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The Dark Matter of Bilateral Preferential Margins: An Assessment of the Effect of US Tariffs

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Abstract: This article aimed to quantify the impact of United States (US) trade policies and assess how changes in tariff margins will affect imports to the US. To do that, we estimated trade elasticities by sector using a gravity structural model, computed US preference margins on a bilateral basis, and investigated alternative scenarios for properly measuring the effects of US trade agreements on international trade. Results showed that the removal of all preferences might lead to a negative net effect of $41,202 million (2% of predicted trade), indicating that the actual US structure of tariffs generates a trade diversion to less efficient exporters and destroys trade flows, even if the impact differs by sector.

Keywords: preferential trade policy; US trade policy; bilateral tariff margin; structural gravity model

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1. Introduction

Over the last few decades, the United States (US) has been actively engaged with developing countries to integrate them into international trade and promote their economic growth. Numerous nonreciprocal preferential trade agreements (PTAs) have been concluded, in the belief that trade is an essential element in efforts to reduce poverty and promote sustainable development. The current US trade policy agenda [1] aims to conclude multilateral and bilateral trade agreements to address the climate crisis and strengthen sustainable renewable energy supply chains, to tackle unfair trading practices and regulatory arbitrage, and to promote innovation and creativity (see Section 2).

A number of empirical papers, reviewed in Section 3, have analyzed the impact of US preferential regimes on trade. However, there were significant limitations in much of the existing literature. These included, on the one hand, the frequent use of aggregate trade data (whereas preferences are granted at the product level) and, on the other hand, the inability to correctly capture preference regimes, leading to the widespread use of dummy variables or incorrectly specified preference margins.

From a policy perspective, the lack of robust empirical evidence is particularly disturbing. The central objective of this paper was to identify the extent to which preferences may have impacted trade much more precisely than had been previously accomplished.

Building on the advancements of the international trade empirical literature [2–7], we overcame the limitations outlined above, assessed the actual impact of US preferential margins, and defined it, in relative terms, using highly disaggregated data.

Several authors [2–9] have pointed out that the advantage conferred by a preferential tariff to a given exporter depends not only on the level of the bilateral tariff but also on the tariffs applied by the same country to the exports of other competitors in other markets. Accordingly, preference margins assume positive as well as negative values.

This implied that some exporters can face a disadvantage, i.e., a negative preference margin, and therefore have lower trade flows than the most preferred exporters. On the other hand, any change in tariffs that improve preferential access to one exporter can erode the trade preferences of other exporters (see Section 3).

We focused strictly on the directly trade-related provisions, and particularly on the tariffs. We did not cover other issues related to US preferences, such as aid and political cooperation. Specifically, our goal was to provide accurate estimates of the impact of US tariff policies and to use the estimated elasticities of substitution to make counterfactual simulations to assess both the preferential and protectionist nature of US trade agreements. We used the most detailed available information about preference utilization, distinguishing preferential and most favored nation (MFN) trade flows, and computed tariff margins at six digits of the Harmonized System (HS) product codes, over the period 2009–2018, applied on US imports of 5020 commodities from 221 countries. We estimated a structural gravity equation that included the bilateral tariff margins to obtain trade elasticities of substitution at the sectoral level. In turn, we used such elasticities to consistently aggregate tariffs using CES aggregators (see Section 4).

Our results showed that there were significant differences in trade elasticity across sectors and, consequently, heterogeneous trade impacts from preferential policies across sectors and countries. The overall increase in trade flows due to preference was equal to $169,370 million (7% of predicted trade), while the trade decrease, due to tariffs, is equal to $210,572 million (9% of predicted trade). Finally, we used the estimated elasticities to calculate two counterfactual scenarios. In the first scenario, we eliminated all preferences as a result of increased protection, when all imports are subject to MFN duty, or a free trade agreement, whereby all duties are removed. In the second scenario, we considered a very simple Trans-Pacific Partnership (TPP) agreement where we supposed that all US tariffs on products that originated in the actual members of the TPP-11 were eliminated. The Trans-Pacific Partnership (TPP) agreement between the United States, Canada, Mexico, Chile, Peru, Japan, Singapore, Vietnam, Malaysia, Brunei, Australia, and New Zealand was signed on February 2016 and withdrawn by US President Donald Trump in January 2017. The remaining countries negotiated a new trade agreement, called the Comprehensive and Progressive Agreement for TPP, which incorporated most of the provisions of the TPP and which entered into force on 30 December 2018. The US participation in the TPP, on the one hand, would erode current preferences; on the other hand, it would increase trade flows by $397,255 million (17% of predicted trade), in particular from the countries of East Asia and the Pacific.

2. Literature Review

This article was related to empirical literature estimating the trade effects of preferential trade agreements (PTAs) using a gravity model. Studies in the literature have found mixed results. Exhaustive reviews of existing PTAs and the related literature were recently provided by Limão [10] and Ornelas and Ritel [11]. Previously, using a meta-analysis approach, Cipollina and Pietrovito [12] combined, explained, and summarized the large number of coefficients of the impact of preferences on trade flows, estimated in gravity models, providing a complete investigation on the impact of PTAs. Their reviews concluded that the literature on the trade effect of both reciprocal and nonreciprocal preferences demonstrated a positive, but unstable, impact.

The assessments of PTAs impacts depend very much on how trade policies are measured. Most studies typically assume a dummy variable as a proxy for the US preferential treatment and use aggregate trade data [13–25]. These works estimate both positive coefficients, ranging from 6 to about 700, and negative impacts, ranging from 10 to 90.

