tariff policy areas – legally enforceable or not – are subject to significant building block effects, while the same cannot be said for participants in shallow PTAs.

The evidence in Table 5 suggests that PTAs only lead to significant cuts in MFN tariffs in countries with deeper trade agreements. Interestingly, when focusing on aggregate bilateral trade flows, Mattoo et al. (2017) find evidence that deeper PTAs can actually lead to trade creation even for non-member countries. Our results suggest that at least part of this effect may be due to more extensive sectoral MFN tariff cuts that importers with deeper PTAs implement.[14] That is, importers with deeper PTAs counter potential trade diversion impacts with non-discriminatory tariff cuts that outweigh any negative trade effects on third countries, which could arise from more extensive non-tariff policy cooperation between PTA partners. Hence, the extent of cooperation on

[14] Mattoo et al. (2017) suggest that the presence of non-discriminatory PTA provisions is a particular driver of their results. Using sectoral tariff data, we find no significant differences in terms of building block effects between countries that include a larger or smaller number of these provisions in their agreements. These results are available on request.

non-tariff issues in PTAs is a crucial determinant of whether bilateral trade deals move the world as a whole closer to (tariff-)free trade. If PTAs are sufficiently deep, bilateral trade deals can indeed be building blocks.

6 Reconsidering the Evidence on Building and Stumbling Blocks

As previously discussed, a hallmark of the earlier literature on building and stumbling block effects of preferential trade agreements is the remarkable variation in the empirical evidence that has been uncovered. We therefore consider in this part a number of extensions to the baseline framework that have been proposed to reconcile the mixed evidence in the literature. Our comprehensive global sample of preferential tariff rates offers a unique testing ground to examine the robustness of existing hypotheses, which are generally based on comparisons across different studies.

One established empirical fact in the literature is the markedly different adjustment in subsequent MFN tariffs depending on whether countries enter a customs union (CU) or another less integrated form of a trade agreement. In their sample of Latin American countries in the 1990s, Estevadeordal et al. (2008) find that the building block effects of PTAs are entirely driven by non-CU arrangements. One potential reason for this result is that CU members have more market power when negotiating a common external tariff, which incentives them to raise, or at least not lower, external MFN tariffs; see Baldwin and Freund (2011) for a detailed theoretical discussion of this channel. A second possibility for why CU members may choose not to lower MFN tariffs is that from a theoretical perspective CUs can be designed to be purely trade creating (Kemp and Wan 1976), which removes the incentive to lower MFN tariffs to limit the negative effects of trade diversion.

To examine the evidence for the customs union channel in our sample, columns (13) and (14) in Table 6 split the importers in our data into CU members and non-CU members.[15] We see from these specifications that the building block effect in our global sample is also entirely driven by non-customs union members. The p-value from a t-test of coefficient equality suggests that this difference is statistically significant at the 10% level. While in line with the earlier findings in the literature, this outcome is still remarkable given that many developing country CUs in our sample are not particularly close to being customs unions in the true sense of the term, and are often seen as PTAs with an aspiration to move towards a CU over time. Our findings therefore suggest that

[15] Note that while Table 6 only reports level results, the first- and long-difference estimates are similar and available on request.

even such partial CUs are meaningfully different from standard PTAs.

Beyond the customs union question, Baldwin and Freund (2011) and Limão (2016) both attempt to reconcile the existing literature by arguing that we tend to see building block effects for countries with high initial tariffs and stumbling block effects for countries with low initial tariffs. This result could arise because PTAs might lead to greater trade diversion in high-tariff countries, implying a greater incentive to subsequently lower MFN tariffs. While this argument is based on a very plausible interpretation of the existing evidence, it should also be noted that it draws on the evaluation of distinct studies, which tend to vary substantially in terms of methodology, time period under consideration, and the sample of countries being studied.

Given our diverse sample of countries, we are in a position to test directly whether the effect of PTAs varies systematically depending on a country's initial MFN tariff rates. We classify a country as having high initial tariffs if the average MFN tariff rate is greater than 13 percent, which corresponds to the median in our data, and run the baseline regression on both samples separately. Columns (15) and (16) in Table 6 present the results. Both specifications show a statistically significant building block effect of almost identical magnitude, which is also confirmed by the p-value of 0.39 from the coefficient equality test across the two samples. This finding suggests that at least during the period of exponential PTA growth in the early 2000s the presence of a building block effect was not confined to high-tariff countries.

