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This paper is from the
GTAP Annual Conference on Global Economic Analysis
https://www.gtap.agecon.purdue.edu/events/conferences/default.asp

Estimating the impact of EU trade policy with Structural Gravity

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Abstract: The goal of article is an assessment of the impact of the EU trade policies on EU imports. Our main contribution is that in a theoretically grounded gravity model, that includes domestic trade flows, we compute the EU preference margin to estimate the elasticities of substitution at the tariff line level and exploit a robust theoretical mechanism that shapes the association between the substitution elasticity and the preference margin computation. Our analysis is consistent with the most recent gravity literature and offers an intuitive way to reconcile empirics and theory without assuming arbitrary reference tariffs for the computation of the preference margins.
Accordingly, the identification strategy relies on there being enough variation in tariffs applied by the EU to different origin markets. We use cross-section data (more than 5,000 tariff lines and 188 exporters, including the EU28 Member States, in the year 2017), to obtain structural gravity estimates of trade substitution elasticities. Since tariffs differ substantially by product, an appropriate analysis should take place at the tariff line. Moreover, the present analysis uses the most detailed information available regarding preference utilization, i.e., distinguishing preferential and Most Favored Nation (MFN) trade flows. The estimated elasticities can be used to calculate the counterfactual change in total EU imports that would follow either from the removal of trade preferences or from the removal of trade policies.

Keywords: preferential trade policy; bilateral tariff margin; gravity model; European trade policy
JEL Classification: F13, F14, Q17

1. Introduction

The main goal of this paper is to assess the impact of EU trade policies on imports to the EU. We consider a sample of 188 countries, including intra-EU trade flows, and discuss methodological issues that are relevant when determining the trade-creating impacts of preferences. The analysis is based on the theoretically grounded gravity model and we compute an explicit measure of preference margin at a disaggregated level. The case of the EU is relevant for several reasons. It is the biggest player on the global trading scene and tariffs are still significant in specific sectors, e.g. agriculture, though over time a large number of preferential trade agreements has been concluded between EU and many developing countries.

Our paper speaks to works that say that regressions should be estimated with data that include not only international trade but also intra-national sales. Recent works using the gravity model argue that regressions should be estimated with data that include not only international trade but also intra-national sales (Heid et al., 2017; Feenstra et al., 2018).

Our paper also speaks to the growing literature that estimates the elasticity of substitution at a disaggregated level, using updated econometric methods (Baier and Bergstrand, 2001; Caliendo and Parro, 2015; Romalis, 2007; Imbs and Méjean, 2009; and Corbo and Osbat, 2013; are examples).

This work contributes to the strand of the related literature in two ways. The first contribution is the estimation of the impact of preferences in a theoretically grounded gravity model that includes domestic trade flows. In particular, we measure the advantage/disadvantage of each exporter with respect to other exporters, for disaggregated data producers (as defined by Low et al., 2009; Cipollina et al, 2017) and argue that the intra-national trade is indeed necessary to properly assess the trade policies impact. The preference margins can be positive or negative when they are computed with respect to the tariffs paid by other exporters. This is more likely to happen when we take into account intra-EU trade since the intra-EU free trade flows lower the reference tariffs. This leads to a significant reduction, if not disappearance, of the preference margins however they are likely to have a larger impact since they affect total consumption rather than imports only.

The second contribution of this paper is to develop an empirical strategy that considers both international and intra-national trade data, and this implies that the preference margin computation takes into account the fact that intra-EU trade flows are duty-free. Therefore, our measurement of the trade policy allows estimating both components (discriminatory and non-discriminatory) of EU trade policy. As far as discriminatory trade policies are concerned, including both domestic and foreign

goods allow to asses of the effects of trade policies taking into account both trade creation and trade diversion impact. the inclusion of intra-national trade allows the same line reasoning to be extended to all (i.e., bilateral and multilateral) tariffs since in this case the preferential treatment also takes the domestic competitors into account.

Since the treatment of tariff reduction/elimination differs substantially by product, an appropriate analysis must examine the impacts at the product level. Specifically, in this paper we develop an empirical strategy that enables us to document and explain the variation of margins across 5,388 tariff lines and 188 exporters (including the EU28 Member States) to the EU market in the year 2017. The present analysis uses the most detailed information available regarding preference utilization, i.e., distinguishing preferential and Most Favoured Nation (MFN) trade flows, and using data cross-section we obtain structural gravity estimates of trade substitution elasticities. Finally, the estimated elasticities are used to calculate the counterfactual change in total EU imports that would follow either from the removal of trade preferences or from the removal of trade policies.

The paper is structured as follows. Section 2 introduces the theoretical gravity model and discusses the empirical methodology, Section 3 includes data and descriptive analyses, in Section 4, we present and discuss the results and finally, Section 5 concludes.

2. Structural Gravity Model

Following Anderson (1979) and Anderson and van Wincoop (2003) theoretically grounded gravity model we start from the well-known gravity equation:

$$im_i^k = \alpha_i^k M^k \frac{\left(P_i^k\right)^{-\sigma}}{\left(\Pi^k\right)^{(1-\sigma)}} \quad (1),$$

where σ is the elasticity of substitution between varieties ($\sigma > 1$) (i.e., the origin of the product), 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 $p_i^k c_i^k \left(1 + t_i^k\right)$, with $c_i^k > 1$ capturing the transport costs that differ by product and exporter, while t_i^k is the bilateral applied ad valorem tariff, and p_i^k is the fixed free-on-board (FOB) export price of a physical unit. Accordingly, the tariff component applies multiplicatively to the value of merchandise, as calculated at the time of the delivery at the EU

frontier. This value already embeds insurance and freight charges incurred up to that moment, assuming all these charges to be proportional to the FOB price. In this specification, any possible non-tariff measures (NTMs) include all charges that generate a spread between the FOB and cost-insurance-freight (CIF) prices by acting multiplicatively with respect to the FOB value:

$$P_i^k = p_i^k c_i^k \left(1 + t_i^k\right) \tag{2}$$

The separation of tariffs from other trade cost components allows the computation of the price index Π^k as a weighted average tariff factor $(1 + T^k)$ applied to product *k* computed as a CES aggregator (Cipollina et al. (2017):

$$\Pi^k = \left[\sum_i \alpha_i^k \left(p_i^k c_i^k \left(1 + t_i^k\right)\right)^{(1-\sigma)}\right]^{\frac{1}{1-\sigma}} = 1 + T^k \tag{3}$$

Equation (3) measures the overall (i.e., aggregated across exporters) incidence of the EU's trade policies for a given product and hence provides an explicit representation for the inward multilateral resistance term. The computation is straightforward even if it requires knowledge of σ. Since we deal with a single importer, there is not an analogous expression for the outward multilateral resistance term.