Using a dummy variable and aggregate trade data, some research studies attempted to pin down the impact of specific preferential schemes and found that not all agreements positively affected member countries' exports. For example, an article by Nouve [16] found that GSP beneficiaries increased their exports to the US market but that the impact of AGOA was greater. On the other hand, other studies focusing on the impacts of AGOA obtained inconclusive evidence [17–20]. Lederman and Özden [21] found that the impact of US preferences had economically large and statistically significant effects on the exports of recipient countries. FTA members had significantly greater effects than CBI, ANDEAN and AGOA members. An exception was the GSP, which has tended to have a negative impact on the exports of recipient countries. Other results, consistent with Lederman and Özden [21], have been found more recently by Herz and Wagner [22] and by Eicher and Henn [23]. Gil-Pareja et al. [24] also found a negative and statistically significant impact of the Andean Trade Preference Act and CBI, while showing that AGOA and GSP had a clear positive effect on beneficiaries' exports. More recently, Sorgho and Tharakan [25] compared the trade impacts of AGOA and EBA and showed that both agreements have had a positive impact on the exports of African beneficiary countries, even though the EBA's impact was significantly less than that of AGOA. Even if preferences seem to be significant for development, the phenomenon of preference erosion, largely due to US multilateral liberalization, has had a direct negative impact on investment and growth in Central America and growth in the Caribbean.

Since the policy dummy cannot catch the variability of tariff margins across countries and products, many authors have defined explicit measures of preference margins [2,4–6,9]. also called attention to the importance of working with highly disaggregated data [2,26] to provide an accurate assessment of policies that often discriminate among products. An explicit measure of the preference margin is designed to measure the tariff advantage that a preference scheme provides, and can be calculated in absolute terms as the difference between the multilateral tariff (or another reference tariff) and the applied one, or in relative terms as a competition-adjusted relative preference margin [27].

This article was strictly related to empirical literature aimed at estimating the trade impacts of preference margins at a disaggregated sectoral level, using updated econometric methods [28–33].

Some applications strictly related to our analysis (and regarding the US) that highlighted the necessity of measuring the actual preferential margin(s) and the need to work with highly disaggregated data were provided by Ornelas [11], Gaulièr et al. [34], Davies and Nilsson [35], Jayasinghe and Sarker [36] and Siliverstovs and Schumacher [37]. These studies found that the PTAs had significant positive effects on the exports of developing countries.

With the proliferation of free trade agreements, there has been a surge in trade in intermediate goods. Recently, studies [38,39] analyzed the impact of PTAs on trade integration and global value chains (GVC) and showed that greater product liberalization could promote the development of the production network. Furthermore, the positive impacts of deep trade agreements on GVC integration were driven by value-added trade in intermediate, rather than final, goods and services.

More recently, Conconi et al. [40] analyzed the impact of NAFTA on imports of intermediate goods, subject to rules of origin (RoO). Trade preferences are often accompanied by complex rules relating to the origin, which are seen as a major obstacle for exporters of processed goods, leading to an increase in trade costs. Conconi et al. [40] built a unique dataset that allowed them to map the input–output links in its RoO and focus the analysis on the impact of NAFTA. They showed that RoO in NAFTA has led to a significant reduction in imports of intermediate goods from third-world countries compared to NAFTA partners.

Other recent papers focusing on NAFTA evaluated the overall economic effects. Caliendo and Parro [29] relied on Eaton and Kortum [41] to develop a multi-sectoral and multinational Ricardian model with intermediate inputs and production heterogeneity within the sectors. They found that the welfare effects of NAFTA were heterogeneous among members. NAFTA had a positive effect on US' welfare (although the impact was only 0.08%) and on Mexico's welfare (increased by 1.31%), whereas Canada's welfare decreased by 0.06%.

Other authors [42] focused on the distributional impacts of NAFTA and found very marked adverse effects for some groups of workers, e.g., workers in sectors that were heavily protected by Mexican export tariffs before NAFTA suffered a decline in wage growth (up to 17 percentage points of wage growth in nonaffected sectors).

In a different perspective, Mai and Stoyanov [43], analyzing the effects of the Canada–US Free Trade Agreement, showed that the size of the partner country of an FTA may play an important role in the effects, in terms of trade, and on the incentives to liberalize trade at the multilateral level. The effect is modest when the partner country is small.

Most of the trade preferences the US has for developing countries cover more than trade issues, such as aid and political cooperation, but in this article, we focused strictly on provisions directly related to trading.

Table 1 shows all the preferential schemes included in our dataset, which referred to the period 2009–2018.

Table 1. Preferential schemes in the period 2009–2018.

Preference Programs:
African Growth Opportunity Act (AGOA)
Andean Trade Promotion and Drug Eradication Act (ATPDEA)—expired on 31 July 2013
Caribbean Basin Initiative (CBI)
Caribbean Basin Trade Partnership Act (CBTPA)
Generalized System of Preferences (GSP)
North America Free Trade Association (NAFTA)
Free Trade Agreements:
US—Australia
US—Bahrain
US—Dominican Republic—Central America
US—Chile
US—Colombia
US—Israel
US—Jordan
US—Korea
US—Morocco
US—Oman
US—Panama
US—Perù
US—Singapore

3. The Bilateral Tariff Margin and Trade Elasticities: Theory

Following Cipollina et al. [2], we derived the bilateral tariff margin from the standard theoretically grounded gravity equation à la Anderson and van Wincoop [44]:

$$im_{i,t}^k = \alpha_{i,t}^k M_t^k \frac{\left(P_{i,t}^k\right)^{-\sigma}}{\left(\Pi_t^k\right)^{(1-\sigma)}} \tag{1}$$

$$P_{i,t}^k = p_{i,t}^k \beta_{i.t} \gamma_t^k \left(1 + \tau_{i,t}^k\right) \tag{2}$$

$$\Pi_t^k = \left[\sum_{i,t} \alpha_{i.t}^k \left(p_{i,t}^k \beta_{i.t} \gamma_t^k \left(1 + \tau_{i,t}^k\right)\right)^{(1-\sigma)}\right]^{\frac{1}{1-\sigma}} = 1 + T_t^k \tag{3}$$

where im_i^k is the expenditures on goods k exported from origin i to destination (the US in our case) at time t, σ is the elasticity of substitution ($\sigma > 1$), α_i^k is the consumer preference parameter, M^k is the expenditure on import k, Π^k is the product k import price index computed across all exporters i, and P_i^k is the domestic price of imported good k from country i; the domestic price is given by $p_{i.t}^k c_{i,t}^k (1 + \tau_{i,t}^k)$, with $c_{i,t}^k > 1$, capturing transport costs that differ by product and exporter, while $\tau_{i,t}^k$ is the bilateral applied ad valorem tariff at time t, and $p_{i,t}^k$ is the fixed free-on-board (FOB) export price of a physical unit. We separated tariffs from other trade cost components and computed the price index as a weighted average tariff factor $(1 + T_t^k)$ applied on product k; it was computed consistently with the import demand structure as a CES (constant elasticities of substitution) price aggregator [2].