Splitting the sample differently, we also examine whether there are systematic differences between low- and high-income countries, which could serve as another proxy for different degrees of trade protection. The literature generally does suggest building block effects for developing countries and stumbling block effects for developed economies, with the important exception of Ketterer et al. (2014) and Mai and Stoyanov (2015) who find building block effects for Canada. In columns (17) and (18) in Table 6, we report results when dividing the sample into two groups based on their real per capita income levels. Interestingly, in our comprehensive global sample, we find a building block effect for both sets of countries but with a substantially larger point estimate for higher income economies. However, the difference in the estimated coefficient magnitudes is not statistically significant at conventional levels with a p-value of .12.

Finally, given that Limão (2007) and Karacaovali and Limão (2008) have found stumbling block effects for the US and the EU while other studies have identified building block effects for many smaller countries, we also evaluate whether there might be any heterogeneity based on a country's size relative to its PTA partners. Limão (2007) and Karacaovali and Limão (2008) emphasize that non-economic objectives of larger countries can lead to stumbling block effects in order to maintain concessions from smaller partner countries. We classify a country as large if it is, on average over the sample period, larger than its PTA partners in terms of GDP. The results from splitting the sample in this way are shown in columns (19) and (20) in Table 6. Once again, we find a significant building block effect for both groups of countries. While we cannot reject the hypothesis that the WeightedTariff coefficients are significantly different across the two samples, the point estimate is higher for large countries. If anything, this result suggests that larger countries tend to exhibit stronger building block effects.

Taken together, our results imply that the presence of a building block effect of PTAs toward multilateral trade liberalization seems to be fairly consistent across various subsamples during the period under consideration. Interestingly, the differential impacts suggested in the literature in terms of initial tariff levels or income groups mostly do not manifest themselves in our more recent and comprehensive sample of preferential and MFN tariffs. Combined with our results on PTA depth as important channel, these findings suggest that it is mostly the content of negotiated trade agreements that matter for building or stumbling block effects and not the characteristics of countries themselves. Specifically, deeper trade deals – but not customs unions – are more likely to create incentives that prompt subsequent reductions in MFN tariffs.

7 Concluding Remarks

Using the most extensive and detailed data on preferential and MFN tariffs to date, we consider the question whether PTAs help or hinder multilateral trade liberalization. To circumvent endogeneity concerns, our empirical strategy relies on identifying variation that measures the exposure of importers to PTA partners' exports of a given product. We show for a global sample of countries and PTAs from 2001 to 2010 that there is a building block effect from PTA formation to multilateral tariff cuts.

Hence, even during a period that was marked by a tremendous increase in PTA deals and slow-moving multilateral negotiations, preferential tariff concessions fed into MFN tariff reductions. The associated inefficient trade diversion effects from PTAs therefore seem to be a serious consideration for WTO members, even in the absence of reciprocal MFN tariff concessions from other trading partners. Consistent with this interpretation, we provide evidence that the building block effect is driven by countries who negotiate trade deals that cover more non-tariff policy areas, which could potentially lead to more trade diversion. Countries who commit to trade agreements that attempt to reduce non-tariff barriers between PTA members create a stronger incentive to subsequently lower MFN tariffs.

In contrast to some interpretations of the disparate results in the existing literature, we find that the existence of a building block effect is remarkably consistent across a number of subsamples, including high- and low-tariff countries, richer and poorer economies, and for large and small nations. The only exception is customs union members, for which we cannot detect a significant relationship between PTA and MFN tariffs. Our results instead indicate that the actual content of PTAs is the key to understanding building and stumbling block effects. We believe that further exploring the tradeoffs between trade agreement provisions and MFN tariff choices is a promising area for future research.