Rewriting equation (1) as:

$$im_i^k = \alpha_i^k M^k \frac{\left(p_i^k\left(1+t_i^k\right)\right)^{-\sigma}}{\left(1+T^k\right)^{(1-\sigma)}} \tag{4},$$

and defining the bilateral tariff margin (btm_i^k) as the ratio between the reference tariff factor ($1+T^k$) and the applied tariff factors faced by each exporter:

$$btm_i^k = \frac{\left(1+T^k\right)}{\left(1+t_i^k\right)} \tag{5},$$

we can rewrite the gravity equation to be estimated:

$$im_i^k = \frac{\alpha_i^k M^k}{\left(1+T^k\right)} \left(\frac{p_i^k \beta_i \gamma^k}{btm_i^k}\right)^{-\sigma} \tag{6}.$$

The bilateral tariff margin gives additional information about the intensity of the trade policy. Trade policies present a 'multilateral nature', and the intensity of the preferential/protection treatments depends both on the higher rates and on the share of exporters paying those rates. The main idea is

that the bilateral tariff margin is not confined to the country-specific structure of tariffs, therefore the "reference tariff" used to compute margins should take into account the competitive advantage with respect to other exporters/competitors, since bilateral trade depends on the whole structure of applied tariffs as well as the country-pair specific margins. We compute the actual tariff margin in relative terms and on a bilateral basis taking into account the "multilateral nature" of trade policies. When the reference tariff is lower than the applied the margin is between "0" and "1" and signals the existence of negative margins, depending on the disadvantage of the country with respect to other competing exporters. Notice that negative preferences may be due both to the lack of preferential treatments, as it is typically the case for developed countries, or the failure to make use of them, as it is the case for several developing countries.

We estimate our gravity model in multiplicative form, using a Poisson pseudo-maximum-likelihood (PPML) estimator, commonly used in recent empirical analyses (Yotov et al, 2017), and including exporter and product (HS6 digit) fixed effects that enable to control for any other observable and unobservable characteristics that vary over exporters and sectors, respectively:

$$im_{i,}^{k} = \exp\{\sigma ln(btm_{i}^{k}) + \gamma EXP_{i} + \delta PROD_{HS6}\} + \varepsilon_{i}^{k} \quad (7).$$

Note that most of the usual controls included in gravity estimations (such as GDP, distance, colonial status and common language) are either country-specific or time-invariant. Consequently, their impacts are absorbed into the fixed effects. Since they are not of particular interest here, it is preferable to use the large set of fixed effects described above to control for all observable and unobservable trade costs in their respective dimensions (Ornelas and Rittel, 2018).

We group products into sections to estimate equation (7) and obtain an estimation for each parameter, including σ. Although σ is assumed to be constant across products, elasticities are allowed to differ across HS sections.

We group products into sections and estimate our gravity equation (7) using a relative bilateral tariff margin, computed taking the applied MFN duty as reference tariff. Once estimated each parameter, including the value of the elasticity of substitution σ, we compute the CES tariff margins.

A new set of elasticities is obtained using the CES margins, then, we iterate the process (in the spirit of Head and Mayer, 2013, and Cipollina et al., 2017) until the parameter estimates stop changing at the second-decimal digit.

Finally, following Lai and Zhu (2004) we to compute the percentage change due to the hypothetical elimination of trade policies and consider two possible scenarios:

1. we estimate the counterfactual change in the EU imports, which would follow from the removal of trade policies setting all tariffs equal to "zero". The difference between the counterfactual (i.e., free-trade) and predicted flows represents the trade decrease resulting from the protectionist impact of EU tariffs. When all tariffs are removed, the numerator (i.e., the reference tariff *T*) decreases more than the denominator (i.e., the bilateral tariff t_i) for the extra-EU countries facing negative margins (i.e., $btm_i^k < 1$). Accordingly, their export to the EU will increase at the expense of intra-EU trade flows and exports originating from extra-EU countries facing positive margins (i.e., $btm_i^k > 1$). The reduction in exports suffered by the preferred countries corresponds to the value of preference erosion in the case of unilateral liberalization by the EU. However, it is worth emphasizing that preference erosion is ubiquitous: even the change of a single bilateral duty will affect the reference tariff, modifying the margins for all the exporters;

2. we estimate the counterfactual change in EU imports, which would follow from the removal of the preferential policies setting all bilateral tariffs equal to the applied MFN rate. In this case, the difference between the counterfactual (i.e., non-discriminatory protection) and predicted flows represents trade flows that either would or would not take place without preferences. The former represents the trade diversion (Viner, 1950). As far as the latter is concerned, unlike Cipollina et al. (2017), the CES reference tariff takes into account extra- as well as intra-EU trade. Hence, the trade flows generated by the EU trade preferences include both trade creation and trade diversion.