Equation (3) is crucial in our model because it specifies the reference tariff to be used to calculate the bilateral tariff margin. Substituting Equations (2) and (3) in Equation (1) and defining the bilateral tariff margin (btm_i^k) as the ratio between the reference tariff factor $(1 + T_t^k)$ and the applied tariff factors faced by each exporter $(1 + \tau_{i,t}^k)$, the gravity equation became:

$$im_i^k = \frac{\alpha_i^k M^k}{(1 + T^k)} \left(\frac{p_i^k \beta_i \gamma^k}{btm_i^k} \right)^{-\sigma} \quad (4)$$

The bilateral tariff margin, thus defined, takes into account the multilateral nature of trade policies, since the reference tariff takes into account the competitive advantage (or disadvantage) of an exporter over other exporters/competitors in the US market. When the reference tariff is greater than the applied duty, the preference margin is greater than 1. This means that an exporter has a competitive advantage on the US market. On the contrary, when the reference tariff is lower than the applied duty, the margin is between 0 and 1 and indicates a disadvantage of an exporter compared to other competitors. The latter case can occur both because of a lack of preferential treatment (as is typically the case in developed countries) and because of nonuse, as is the case of several developing countries.

Econometric Approach

To perform our empirical analysis, we started from a dataset covering US imports of 5020 commodities based on the 6 digits of the commodity classification in the Harmonized Tariff Schedule of the U.S. International Trade Commission, from 221 countries for the years 2008, 2012, 2015, and 2018, and we grouped products into 21 WTO sections. We computed tariff margins at the disaggregated level and used them to obtain structural gravity estimates of trade elasticities of substitution at the sectoral level.

Since we used highly disaggregated data, our sample had an elevated percentage of zero trade flows. Therefore, we estimated the gravity model Equation (5) in multiplicative form and used a Poisson pseudo-maximum-likelihood (PPML) estimator, as suggested in recent empirical analyses [26], including exporter—time, exporter—product, and product—time fixed effects that enabled us to control for any other observable or unobservable characteristics, as well as missing or imperfectly measured variables, that varied over time for each exporter and sector [45]:

$$im_{i,t}^k = \exp\left\{\sigma\, ln\left(btm_{i,t}^k\right) + \gamma_{i,t} + \delta_{k,t} + \theta_{i,kt}\right\} + \varepsilon_{i,t}^k \quad (5)$$

It is worth emphasizing that fixed effects are common in structural gravity equations to proxy multilateral resistance [46], but this was not required in our case since the theoretically consistent computation of the bilateral tariff margins provided for an explicit expression of the multilateral resistance term (MRT) [2,3]. We used panel data over 4 years [28,47,48] to avoid the critique that deviations in trade as a result of trade policy changes do not take place in a single year, as noted in Cheng and Wall [49]. Furthermore, regardless of policy shocks, bilateral duties could vary due to changes in the reference price used to compute the ad valorem equivalents.

Once we estimated sectoral elasticities of substitution for sectors with statistically significant coefficients, we usde them to compute the trade effects due to possible changes in tariffs according to two scenarios [50]:

1. The elimination of preferences:

In this scenario, we removed all duties, and the difference between the counterfactual (i.e., free-trade) flows and predicted trade represented the trade decrease resulting from the protectionist impact of US tariffs.

$$Pref.effect = \sum_s \sum_i \left(E\left[im_i^k \middle| btm_i^k = 0 \right] - E\left[im_i^k \middle| btm_i^k \right] \right) \tag{6}$$

With the removal of tariffs, preferences were removed, which led to an erosion of current preferences and an elimination of the disadvantage of exporters paying higher tariffs. Conversely, preferences were also removed when the multilateral tariff was applied to all products from any country, i.e., when all preferential agreements were withdrawn. This represented a severe scenario, but it was useful for assessing the trade effects of current preferences.

2. Free trade with TPP-11 countries:

In the case of the TPP in the counterfactual simulation, Equation (5) was modified as follows:

$$FTA_{tpp}.effect = \sum_s \sum_i \left(E\left[im_i^k \middle| t_{tpp}^k = 0 \right] - E\left[im_i^k \middle| btm_i^k \right] \right) \tag{7}$$

Tariffs were removed only for TPP-11 countries, such that preference margins for these countries increased at the expense of erosion of existing preferences. This scenario was also useful for evaluating trade effects due to withdrawal from the agreement.

4. Data

Our dataset covered US imports of 5020 commodities (defined at 6 digits of the HS product codes) from 169 DC, over the period 2009–2018. Trade data were taken by US imports from https://usatrade.census.gov/, accessed on 10 February 2021, which also provided information on the free or dutiable status of merchandise imported into the US. Data on tariffs were from WITS-TRAINS. The product classification was HS 6-digit. Figure 1 shows the share of US imports associated with duty-free, positive MFN, and preferential duty. Most flows (50%) were duty-free. For the remaining 50% of imports, 21% were registered as preferential and 29% paid MFN duties.