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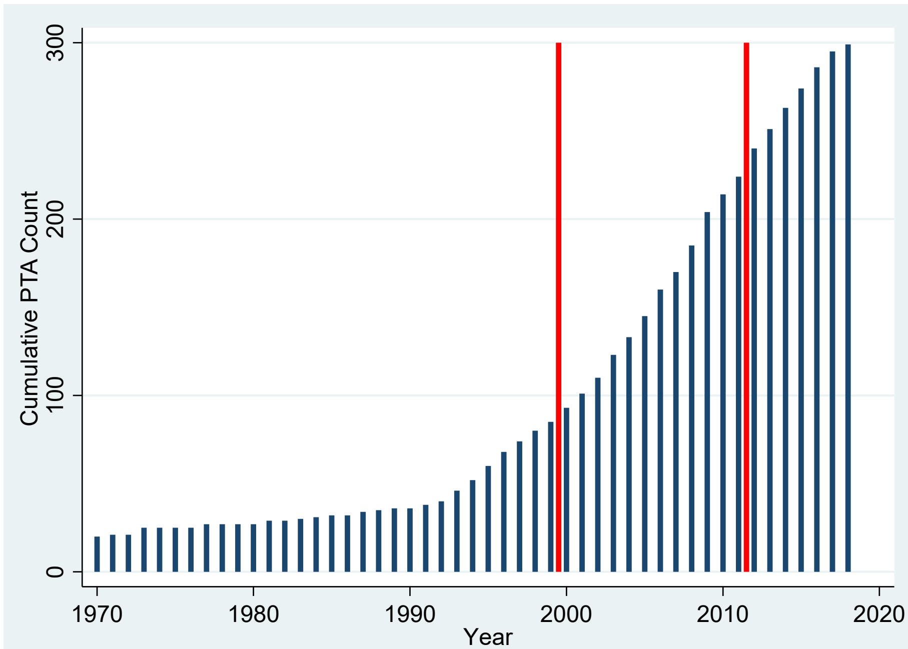
Figure 1: Cumulative Number of PTAs in Force



Notes: The figure shows the number of cumulative PTAs in force that have been notified to the WTO. The red vertical lines delimit our sample period.

Table 1: **Countries in Sample – Number of PTA Partners, Pre-2001 and 2010**

Country	**Number of Pre-2001 PTA Partners**	**Number of 2010 PTA Partners**
Albania	0	35
Australia	2	11
Bangladesh	0	6
Canada	4	9
Chile	2	45
Colombia	5	8
Costa Rica	1	10
Croatia	3	35
Dominican Republic	3	45
Egypt	35	61
El Salvador	5	11
European Union	38	67
Georgia	6	8
Guatemala	5	11
Honduras	5	11
India	1	17
Indonesia	9	12
Israel	26	32
Jamaica	11	37
Japan	0	13
Jordan	18	47
Kenya	17	18
Korea (South)	0	15
Madagascar	13	16
Malawi	15	16
Malaysia	9	15
Mauritius	16	17
Mexico	26	40
Morocco	32	47
Mozambique	6	5
Myanmar	8	14
New Zealand	2	10
Nicaragua	4	9
Norway	29	43
Oman	16	18
Pakistan	0	8
Panama	0	8
Papua New Guinea	1	29
Paraguay	3	3
Peru	4	8
Philippines	9	14
Rwanda	11	12
Sri Lanka	1	6
Switzerland	30	45
Trinidad and Tobago	11	38
Tunisia	29	46
Turkey	28	41
Uganda	16	18
United States	4	16
Uruguay	3	4
Zambia	15	14

Table 2: Summary Statistics

Variable	Definition	Mean	SD	Min	Max
MFN_{ist}	Applied MFN tariff rate (including ad valorem equivalents)	0.127	0.181	0.000	10.000
WT_{ist-1}	Trade-weighted average applied tariff rate (using 2001 MFN tariffs)	0.097	0.167	0.000	10.000
PS_{ist-1}	Predicted PTA share (PTA partners' share of exports to the rest of the world)	0.162	0.199	0.000	0.995
ΔMFN_{ist}	Change in MFN tariff rate between consecutive periods	-0.013	0.057	-1.000	1.000
ΔWT_{ist-1}	Change in WT between consecutive periods	-0.007	0.064	-4.664	7.609
ΔPS_{ist-1}	Change in PS between consecutive periods	0.042	0.101	-0.733	0.945
$\Delta_9 MFN_{ist}$	Change in MFN tariff rate between 2001 and 2010	-0.038	0.089	-0.994	0.988
$\Delta_9 WT_{ist-1}$	Change in WT between 2001 and 2010	-0.019	0.114	-7.314	5.105
$\Delta_9 PS_{ist-1}$	Change in PS between 2001 and 2010	0.128	0.159	-0.596	0.960

Notes: All variables are at the importer-period-HS-6 level.