4. Data

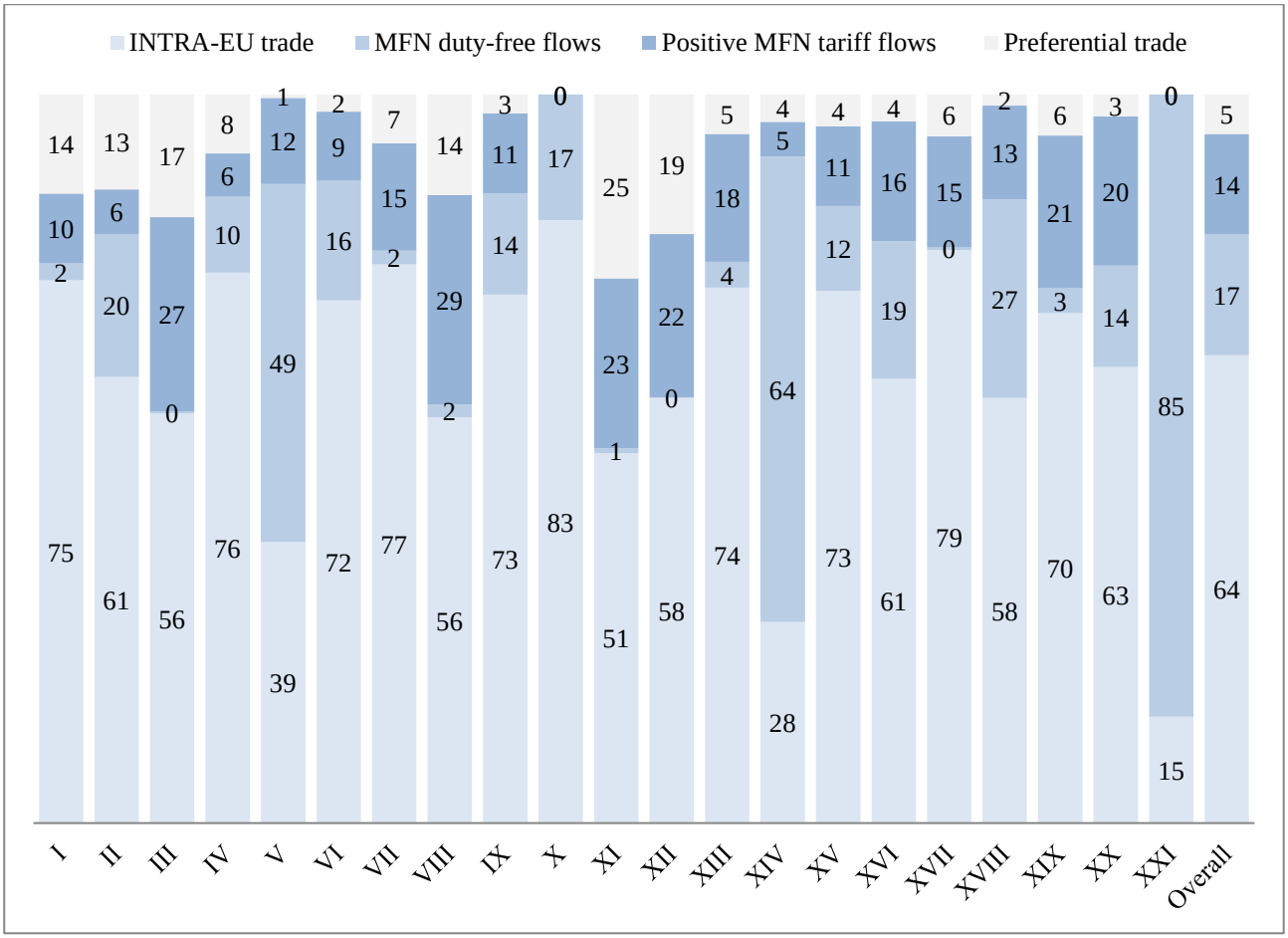
To perform our empirical analysis, we build a data set of consistently constructed international and intra-national EU trade flows. We estimate a cross-section model, covering imports of 5,388 commodities based on the WTO definition, from 188 countries (including the EU) to EU28 in the year 2017. The number of observations is 1,006,180 rather than 1,012,944 (1 importer*188 exporters*5,388 products*1 year) since products that are never exported, either to the EU28 or to any other country, are dropped from the sample. Data on trade at the HS6 level of detail are taken from the Eurostat Comext database (see http://fd.comext.eurostat.cec.eu.int/xtweb/) and data on tariffs are from TRAINS database (see http://r0.unctad.org/trains/) which is integrated into the WITS software

(see http://wits.worldbank.org/witsweb/default.aspx).[1] The Comext database does not provide information on the utilization of each preference scheme. However, it makes a distinction between preferential and non-preferential (MFN) trade. Using the information on preferential trade flows, the level of duty used for the computation of the bilateral tariff margins is equal to the MFN (applied) tariff if the preference is not used, and to the preferential (bilateral) tariff otherwise. Accordingly, our estimation will take account of the volume of trade benefiting from the preferences and avoid overestimation of the preference impact that can arise from the association between a positive preference and a trade flow that does not exploit it.

We estimate the impact of trade policies for 21 sectors, following the sections of the HS (listed in Appendix 1). Figure 1 shows the percentage of imports associated with duty-free, positive MFN and intra-EU members for each sector. Most imports (64%) take place among EU members, whereas the residual is divided between duty-free imports (17%) and imports paying positive MFN duties (19%). The section that accounts for the lowest share of intra-EU trade, Section XIV (natural and precious metals), also shows the highest percentage of duty-free imports (64%). At the other extreme in Section I (animal products) the intra-EU trade share reaches 75% and only 2% benefits from duty-free treatment. The EU imports all products of section X (paper and paperboard and articles thereof) and XXI (works of art) under an MFN duty-free regime. These sections are obviously excluded from the sample, along with sections V (mineral products) and XIV (natural and precious metals) which feature trivial percentages of preferential trade flows. Finally, we exclude section XIX (arms and ammunition) due to the significantly lower number of observations and given that trade flows in this section are likely to be driven by political rather than economic motivations.

[1] WITS integrates TRAINS with other trade-related databases, such as UN COMTRADE, WTO Integrated Data Base (IDB), and WTO Consolidated Tariff Schedules (CTS). As a result, WITS provides bilateral data at the tariff-line level about trade and tariff rates for more than 150 countries. UNCTAD and the World Bank have jointly computed ad valorem equivalents (AVEs) of common forms of import tariffs (such as specific, tariffs, and compound tariffs). The computation of the AVEs follows three-steps for estimating unit values: (1) from tariff line import statistics available in TRAINS; then (if (1) is not available) (2) as an average from the HS 6-digit import statistics available in UN COMTRADE; then (if (1) and (2) are not available) (3) as an average from the HS 6-digit import statistics of OECD countries. Once a unit value is estimated, then it is used for all types of rates (MFN, preferential rates, etc.). Since EU data in WITS do not include the TRQs fill rate, the tariff rates we get are only the beyond-quota rates (basically the MFN rate). This implies that the protection level used in our estimation is overestimated when the quotas are not binding. For more details see: https://wits.worldbank.org/