Looking at the sectoral level, the structure of trade differed considerably. All products of the section Works of Art (XXI) entered the US market under an MFN duty-free regime. More than 50% of Animal Products (I), Minerals (V), Chemicals (VI), Paper and Paperboard and Articles Thereof (X), Pearls and Precious stones (XIV), Machineries (XVI), Instruments (XVIII), Arms (XIX) and other Misc. Manufactured Articles (XX) entered under an MFN duty-free regime, while most of the imports of the other sectors entered into the US market paying a positive MFN duty. Higher preferential imports were registered for some agricultural sectors, such as Vegetables (II), Oils and Fat (III), and Foodstuff (IV), with percentages equal to 53%, 40%, and 42%, respectively. This also held true for the section Transport (XVII), with a share of 43%.

Table 2 shows the trade volume by section, the share of tariff lines with positive trade flow that could potentially benefit from preferential treatment, and the share of preferential tariff lines that entered the US under a preferential agreement. To give an idea of utilization rates, Table 2 shows that, in all sections, almost half of tariff lines benefitted from preferential treatment. Looking at the overall sample, 42% of tariff lines with positive trade flows could benefit from preferential treatment by paying a tariff below the MFN duty, while 37% could benefit from preferential duty-free. For these tariff lines, a little over 20% used the preferential arrangement. This was not surprising; indeed, preferential schemes are often accompanied by complex rules relating to the origin—a major obstacle for exporters of processed goods—and, therefore, exporters could prefer not to use the preferential access to avoid high compliance costs.

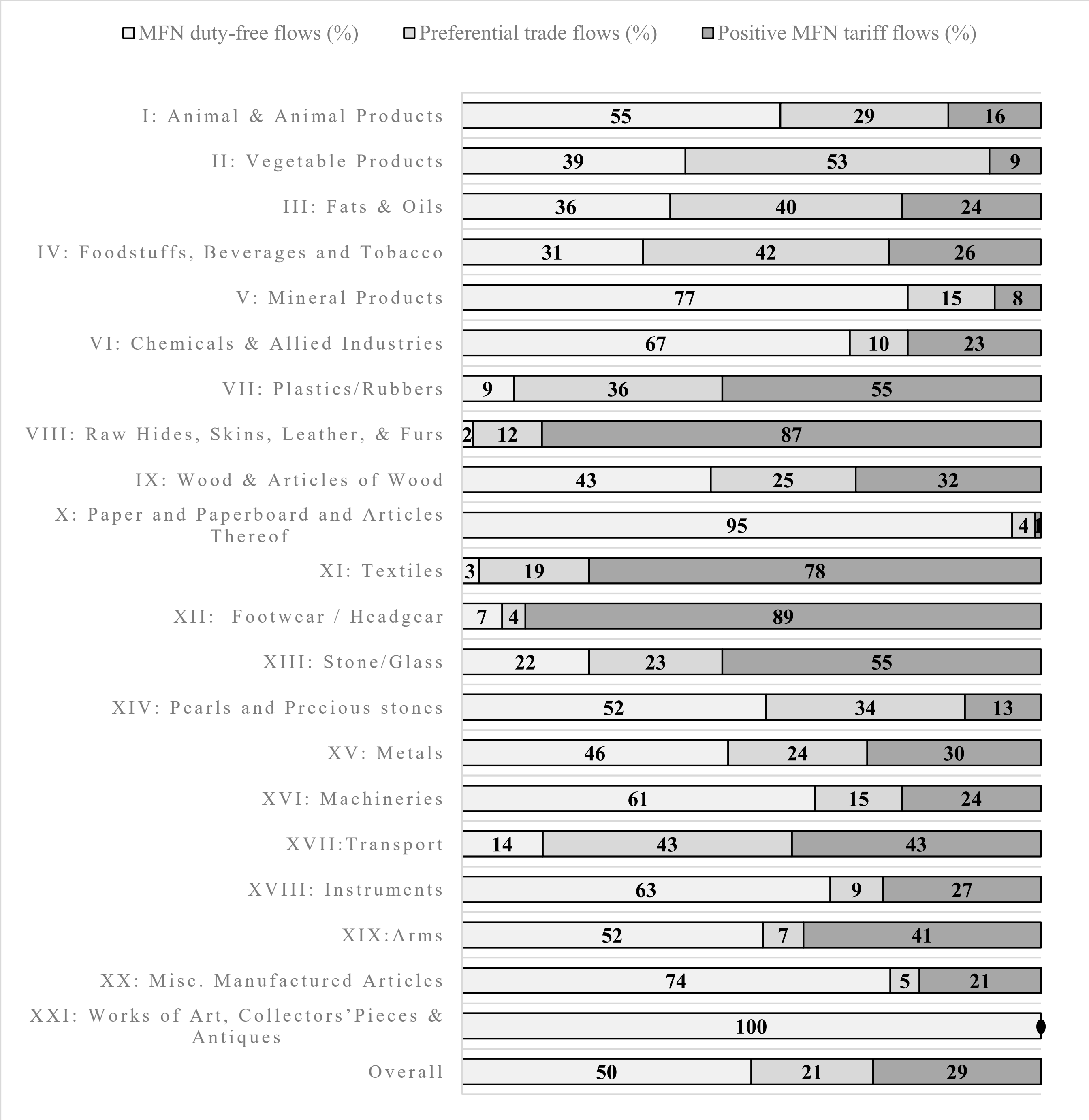

Figure 1. US imports by tariff regime (average period 2009–2018).

Table 2. Tariff-lines subject to preferential duties (%).