Table 3: MFN and Applied Tariffs – Baseline IV Results

Dep. Variable:	Level MFN_{ist} (1)	FD ΔMFN_{ist} (2)	LD $\Delta_9 MFN_{ist}$ (3)
WeightedTariff$_{ist-1}$	0.419*** (0.093)		
ΔWeightedTariff$_{ist-1}$		0.343** (0.154)	
Δ_9WeightedTariff$_{ist-1}$			0.560*** (0.088)
Observations	367,991	272,927	82,926
R-squared	0.911	0.140	0.050
First-stage F-stat	191.2	79.17	70.88
Importer x year FE	Yes	Yes	Yes
6-digit HS x importer FE	Yes	No	No
6-digit HS x year FE	Yes	Yes	Yes

Notes: Clustered standard errors at the importer/6-digit HS level are in parentheses. ***, ** and * indicate 1 percent, 5 percent and 10 percent significance levels, respectively.

Table 4: MFN and Applied Tariffs – OLS Results

Dep. Variable:	Level MFN_{ist} (4)	FD ΔMFN_{ist} (5)	LD $\Delta_9 MFN_{ist}$ (6)
WeightedTariff$_{ist-1}$	0.115*** (0.042)		
ΔWeightedTariff$_{ist-1}$		0.045*** (0.013)	
Δ_9WeightedTariff$_{ist-1}$			0.040*** (0.007)
Observations	367,991	272,927	82,926
R-squared	0.916	0.189	0.444
Importer x year FE	Yes	Yes	Yes
6-digit HS x importer FE	Yes	No	No
6-digit HS x year FE	Yes	Yes	Yes

Notes: Clustered standard errors at the importer/6-digit HS level are in parentheses. ***, ** and * indicate 1 percent, 5 percent and 10 percent significance levels, respectively.

Table 5: MFN and Applied Tariffs – Trade Agreement Depth

	PTA Depth				PTA Depth LE			
Dep. Variable:	MFN_{ist}		ΔMFN_{ist}		MFN_{ist}		ΔMFN_{ist}	
	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
	Less Depth	More Depth	Less Depth	More Depth	Less Depth	More Depth	Less Depth	More Depth
WeightedTariff$_{ist-1}$	0.117*	0.536***			0.082	0.607***		
	(0.066)	(0.195)			(0.076)	(0.162)		
ΔWeightedTariff$_{ist-1}$			-0.151	0.562			-0.072	0.593**
			(0.107)	(0.347)			(0.128)	(0.273)
Observations	187,875	178,977	139,510	132,554	184,792	181,828	137,266	134,631
R-squared	0.948	0.906	0.243	0.115	0.869	0.930	0.285	0.017
Tests:								
First-stage F-stat	161	54.85	55.75	23.22	168.3	68.78	50.63	30.63
Coefficient equality test p-value	0.041		0.049		0.003		0.027	
Importer x year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
6-digit HS x importer FE	Yes	Yes	No	No	Yes	Yes	No	No
6-digit HS x year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: Clustered standard errors at the importer/6-digit HS level are in parentheses. ***, ** and * indicate 1 percent, 5 percent and 10 percent significance levels, respectively.

Table 6: MFN and Applied Tariffs – Extensions (Level Results)

	CU vs. No CU Members		High vs. Low Tariff Countries		Low vs. High Income Countries		Large vs. Small Countries	
Dep. Variable:	MFN_{ist}		MFN_{ist}		MFN_{ist}		MFN_{ist}	
	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)
	No CU	CU	High Tariffs	Low Tariffs	Low Income	High Income	Large	Small
WeightedTariff$_{ist-1}$	0.552***	-0.061	0.378***	0.544***	0.266***	0.914**	0.568***	0.472**
	(0.119)	(0.302)	(0.122)	(0.150)	(0.055)	(0.414)	(0.168)	(0.200)
Observations	271,058	94,409	188,124	178,776	181,134	183,052	108,894	168,612
R-squared	0.928	0.789	0.946	0.900	0.930	0.894	0.913	0.944
Tests:								
First-stage F-stat	152.5	8.717	99.51	106.2	196.9	22.99	61.52	26.81
Coefficient equality test p-value	0.051		0.390		0.120		0.719	
Importer x year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
6-digit HS x importer FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
6-digit HS x year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: Clustered standard errors at the importer/6-digit HS level are in parentheses. ***, ** and * indicate 1 percent, 5 percent and 10 percent significance levels, respectively.