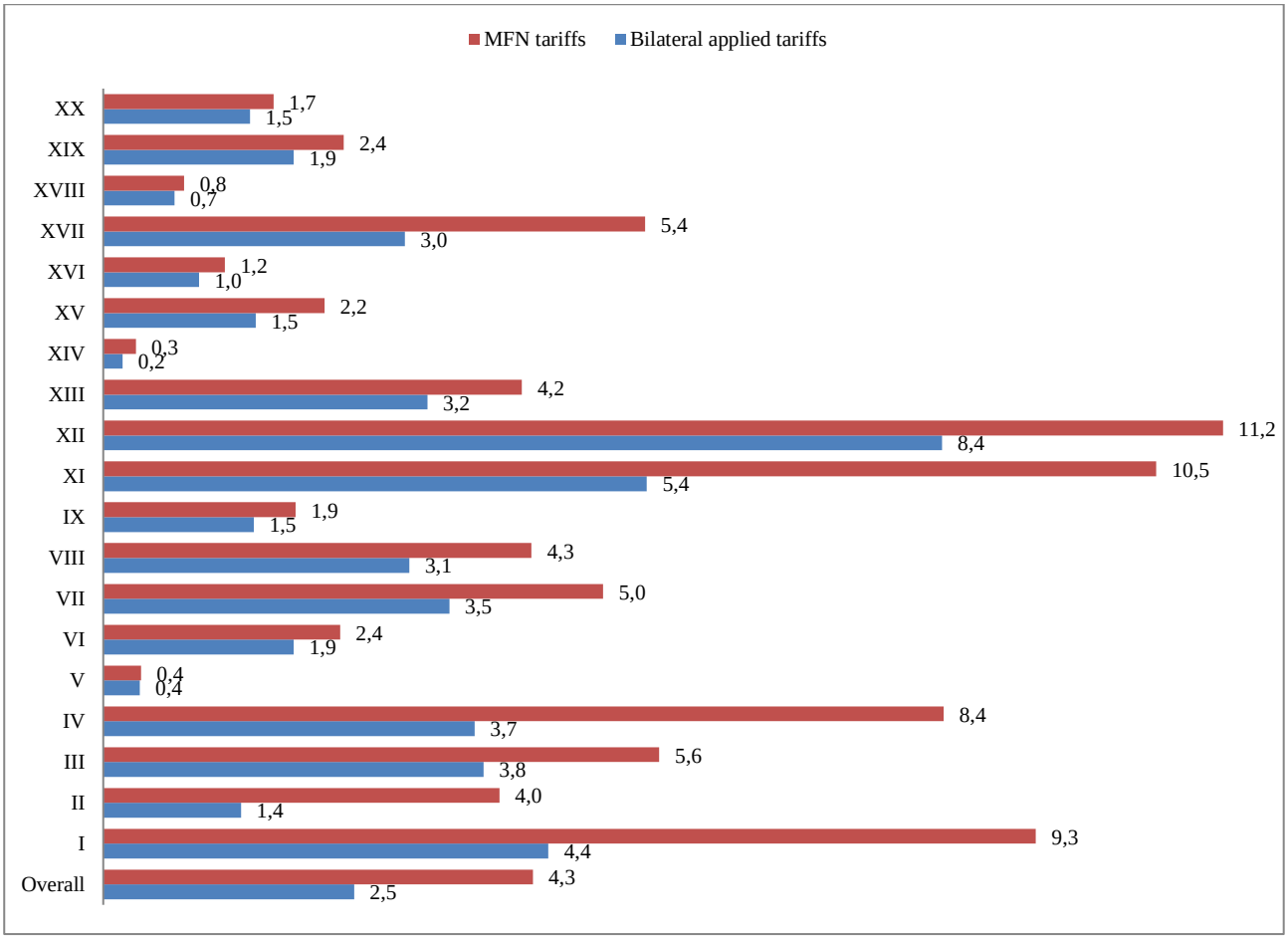
Figure 1: Structure of EU28 imports by section



Source: elaboration on data by COMEXT and TRAINS; 2017.

Figure 2 presents the bilateral applied and MFN tariffs (trade-weighted averages). Using the MFN rates as a benchmark, the most protected sectors are animal products, foodstuffs and beverages, textiles and footwear (Sections I, IV, XI and XII).

Figure 2: Tariffs (%, trade weighted mean)



Source: elaboration on data by COMEXT and TRAINS; 2017.

5. Results

Table 1 reports the estimated coefficients for the preference margin in the 16 sections under investigation based on Equation (7). Results for the CES reference tariff indicate that trade policies have very different impacts across sectors.

Table 1: Elasticities of substitution by section.

Sections	Sigma ($\hat{\sigma}$)	N. of Obs.
I	5.2***	4,5798
II	19.5***	45,545
III	20.2***	7,024
IV	9.4***	28,676
VI	3.3**	152,831
VII	14.3***	39,659
VIII	-0,9	12,471
IX	7.3**	19,865
XI	12.8***	160,859
XII	1.4	9,001
XIII	-0.8	24,829
XV	2.5	105,729
XVI	14.1***	151,063
XVII	14.8***	26,398
XVIII	2.6	36,007
XX	5.54	23,304

Robust standard errors, clustered by country-product, are shown in parentheses. Data refer to 2017. All specifications include exporter and product fixed effects. *significant at 10 per cent level; **significant at 5 per cent level; ***significant at 1 per cent level.

Trade preferences have very different impacts across sectors, almost all sections show significant estimates, with the exception of Sections VIII (raw hides and skins, leather, fur skins and articles thereof) and XII (footwear, headgear, umbrellas and other textile articles), XIII (ceramic and glassware), XV (metals), XVIII (instruments and apparatus) and XX (miscellaneous manufactured articles). Sections VIII and XII seem to be characterized by an inelastic demand as confirmed by the observation that the trade-weighted average tariffs are higher than simple averages (sections VIII and XII) and by a low share of preferential trade (sections XVIII and XX). The most of imports of sections XIII and XV are among EU countries and preferences seem to be not relevant for the international trade.

In Sections II (vegetable products) and III (oils and fats), the estimates for the elasticity of substitutions reach quite a high value (respectively, 19 and 20) showing high substitutability among country varieties. This is also true for Sections VII (plastics), XVI (machinery) and XVII (transport equipment), with an estimated coefficient equal to 14. Indeed, from this perspective, the most differentiated sectors seem to be those where estimates are not significant.

Table 2 shows the structure of EU imports according to CES preference margins and preferential status. More than 18 percent of preferential imports, corresponding to €189,929million, are actually associated with a positive margin. Whereas, for the 2 percent of preferential imports, the exporters

face tariffs that, even though they are lower than MFN duties, are not lower than those faced by their competitors. This is especially relevant in the case of agricultural products (Sections I-IV). However, this does not imply that the preferences are necessarily irrelevant since the associated rents may still be significant.

On the other hand, there are cases (corresponding to €11,108 million) in which the bilateral ad valorem equivalent MFN tariff could be lower than those faced by competitors; this happens when particularly high bilateral unit values lower the value of the bilateral ad valorem equivalent. This is especially relevant in the case of Sections VI (chemicals) and XVI (machinery and mechanical appliances).

Table 2: Trade flows according to CES tariff margins, preferential status, and shares with respect to total EU imports.