Sectors	Preferential Duty		Preferential Duty-Free		Total Trade Volume (Ml $)
	Potential	Used	Potential	Used	
I: Animal & Animal Products	48	29	33	27	25,287
II: Vegetable Products	61	40	52	39	37,079
III: Fats & Oils	45	29	40	28	5572
IV: Foodstuffs, Beverages & Tobacco	54	28	31	24	54,428
V: Mineral Products	59	31	47	31	286,460
VI: Chemicals & Allied Industries	38	21	33	21	179,596
VII: Plastics/Rubbers	47	23	44	22	68,800
VIII: Raw Hides, Skins, Leather	52	24	39	21	12,962
IX: Wood & Articles of Wood	52	31	46	30	15,489
X: Paper & Paperboard & Articles	0	0	0	0	24,069
XI: Textiles	31	15	27	14	103,935
XII: Footwear/Headgear	42	18	33	17	28,514
XIII: Stone/Glass	43	25	40	24	17,785
XIV: Pearls and Precious stones	61	35	59	35	55,301
XV: Metals	43	23	41	22	111,118
XVI: Machineries	45	23	43	22	594,452
XVII: Transport	44	21	42	20	265,672
XVIII: Instruments	42	21	41	21	79,926
XIX: Arms	34	22	32	22	2985
XX: Misc. Manufactured Articles	47	25	43	24	82,326
XXI: Works of Art	0	0	0	0	8896
Overall	42	22	37	21	2,060,653

Average period 2009–2018.

In the following, we excluded from the samples the Paper and Paperboard and Articles thereof (X) and Works of art (XXI) sectors, which had an MFN duty equal to zero in all tariff lines, as well as Arms and Ammunition" (XIX), since trade flows in this sector were likely to be driven by political, rather than economic, motivations.

Figure 2 presents the trade-weighted averages of the MFN duties and bilateral applied tariffs for the sectors included in our analysis.

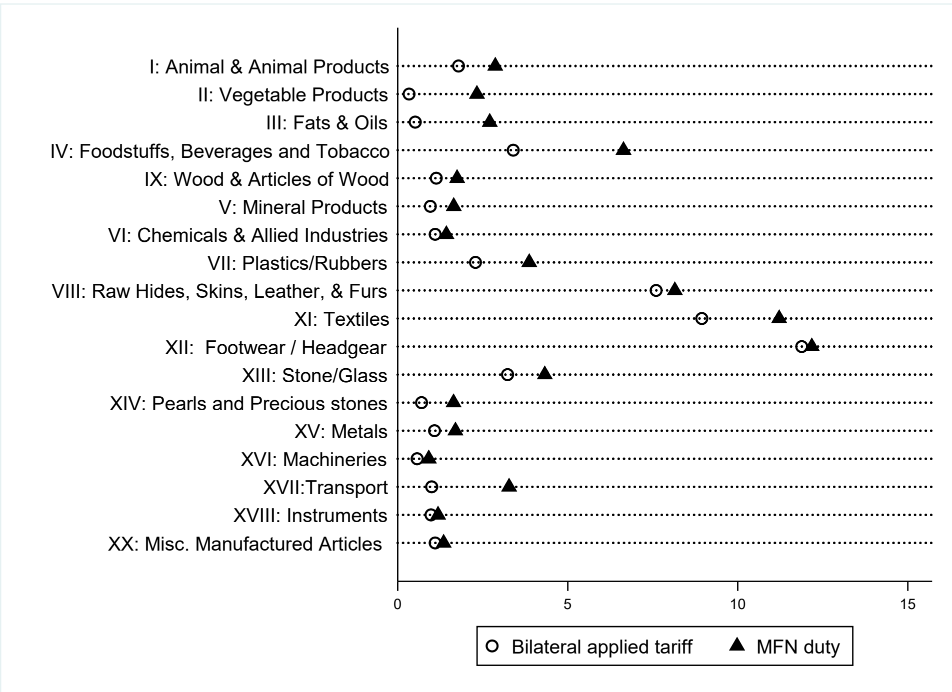

Figure 2. US tariffs by sector (trade-weighted averages over the period 2009–2018, %).

The most protected products were Raw Hides, Skins, and Derived products sector and products from the Textile and clothing industries (sections VIII, XI, and XII). These had high duties, both bilateral and multilateral. Using the MFN duty as a benchmark, larger preference margins were observed in the agricultural sectors (sections II, III, and IV) and the transport sector (section XVII). Meanwhile, there was little room for further liberalization on a preferential basis in the other sectors, characterized by low multilateral tariffs.

5. Econometric Results: Elasticities of Substitutions across Exporters by Sections

In the first step, we computed a relative preference margin using the applied MFN duty as reference tariff and then estimated our gravity equation, Equation (5). Once we estimated each elasticity of substitution σ by sector, we computed the CES tariff margins. We reestimated our model to get the new set of elasticities, then iterated the process (in the spirit of Head and Mayer [51], Cipollina et al. [2], and Cipollina and Salvatici [3])) until the second-decimal digit of the estimated parameter stopped changing. Table 3 reports the estimated coefficients for the tariff margins. The estimated elasticities were statistically significant in all sections and results showed that bilateral tariff margins had very different impacts across sectors. Differences in elasticities of substitution across sectors were mainly due to the magnitude of tariff margins as well as tariff dispersion across exporters.

Table 3. Elasticities of substitution across foreign source countries by section.

Sectors	Estimated Sigma (Std. Error)		Number of Obs.	Pseudo R^2
I: Animal & Animal Products	26.55 ***	(3.55)	15,378	0.68
II: Vegetable Products	18.60 ***	(2.66)	33,421	0.69
III: Fats & Oils	23.91 **	(10.24)	4711	0.78
IV: Foodstuffs, Beverages & Tob.	7.00 ***	(1.2)	33,871	0.71
V: Mineral Products	27.07 ***	(5.27)	11,604	0.94
VI: Chemicals & Allied Industries	27.30 ***	(2.96)	78,854	0.71
VII: Plastics/Rubbers	28.39 ***	(4.07)	46,905	0.70
VIII: Raw Hides, Skins, Leather	23.98 ***	(3.96)	15,149	0.81
IX: Wood & Articles of Wood	12.77 **	(6.46)	15,254	0.68
XI: Textiles	8.04 ***	(1.17)	153,257	0.71
XII: Footwear/Headgear	24.00 ***	(5.73)	13,223	0.82
XIII: Stone/Glass	23.55 ***	(4.91)	25,793	0.71
XIV: Pearls and Precious stones	22.73 **	(11.21)	12,224	0.72
XV: Metals	21.33 ***	(3.62)	81,302	0.69
XVI: Machineries	34.00 ***	(7.85)	165,809	0.74
XVII: Transport	18.04 **	(8.48)	19,237	0.69
XVIII: Instruments	22.08 ***	(5.55)	46,295	0.70
XX: Misc. Manufactured Articles	5.26 **	(2.55)	28,980	0.81

In parentheses: robust standard errors, clustered by exporter-HS4 digit product. The years used in the panel are 2009, 2012, 2015, and 2018. All specifications include time-varying exporter, exporter- HS4 digit product fixed effects, and time-varying HS4 digit product fixed effects. ** significant at 5% level; *** significant at 1% level.