Appendix A: Data

This appendix provides more detail about our data sources and the steps we follow in order to construct the key variables for our empirical analysis.

Tariffs: The key data source for our analysis is the CEPII (2012) MAcMap-HS6 database. This dataset is built and updated by CEPII using underlying tariff line information that is maintained by the International Trade Center. CEPII constructs the HS6 level preferential and MFN tariff rates by taking a simple average of the underlying tariff line rates. These tariff lines can vary substantially by country and the aggregation to the HS6 level ensures global harmonization. CEPII uses a methodology based on reference countries to calculate ad valorem equivalents for specific tariffs and tariff-rate quotas. When both specific and ad valorem tariffs are available for a product, the ad valorem tariff rate is preferred. Finally, and crucially for our application, the database exhaustively takes into account tariff rates under any applicable preferential trade agreement. We complement missing MFN tariff data with information from the TRAINS database.

Trade Flows: We source our trade data at the HS6 level from the CEPII (2016) BACI database. While the raw trade flows on which the BACI dataset is based are sourced from UN Comtrade, CEPII applies a harmonization procedure to improve the data quality. In addition to cleaning the database, CEPII makes use of trade flows reported by both the importer and the exporter, giving more weight to the more reliable partner. The reliability weights are obtained by using a variance analysis methodology that is based on reporting distances among partners. The database also adjusts for the differences due to c.i.f. and f.o.b. reporting that arises when using both importer and exporter reported data.

Preferential Trade Agreements: We obtain detailed information on countries PTA partner's from Mario Larch's Regional Trade Agreements database (Egger and Larch 2008). In addition to keeping track of multilateral and bilateral trade agreements worldwide between 1950 and 2017, this data distinguishes FTAs from other types of preferential agreements such as customs unions and partial scope agreements.

Predicted PTA Share: We use the Larch database together with the CEPII (2016) trade flow information to calculate our instrument, the predicted PTA share variable, PS in equation (3). For this variable, we calculate the share of global trade in a product accounted for by FTA partners of a given importer, excluding exports to the importing country in question. Note that for this variable, we specifically use FTA partners and not all preferential agreements. This constraint is imposed for two reasons. First, the common external tariffs for customs unions complicates the interpretation of the link between imports from CU members and MFN tariffs in any particular CU country. Second, partial scope trade agreements would presumably weaken the instrument as for many products the applied tariffs would not be affected at all. In any case, the estimates reported above are similar when also considering CU and partial scope agreements in the construction of our instrument. These results are available upon request.

Weighted Tariff: To construct the weighted applied tariff measure, WT in equation (2), we use information from all data sources above. The basic idea is to have a weighted applied tariff measure that keeps MFN tariff rates at their 2001 level. To achieve this goal, we apply the 2001 MFN tariff rate to all exporters that are not in any kind of preferential agreement with the country in question. For exporters in a preferential agreement, we generally use the preferential applied tariff rate provided in CEPII (2012). For years after 2001, we need to account for cases where the MFN tariff rate itself decreased but the preferential tariff rate remains equal to the new MFN tariff. To circumvent this issue, we use the 2001 MFN tariff for countries in a preferential agreement for all years as long as the preferential tariff is equal to the MFN rate in that year.

Appendix B: Additional Results

Table B1: MFN and Applied Tariffs – First-stage Results, Table 3

Dep. Variable:	Level WT_{ist-1} (A1)	FD ΔWT_{ist-1} (A2)	LD $\Delta_9 WT_{ist-1}$ (A3)
PS_{ist-1}	-0.032***		
	(0.002)		
ΔPS_{ist-1}		-0.018***	
		(0.002)	
$\Delta_9\text{PS}_{ist-1}$			-0.042***
			(0.005)
Observations	367,991	272,927	82,926
R-squared	0.943	0.156	0.129
Importer x year FE	Yes	Yes	Yes
6-digit HS x importer FE	Yes	No	No
6-digit HS x year FE	Yes	Yes	Yes

Notes: Clustered standard errors at the importer/6-digit HS level are in parentheses. ***, ** and * indicate 1 percent, 5 percent and 10 percent significance levels, respectively.