Sections	**Preferential trade flows[a]**			**MFN flows[a]**		
	Margin > 1	Margin = 1	Margin < 1	Margin > 1	Margin = 1	Margin < 1
Overall	189,929	468	17,926	11,108	340,979	477,131
	(18)	(0)	(2)	(1)	(33)	(46)
I	6,423	7	2,725	44	1,451	6,515
	(37)	(0)	(16)	(0)	(8)	(38)
II	12,118	402	4,659	603	24,783	8,099
	(24)	(1)	(9)	(1)	(49)	(16)
III	3,712	0	261	0	75	6,281
	(36)	(0)	(3)		(1)	(61)
IV	9,458	59	1,301	560	13,217	7,927
	(29)	(0)	(4)	(2)	(41)	(24)
VI	13,091	0	568	4,482	82,313	61,502
	(8)		(0)	(3)	(51)	(38)
VII	16,390	0	737	342	4,313	37,748
	(28)		(1)	(1)	(7)	(63)
IX	954	0	177	195	5,765	4,878
	(8)		(1)	(2)	(48)	(41)
XI	49,836	0	7,345	38	1,374	52,759
	(45)		(7)	(0)	(1)	(47)
XVI	42,094	0	21	4,842	205,692	195,021
	(9)		(0)	(1)	(46)	(44)
XVII	35,853	0	132	2	1,994	96,400
	(27)		(0)	(0)	(1)	(72)

[a] Millions of €; shares of total EU imports (in parenthesis). 2017.

5.1 Trade effect

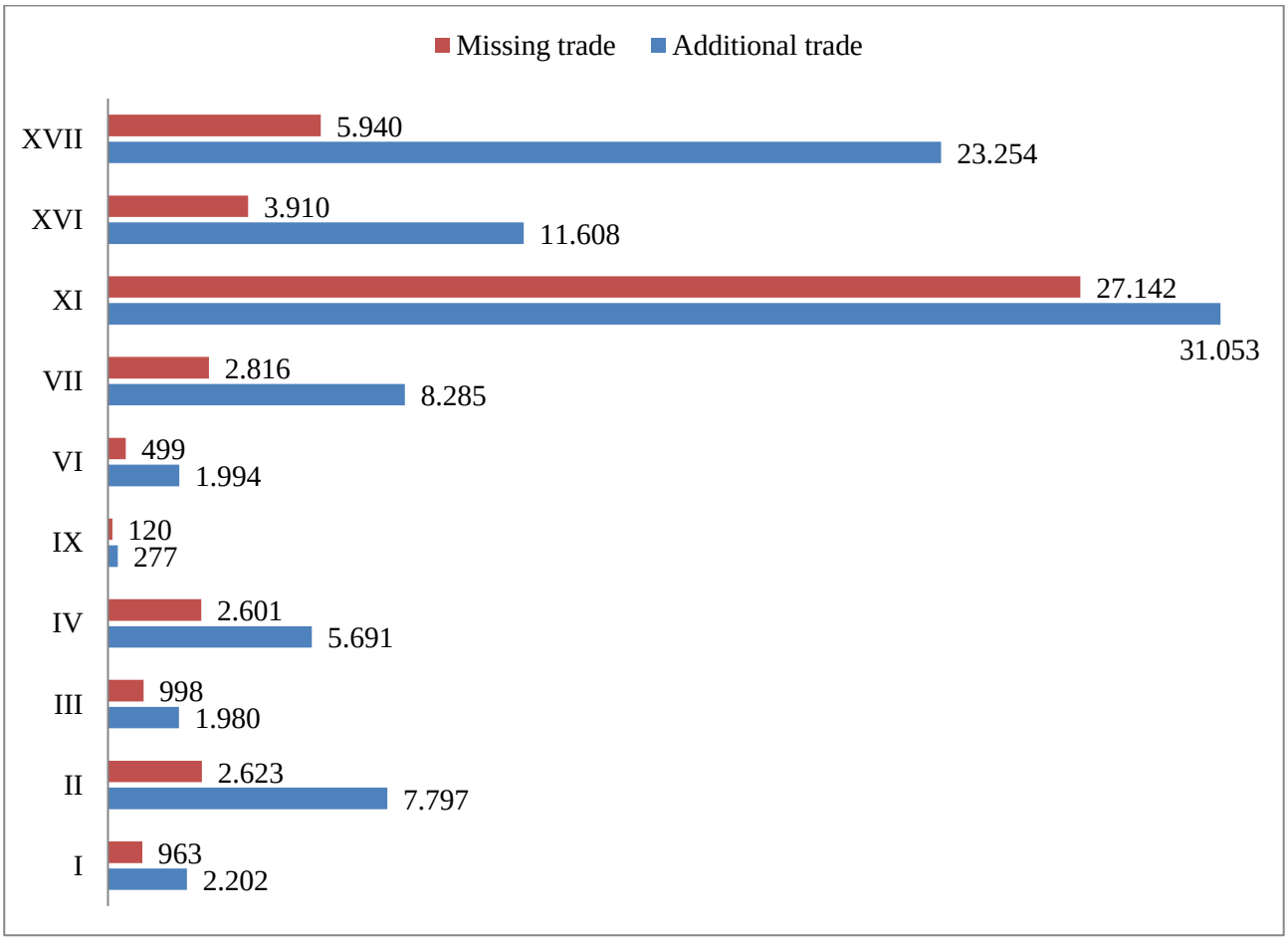
The inclusion of intra-EU trade allows us to compute two counterfactual scenarios. In both cases, preferences are removed but in one case this is the consequence of free trade (all duties are removed) and in the other, it is the consequence of increased protection since all imports are subject to MFN duty.

When we compute trade by setting all tariffs equal to the MFN duties, extra-EU exporters will export less due to the higher protection faced.

Taking into account the sectors for which we got statistically significant estimates, Figure 3 shows that EU preferences generate additional imports, that is, trade that would not take place without preferences, for 94,142 million euros (representing 9% of predicted trade). Since we consider intra-EU trade flows, this includes both trade creation and trade diversion impact.

On the other hand, imports that would take place if preferences were removed are equal to 47,612 million euros (around 5% of predicted trade): this represents the trade diversion impact of EU trade policies. The net effect, corresponding to the trade creation effect, is equal to 46,530 million euros (that is 4% of predicted trade).

Figure 3: Trade effect due to preferences: results for sectors with significant preference impact (CES reference tariff)



At world prices; millions of €. 2017.