The estimated elasticity was low in section XX (Manufactured Articles). However, this included other products from the manufacturing sector, therefore, it was characterized by heterogeneous goods. The same was true for section IV (Foodstuffs, Beverages and Tobacco). The low coefficients in section XI (Textiles) were due not only to the heterogeneity of textile products but also the low impact of the preference margins, which presented higher variability across products (see Table 3). The estimated elasticities were higher in sectors where goods were more homogeneous (see sections XIII (Stone/Glass), XIV (Pearls/Precious Stones) and XV (Metals)). However, in those sectors, trade was expected to be influenced primarily by endowments. The estimated elasticities were higher in sections where the preferences were large and presented high shares of preferential flows (see the agricultural sectors (sections II, III, and IV) and transport sector (section XVII)).

Machinery imports had the largest share in the US (around 30%, see Table 2); as such, this was the section with the highest estimated elasticity.

Figure 3 shows, for each sector, the distribution of the trade-weighted preference margin, computed using the CES reference tariff. When the bilateral applied tariff was equal to the reference tariff, the margin was equal to 1 and signaled that there was not a preference. If the reference tariff was lower than the applied tariff, the margin was between 0 and 1, signaling that a country had a disadvantage compared to other competing exporters, likely due to a lack of preferential treatment or a failure to make use of them. The lowest margin indicated the highest protection faced and the highest margin indicated the largest preference. If we look at how the margins were distributed within and across sectors, we noted that preference margins varied greatly within Textiles (section XI), Rawhides, Skins and Leather products (section VIII), and Footwear products (section XII), where the trade-weighted average CES margin was lower. These were also the most protected sectors.

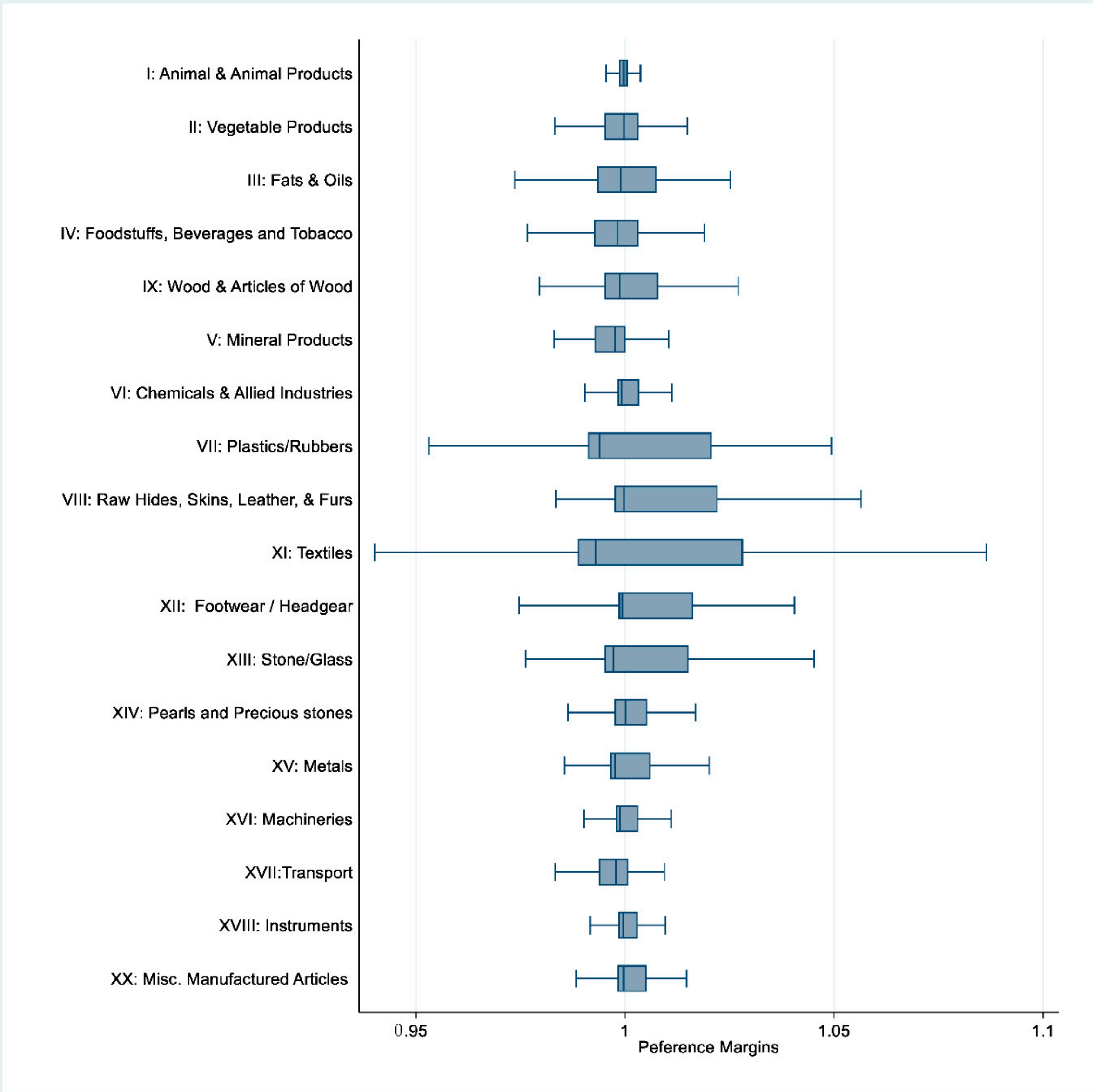

Figure 3. CES Preference margins by sector.