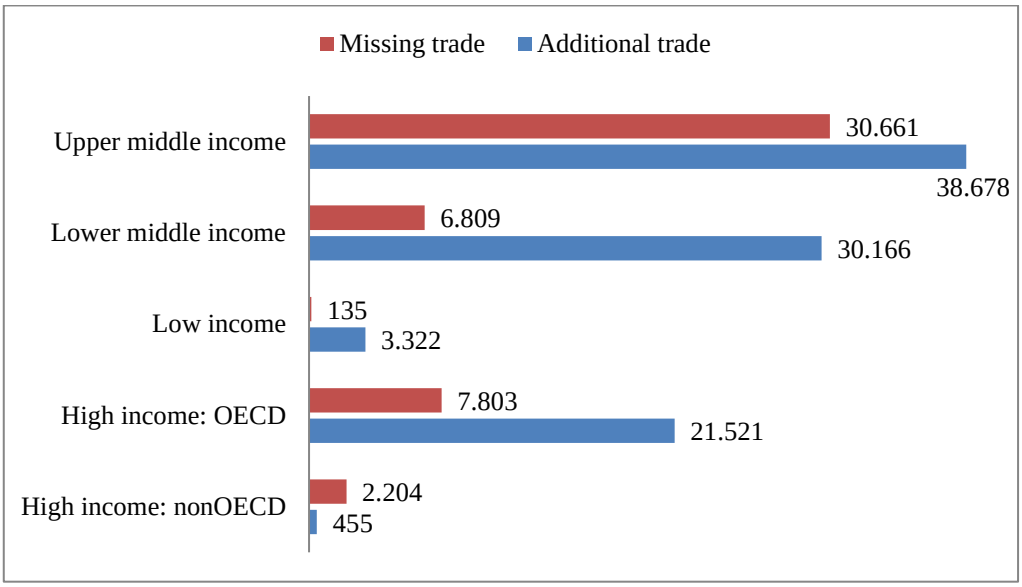
If we look at the results for different sectors, we can see large differences. The agricultural sector (sections I-IV) benefits the most from the preferential treatment in relative terms. It is characterized by a large share of preferential trade (see Figure 1) while vegetable products (Section II) and oils and fats (Section III) have by very elastic import demand (see Table 1). Other sections that present a high trade creation effect are plastic (VII) and transport (XVII).

Figure 4 and 5 present the impact of trade preferences for regions as well as country groups defined according to income levels. Low and lower middle income countries (especially Asian countries, such as Bangladesh, Pakistan, Cambodia, Philippines, Indonesia, and Sub-Saharan Africa, such as Côte d'Ivoire, Ghana, Madagascar, Ethiopia, Uganda) are the ones with the largest trade increase in relative terms.

The Upper Middle income countries also benefit significantly from EU preferences both in relative and absolute terms due to the existing free trade agreements with countries in Latin America, such as Mexico, Peru and Ecuador, and with countries in Europe such as Turkey, Serbia and Montenegro. However, it is worth noting that the highest trade flow from High-income OECD that would not take place without preferences concerns imports from Korea, Switzerland, Israel and Chile, under specific preferential treatment and free trade agreements.

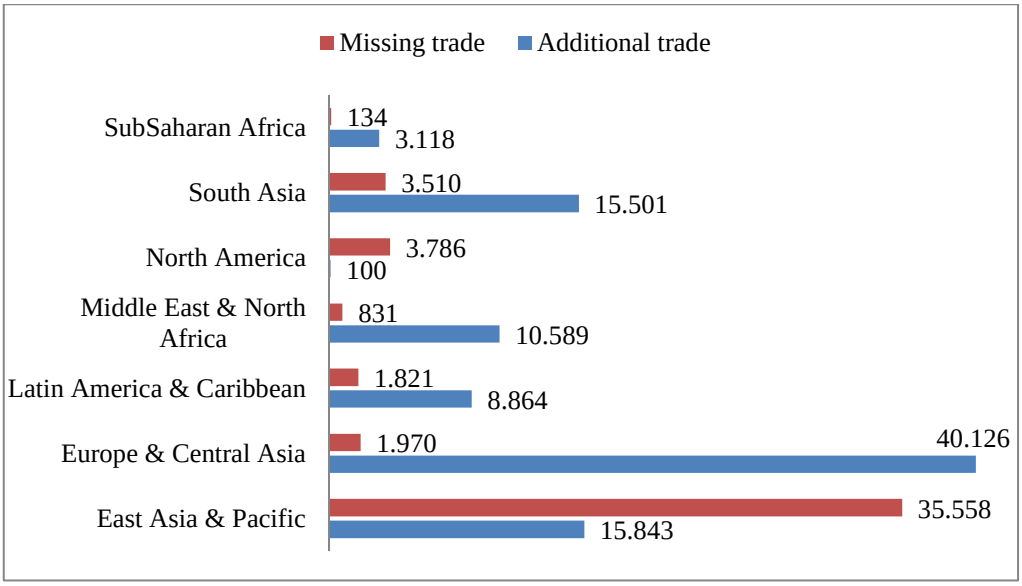
On the other hand, the Middle income group of countries in Asia and Pacific (especially, China) are those most negatively affected by the existing preferential schemes. In actual fact, these are countries that would register higher exports if preferences were removed.

Figure 4: Trade effect due to preference: results by countries according to income levels (CES reference tariff)



At world prices; millions of €. 2017.

Figure 5: Trade effect due to preference: results by countries according to regions (CES reference tariff)



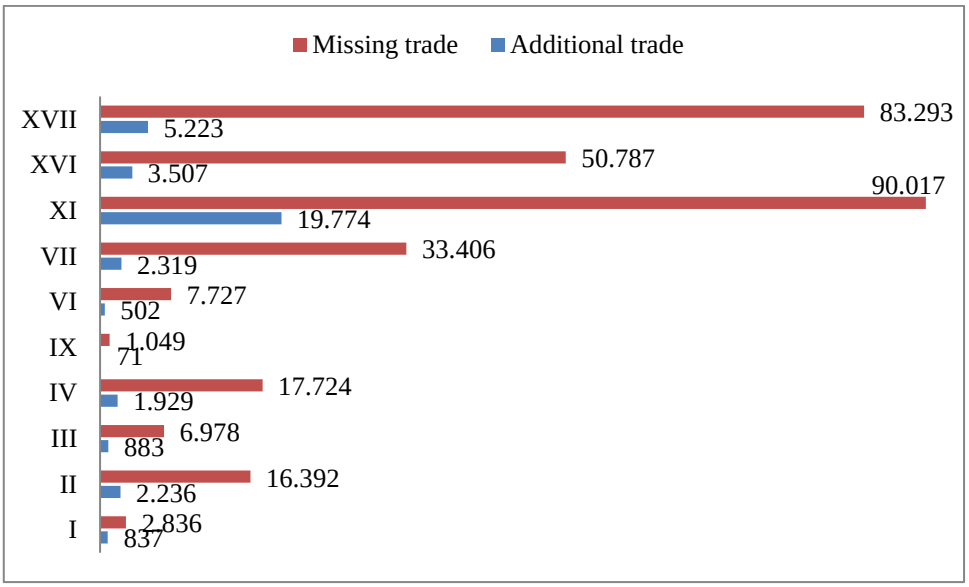
At world prices; millions of €. 2017.

Figure 6 shows the trade effect of the actual EU agricultural trade policies through the computation of the counterfactual trade flows that would be recorded if all tariffs were removed. The overall protectionist impact of EU trade policies is quite large and amounts to 310,210 million euros, around 30% of predicted trade. These are imports that would take place under free trade. Larger decrease of trade due to protection are registered for textile products (XI), so that the major exporters of textiles

(such as China, India and Viet Nam) should be particularly affected by a liberalization policy. Other sections that might suffer from trade liberalization are the agriculture (sections I-IV) and the plastic sector (VII). When comparing results so far, notwithstanding the existence of several preferential schemes, the overall stance of the EU trade policy seems to remain quite protectionist.

Results show that 37,282 million euros (around 4% of predicted trade) of imports would disappear under free trade. These are exports lost by countries actually enjoying an advantage due to the preferential treatment and represents what developing countries may lose as a consequence of multilateral liberalization (preference erosion).

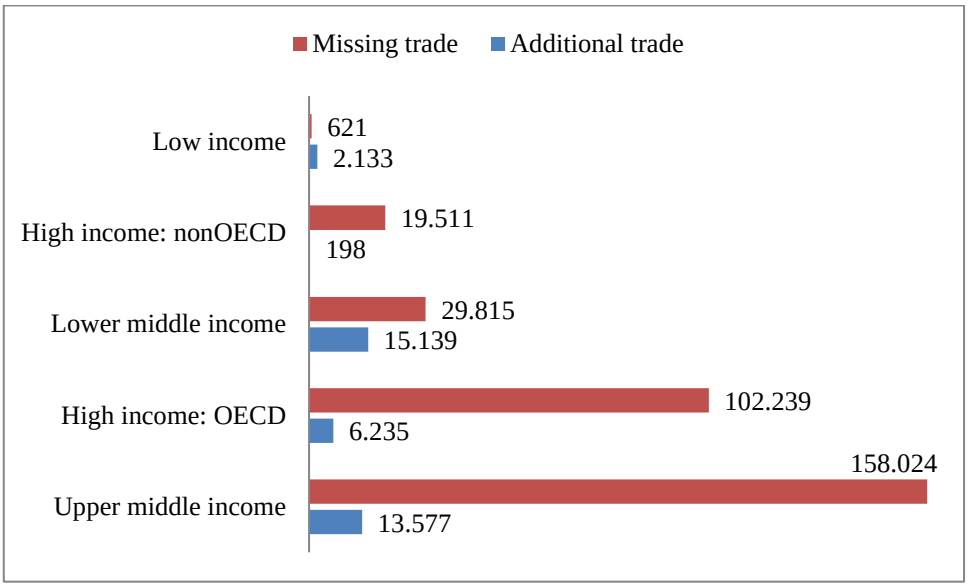
Figure 6: Trade effect due to protection: results for sectors with significant preference impacts (CES reference tariff)



At world prices; millions of €. 2017.

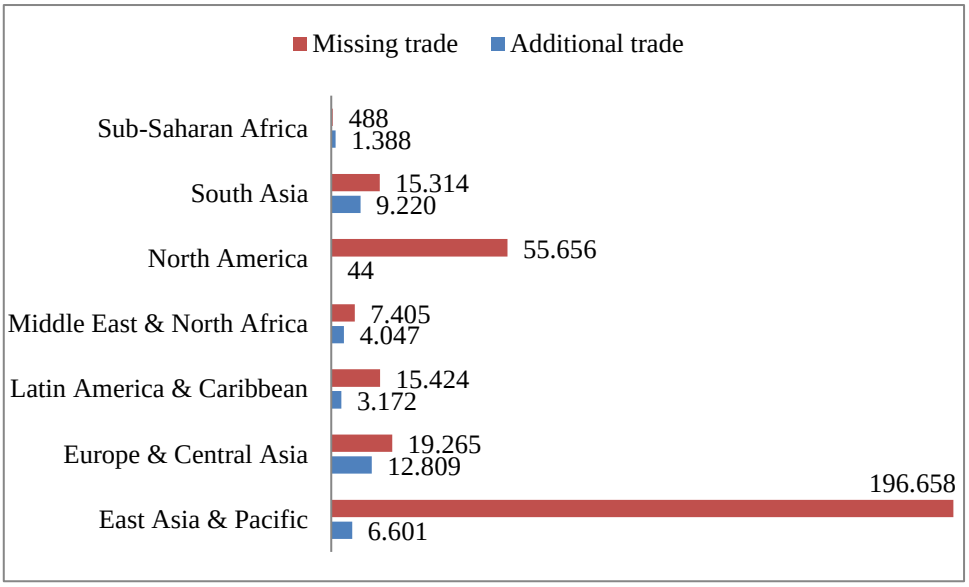
Figure 7 and 8 show the protectionist impact of EU tariffs for regions as well as country groups defined according to income levels different country groups. Exports from the High income OECD countries group are the most negatively affected (first of all, North America, i.e., US and Canada), followed by those from Upper middle income countries. In terms of preference erosion, Low income and Lower middle income countries are the groups that risk more. This is especially the case for Asian countries such as India, Indonesia, Viet Nam, Sri Lanka and Bangladesh.

Figure 7: Trade effect due to protection: results by countries according to regions (CES reference tariff)



At world prices; millions of €. 2017.

Figure 8: Trade effect due to protection: results by countries according to income levels (CES reference tariff)



At world prices; millions of €. 2017.

6. Conclusions

The aim of this paper has been to provide a thorough empirical analysis of the EU's tariffs, estimating their effects on bilateral trade flows while controlling for their multilateral impact and including a full set of fixed effects. Estimating the impact of trade policies involves complex issues due to the

difficulty in correctly specifying the gravity equation. Here, we carry out a simple but theoretically consistent gravity analysis of EU tariffs using a complete, well-documented dataset. We run estimations at the disaggregated level of individual tariff lines and identify relationships on the basis of the extensive variation available in bilateral trade data. That is to say, a variation in trade costs across exporters provides the price variation needed to trace the slope of the EU import demand curves.