5.1. Trade Effects

To analyze the effects of the most recent US trade policy, hereafter, we focused on data from the last year in the dataset (2018).

In the scenario in which tariffs were removed, we hypothesized two different cases: one in which all duties were removed (free trade), and one in which all imports were subject to MFN duty (trade protection). In both cases, we were able to estimate the counterfactual change in total US imports that would follow from the removal of preferences. Results by sector, shown in Table 4, were considered to represent the trade effects due to the actual protection.

Table 4. Trade effect by sector.

Sectors	Additional Flows		Missing Flows		NET Effect	
I: Animal & Animal Products	2691	(9)	4317	(14)	−1625	(−5)
II: Vegetable Products	3068	(7)	2253	(5)	815	(2)
III: Fats & Oils	583	(8)	322	(5)	261	(4)
IV: Foodstuffs, Beverages & Tobacco	4941	(7)	6051	(9)	−1110	(−2)
V: Mineral Products	11,535	(5)	11,523	(5)	12	(0)
VI: Chemicals & Allied Industries	8621	(4)	11,367	(5)	−2746	(−1)
VII: Plastics/Rubbers	17,779	(21)	22,969	(27)	−5190	(−6)
VIII: Raw Hides, Skins, Leather & Furs	1506	(10)	3886	(26)	−2380	(−16)
IX: Wood & Articles of Wood	808	(4)	1180	(5)	−372	(−2)
XI: Textiles	10,348	(9)	13,955	(12)	−3607	(−3)
XII: Footwear/Headgear	930	(3)	3002	(9)	−2072	(−6)
XIII: Stone/Glass	2461	(11)	4375	(19)	−1914	(−8)
XIV: Pearls and Precious stones	2335	(4)	2788	(5)	−453	(−1)
XV: Metals	7749	(6)	10,119	(7)	−2369	(−2)
XVI: Machineries	40,128	(5)	46,553	(6)	−6424	(−1)
XVII: Transport	50,661	(15)	60,448	(18)	−9786	(−3)
XVIII: Instruments	2326	(2)	3130	(3)	−804	(−1)
XX: Misc. Manufactured Articles	898	(1)	2335	(2)	−1437	(−1)
Overall	169,370	(7)	210,572	(9)	−41,202	(−2)

% of predicted trade are shown in parentheses. Data refer to the year 2018; imports are at world prices; millions of $.

The counterfactual trade flows that would be registered if preferences were removed allowed us to assess the protectionist impact of the actual US trade agreements. The column Additional Flows represents trade due to the existence of tariff advantage, or positive preference margins, in which the predicted trade was higher than the counterfactual trade flows that would be registered if preferences were eliminated. These suggested that the US structure of tariffs generated a trade diversion to less efficient exporters equal to $169,370 million, which was 7% of the predicted trade. The column Missing Flows shows the trade that would be registered from exporters at a disadvantage compared to other competitors. The net effect, indicated in the last column, showed that the US structure of tariffs could lead to a reduction in trade equal to $41,202 million, or 2% of predicted trade. The impact was different across sectors. A removal of preferences increased trade flows of vegetable products (section II) and fats and oils (section III), sectors with high shares of preferential flows (see Figure 1), and greater room for liberalization (see Figure 2). The high protection enjoyed by the Hides, Skins, and Derived Products sector reduced trade by $2380 million, around 16% of predicted trade. In absolute terms, the highest reductions in trade were in Machineries (section XVI), the most important import sector, and the Transport sector (section XVII), characterized by a higher share of preferential flow. There, imports that would take place if preferences were removed were, respectively, equal to $6424 million (1% of predicted trade) and $9786 million (3% of predicted trade).

If we look at the results for country groups in Table 5, preferences increased trade from Latin America and Caribbean countries by $81,935 million (18% of predicted trade) and from North America by $46,573 million dollars (16% of predicted trade). These were the countries that would be most adversely affected by preference erosion, with low-income countries in sub-Saharan Africa having preferential access to the US market under the AGOA; $1732 million in imports (7% of predicted trade) would disappear with the elimination of preferences.

Table 5. Trade effect by region.

Regions	US Additional Flows		US Missing Flows		NET Effect	
East Asia & Pacific	20,874	(2)	117,055	(12)	−96,181	(−10)
Europe & Central Asia	1184	(0)	74,742	(15)	−73,558	(−14)
Latin America & Caribbean	90,672	(20)	8737	(2)	81,935	(18)
Middle East & North Africa	3311	(4)	4415	(6)	−1104	(−1)
North America	47,721	(17)	1147	(0)	46,573	(16)
South Asia	3585	(5)	4185	(6)	−600	(−1)
Sub-Saharan Africa	2023	(8)	291	(1)	1732	(7)
Overall	169,370	(7)	210,572	(9)	−41,202	(−2)

% of predicted trade are shown in parentheses. Data refer to the year 2018; imports are at world prices; millions of $.

Results showed that the protectionist impact of US tariffs on products from European, Asian, and Pacific countries was quite large and amounted to $73,558 million (14% of predicted trade) and $96,181 million (10% of predicted trade), respectively. These were countries with higher trade flows than what would take place if preferences were removed.

5.2. *The Case of the TTP*

Tables 6 and 7 present results on the trade effects of the TPP simulation by sector and region, respectively. Additional import flows that would be generated by US entry into the TPP were significant for Animal and Animal Products (section I), equal to $46,921 million (corresponding to 149% of predicted trade flows), followed by the Footwear and Headgear sector (section XII), with an increase in flow equal to $47,632 million (148% of predicted trade flows), and Instruments (section XVIII), with an increase in flows equal to $108,862 million (111% of predicted trade flow). The overall additional flow was $473,922 million (20% of predicted trade flow). On the other hand, the agreement eroded actual preferences, and a decrease of trade would be registered at $76,667 million, corresponding to 3% of predicted trade), with a larger decrease for specific sectors, e.g., Raw Hides, Skins, Leather and Furs (VIII) and Footwear/Headgear (XI).