A crucial feature is the measurement of the trade policy treatment. In particular, the policy variable must take into account not only absolute changes in bilateral duties but also relative changes in relation to those duties paid by other exporters. This feature should be acknowledged, just as the international trade literature recognized years ago the existence of a multilateral resistance component, capturing the fact that exports from country *i* to country *j* depend on trade costs across all possible suppliers. In other terms, focusing on the absolute costs means that other important general equilibrium effects operating through the price index are often missed.

The main contribution of our paper is to present a general framework in which to structurally estimate the magnitude of trade policies' impacts on trade, using very detailed data that include intra-national flows. We compute the protection/preference margins in relative terms as the ratio between a reference tariff and the applied rates faced by each exporter. Such a choice is consistent with the observation that bilateral trade depends not only on direct market conditions, but also on the market conditions applied to third-party countries. The greater the relative advantage/disadvantage provided by the trade policy, the higher/lower the expected trade flows.

Whereas Cipollina et. (2017) assess the impact of EU preferences considering only extra-EU trade flows, we develop a model with both extra and intra-EU trade flows at the most disaggregate tariff line level. The use of intra-national trade flow data is consistent with gravity theory (Yotov, 2012; Yotov et at., 2016) and the most recent literature has pointed out that it allows a consistent identification of multilateral (Heid et al., 2017) as well as bilateral trade policies (Dai et al., 2014; Bergstrand et al., 2015). Moreover, since intra-EU trade is substantial, it is important to allow foreign and domestic producers to be active in the same sector producing similar goods.

Cipollina et al. (2017) show that preference margins can be positive or negative when they are computed with regard to the tariffs paid by other exporters. This points to a renewed interpretation of the trade creation and trade diversion concepts, through multilateral resistance terms, of changes in tariffs included in T_k. A decrease in t_i^k is directly increasing bilateral imports from *i*, while also

changing the relative trade costs through its impact on the reference tariff. EU consumers, therefore, reallocate demand according to new relative prices, diverting trade from non-preferred countries and reducing demand for domestic producers. Since we take into account the intra-EU duty-free trade, the reference tariffs turn out to be much lower. This leads to a significant reduction, or disappearance, of the preference margins though they are likely to have a larger impact since they affect total consumption rather than imports only.

An important byproduct of our approach is that it can be used to obtain estimates of the elasticity of substitution which is the single most important parameter in the international trade literature. Since tariffs are a direct price-shifter, gravity theory can be used to recover the elasticity of substitution directly from the estimate of the coefficient on bilateral margins. Although bilateral measures of bilateral tariffs have previously been used to identify the trade elasticity in structural gravity frameworks, e.g. Cipollina et al. (2017), we have been able to estimate a more comprehensive elasticity by also taking into account the impact on domestic goods.

Our model allows for differences in the trade elasticity across sectors, meaning that consumers can react differently to price changes in different sectors. This is quite significant since trade tariffs vary substantially across sectors and this means that a failure to account for this heterogeneity across sectors may lead to biased results.

We find that the impact of the community policy, in terms of protection, is much stronger than the increase in extra-EU trade due to the preferential policy. In the debate on how effective the EU preferences are, our analysis shows that, even if the EU seems to lean towards trade liberalization through a proliferation of preferential agreements, the preferences do not seem to be very effective in incrementing trade. Nonetheless, preferences play a significant role in specific products or exporters.

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Appendix 1: Sectors according to the EU Sections of the Harmonized Commodity Description And Coding System

TABLE 1: ***Commodity Classification***

Sectors according to the EU Sections of the Harmonized Commodity Description And Coding System
Sections
I: Live Animals; Animal Products (Chapters 1-5)
II: Vegetable Products (Chapters 6-14)
III: Animal or Vegetable Fats and Oils and Their Cleavage Products; Prepared Edible Fats; Animal or Vegetable Waxes (Chapter 15)
IV: Prepared Foodstuffs; Beverages, Spirits, and Vinegar; Tobacco and Manufactured Tobacco Substitutes (Chapters 16-24)
V: Mineral Products (Chapters 25-27)
VI: Products of the Chemical or Allied Industries (Chapters 28-38)
VII: Plastics and Articles Thereof; Rubber and Articles Thereof (Chapters 39-40)
VIII: Raw Hides and Skins, Leather, Furskins and Articles Thereof; Saddlery and Harness; Travel Goods, Handbags, and Similar Containers; Articles of Animal Gut (Other Than Silkworm Gut) (Chapters 41-43)
IX: Wood and Articles of Wood; Wood Charcoal; Cork and Articles of Cork; Manufactures of Straw, of Esparto or of Other Plaiting Materials; Basketware and Wickerwork (Chapters 44-46)
X: Pulp of Wood or of other Fibrous Cellulosic Material; Waste and Scrap of Paper or Paperboard; Paper and Paperboard and Articles Thereof (Chapters 47-49)
XI: Textiles and Textile Articles (Chapters 50-63)
XII: Footwear, Headgear, Umbrellas, Sun Umbrellas, Walking-Sticks, Seat-Sticks, Whips, Riding-Crops and Parts Thereof; Prepared Feathers and Articles Made Therewith; Artificial Flowers; Articles of Human Hair (Chapters 64-67)
XIII: Articles of Stone, Plaster, Cement, Asbestos, Mica or Similar Materials; Ceramic Products; Glass and Glassware (Chapters 68-70)
XIV: Natural or Cultured Pearls, Precious or Semiprecious Stones, Precious Metals, Metals Clad with Precious Metal, and Articles Thereof; Imitation Jewellery; Coin (Chapter 71)
XV: Base Metals and Articles of Base Metal (Chapters 72-83)
XVI: Machinery and Mechanical Appliances; Electrical Equipment; Parts Thereof; Sound Recorders and Reproducers, Television Image and Sound Recorders and Reproducers, and Parts and Accessories of Such Articles (Chapters 84-85)
XVII: Vehicles, Aircraft, Vessels and Associated Transport Equipment (Chapters 86-89)
XVIII: Optical, Photographic, Cinematographic, Measuring, Checking, Precision, Medical or Surgical Instruments and Apparatus; Clocks and Watches; Musical Instruments; Parts and Accessories Thereof (Chapters 90-92)
XIX: Arms and Ammunition; Parts and Accessories Thereof (Chapter 93)
XX: Miscellaneous Manufactured Articles (Chapters 94-96)
XXI: Works of Art, Collectors' Pieces and Antiques (Chapter 97)