Looking at results by regions, TPP members of East Asia and the Pacific, namely Japan, Singapore, Vietnam, Brunei, Malaysia, Australia, and New Zealand, would register the largest increase in trade, equal to $408,558 million (42% of predicted trade), followed by Canada (North America), with an increase of $46,236 millions (42% of predicted trade), and Latin American and Caribbean countries (Chile, Mexico, and Peru) with additional flows of $19,128 millions (4% of predicted trade).

The most negatively affected countries would be the EU, whose exports to the US would suffer an additional degree of protection, or a worsening of their competitive disadvantage, and developing countries, which would see their preferences eroded.

The net effect, equal to $397,255 million (17% of predicted trade), could also be interpreted as the missing trade due to the withdrawal from the agreement. However, since we did not consider the other aspects of the agreement (which could have led to a change in the estimated behavioral parameters), these estimates should be considered a sort of lower bound.

Table 6. TPP trade effect by sector.

Sectors	Additional US Import Flows from TPP		Missing US Import Flows from the World (Except TPP)	
I: Animal & Animal Products	46,921	(149)	570	(2)
II: Vegetable Products	225	(0)	121	(0)
III: Fats & Oils	723	(11)	37	(1)
IV: Foodstuffs, Beverages & Tobacco	12,494	(18)	1304	(2)
V: Mineral Products	13,884	(6)	4085	(2)
VI: Chemicals & Allied Industries	8408	(4)	3539	(2)
VII: Plastics/Rubbers	19,445	(22)	5706	(7)
VIII: Raw Hides, Skins, Leather & Furs	8706	(59)	3564	(24)
IX: Wood & Articles of Wood	428	(2)	443	(2)
XI: Textiles	29,314	(25)	9737	(8)
XII: Footwear/Headgear	47,632	(148)	9556	(30)
XIII: Stone/Glass	1609	(7)	816	(4)
XIV: Pearls and Precious stones	474	(1)	326	(1)
XV: Metals	9626	(7)	3471	(2)
XVI: Machineries	44,414	(6)	16,849	(2)
XVII: Transport	120,483	(36)	14,847	(4)
XVIII: Instruments	108,862	(111)	1269	(1)
XX: Misc. Manufactured Articles	274	(0)	427	(0)
Overall	473,922	(20)	76,667	(3)

% of predicted trade are shown in parentheses. Data refer to the year 2018; imports are at world prices; millions of $.

Table 7. TPP trade effect by region.

Sectors	Additional US Import Flows from TPP		Missing US Import Flows from the World (Except TPP)	
East Asia & Pacific	408,558	(42)	44,244	(5)
Europe & Central Asia	-	-	23,695	(5)
Latin America & Caribbean	19,128	(4)	3236	(1)
Middle East & North Africa	-	-	2152	(3)
North America	46,236	(16)	-	-
South Asia	-	-	2836	(4)
Sub-Saharan Africa	-	-	504	(2)
Overall	473,922	(20)	76,667	(3)

% of predicted trade are shown in parentheses. Data refer to the year 2018; imports are at world prices; millions of $.

6. Conclusions

The effectiveness of US preference agreements on the world trade integration of developing countries is a matter of debate. The theoretical and empirical literature has rasied serious doubts about their effectiveness on trade and the growth of developing countries. Developed country protectionism hurts poor countries, especially least developed countries, and represents a major barrier to development through trade. Indeed, the high costs of complying with standards and strict rules of origin in developed countries, particularly for agriculture, limit the opportunities for developing countries to increase exports of goods for which they have a comparative advantage.

The liberalization of trade (through the lowering or elimination of tariffs on goods from developing countries, established by numerous WTO agreements) and the proliferation of other agreements of economic integration have effectively eroded preferential margins provided by nonreciprocal trade policies toward developing countries. This erosion has worried the governments of developing and least developed countries, who see limits to the potential impact of preferential policies on their exports.

Our results showed that there were significant differences in the trade elasticity across sectors and, consequently, on the heterogeneous trade impacts of preferential policies across sectors and countries. The overall increase in trade flow due to preferences was equal to $169,370 million (7% of predicted trade), while the trade decrease due to tariffs was equal to $210,572 million (9% of predicted trade). The negative net effect, $41,202 million (2% of predicted trade) indicated that the actual US structure of tariffs generated a trade diversion to less efficient exporters and destroyed trade flows, even if the impact differed across sectors.

The US participation in the TPP, on the one hand, eroded current preferences. On the other hand, it increased trade flows by $397,255 million (17% of predicted trade), in particular from the countries of East Asia and the Pacific.

The main contribution of this article could be its provided assessment of the average impact of the US tariff structure on imports using a structural gravity model. From a methodological point of view, the analysis was based on highly disaggregated data and an explicit measure of tariff margins computed by product and on a bilateral basis. The main feature of our method was that it captured the multilateral nature of preferential trade policies, incorporating the competitive advantage with respect to other exporters/competitors. Therefore, it allowed for a more accurate estimation of the elasticities of substitution among all foreign product varieties.

It is worth mentioning that the main limitation of our analysis was that it focused only on elasticity among foreign suppliers. Our estimates could not capture trade creation effects due to the replacement of domestic sales. A possible extension of this work would be the estimation of the elasticity of substitution between domestic and foreign goods. This would require a model that allowed for a nested CES structure and domestic trade data at the same level of disaggregation as international trade. This is a tricky exercise because, on the one hand, the impact of policies has to be assessed on highly disaggregated data, as policies vary greatly between products and countries; however, on the other hand, detailed data on intranational trade are not available.

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