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Preferential Tariff Formation
The Case of the European Union

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In this paper, we address the impact of multilateral trade liberalisation (MTL) on the preferential tariffs granted by the EU, which is one of the largest traders and one of the biggest contributors to MTL. We empirically address two important questions. First, if the MFN tariff for a product is higher, does it lead to a higher or lower preferential tariff? Second, the EU being a large trading partner in such agreements, does reciprocity matter for giving meaningful preferential access? For a given MFN tariff, we model the preferential tariff with a simple linear functional form. We draw three important conclusions. First, the products that are highly protected do not get high preferential access even at the regional level. Second, reciprocity plays only a limited role in granting better preferential access. Third, GSP preferences matters when the EU negotiates with the developed partners but it does not matter when it negotiates with the developing partners.

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In this paper, we address the impact of multilateral trade liberalisation (MTL) on the preferential tariffs granted by the EU, which is one of the largest traders and one of the biggest contributors to MTL. We empirically address two important questions. First, if the MFN tariff for a product is higher, does it lead to a higher or lower preferential tariff? Second, the EU being a large trading partner in such agreements, does reciprocity matter for giving meaningful preferential access? For a given MFN tariff, we model the preferential tariff with a simple linear functional form. We draw three important conclusions. First, the products that are highly protected do not get high preferential access even at the regional level. Second, reciprocity plays only a limited role in granting better preferential access. Third, GSP preferences matters when the EU negotiates with the developed partners but it does not matter when it negotiates with the developing partners.

Keywords: MFN tariffs, preferential tariffs, reciprocity, GSP
JEL classification: F13, F15.

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1 Introduction

The proliferation of Preferential Trade Agreements (PTAs) and the slow progress of Multilateral Trade Negotiations (MTNs) have raised interest among scholars and policymakers in the question of how MFN and preferential tariffs are related. Bhagwati (1991) set out the basic question, whether lower preferential tariffs makes it harder or easier to lower MFN tariffs. More recently, Either (1998) and Freund (2000) have reversed the question and asked, whether lower MFN tariffs makes it easier to lower tariffs preferentially.

This paper addresses this set of issues using data for the European Union (EU), one of the most prolific signatories of PTAs, but also a long-time participant in MFN tariff cutting. The paper does not attempt to tackle the full set of issues, focusing rather on two specific questions –

1) How does the level of the MFN tariffs set in 1994 in the context of the Uruguay Round, affect the level of preferential tariffs granted in subsequent PTAs?

2) Does the degree of reciprocity in the EU's post-UR PTAs affect the level of the EU's preferential tariffs?

The theory for preferential tariff formations is not tightly interlinked with the empirics, so based on careful reading of legal texts of the agreements and interviews with preferential trade negotiators, we developed an empirical model in which we control for variables that we can measure – e.g. MFN applied tariffs, reciprocity and GSP ; and control for the other factors like political economy, product specific rules of origin, transportation costs, exchange rate movements, growth in GDP of the partners etc., that could potentially affect the preferential tariffs with the fixed effects.

To quantify reciprocity, we construct a variable that measures, for each good, at the six digit level, the reciprocal access provided to the EU by a preferential partner. We codify eleven PTA legal agreements to construct a unique data-set for preferential tariffs applied by partners for our study period 1995- 2007. Since we use a panel data on highly disaggregated HS six digit product level, we are able to estimate the coefficients of our interest without losing any interesting information for this study.

To summarise the results, we find strong evidence that products that are highly protected at the MFN level get less preferential access to the EU. These products mainly are in the agriculture and fishery sectors. Another interesting finding is that the reciprocity matters to the EU but only to a limited extend. Additionally, we also find that when the EU negotiates with developed countries, the GSP preferences granted by the EU have an impact on preferential tariffs formation for the developed partners. But when it comes to negotiating the preferential tariffs with the developing countries, GSP does not seem to have a similar parallel impact.

The remainder of the paper is organised as follows – Section 2 motivates the analysis and presents an overview of EU's tariff structure. Section 3 presents the related Literature. Section 4 discusses the econometric model and methodology. Section 5 discusses the data requirements and sources of data. Section 6 discusses the key econometric issues. Section 7 presents the empirical results on 'testable' hypothesis. It also presents evaluations of the empirical results based on our baseline model and confirms the robustness of results. Section 8 concludes.

2 The EU's Tariff Structure

2.1 MFN Tariff Structure

The EU tariff nomenclature, known as the Combined Nomenclature, is based on the International Convention on the Harmonized Commodity Description and Coding System. As per the EU's Trade Policy Review, 2007 at the WTO, the EU's purely MFN regime applies to only nine WTO Members[2], which account for some 36% of its merchandise trade[3]. The EU's Common Customs Tariff schedule for 2006, contains 9,843 lines at the eight digit level (5224 products at six digit HS 2002). The EU has bound all its tariff lines at the WTO (Annex II). The proportion of tariff lines with the same applied and bound rates is 98.4%. It applies several types of tariff (Annex III); ad *valorem* rates are the most widely used (90%), followed by specific (6.4%), compound (2%), alternate (0.7%) and variable (0.9%). Some agricultural products are subject to tariff rate quotas.

[2] These are: Australia; Canada; Chinese Taipei; Hong Kong, China; Japan; Republic of Korea; New Zealand; Singapore; and the United States.

[3] The European Commission (Trade Policy Review, WTO 2007) estimates that 74% of the EU's trade is under the MFN regime; this implies that MFN trade with the EU's preferential partners represents some 38% of its overall trade.

The simple average applied MFN tariff is estimated at 6.9% in 2006 (up from 6.5% in 2004), with rates ranging from zero to 427.9% (Annex IV). Some 81.5% of tariff lines have rates lower than 10% (Figure I). Agricultural products (WTO definition[4]) are the most tariff-protected, with an average MFN tariff of 18.6% (more than twice the overall average MFN tariff).

2.2 Tariff preferences

The EU has in place a wide variety of PTAs and arrangements motivated by economic, historical, development, and geo-political considerations (Annex I). As per the WTO's preferential agreement database[5], the EU has notified 37 preferential agreements as of February, 2009. Typically, the preferences consist of duty-free access for most non-agricultural products, and lower tariffs (compared with the MFN levels), generally under tariff rate quotas on selected agricultural goods. These preferences vary country-wise, product-wise, and year-wise. Annex V provides information on EU's preferential tariff averages in 2006.

Baldwin and Wyplosz (2006)[6] characterise trade arrangements in Europe as hub-and-spoke bilateralism. The hub is formed by two concentric circles (the EU, which has the deepest level of integration, and EFTA which participates in the Single Market apart from agriculture). The EU's preferential trade relationship can be divided into five major categories. First, the Single Market via the European countries European Economic Area (EEA)[7] with Iceland, Liechtenstein and Norway; and the "Bilateral Accords" with Switzerland. Second, the Customs Union with Turkey (only for industrial products); Stabilisation and Association Agreements with five less-developed European countries Albania, Bosina and Herzegovina, Croatia, Macedonia and Montenegro. Third, Association Agreements with nine developing Mediterranean neighbours Algeria, Egypt, Israel, Jordan, Lebanon, Morocco, Palestinian Authority, Syria and Tunisia. Fourth, PTAs with far away trading partners like Chile, Mexico and South Africa. Fifth, non-reciprocal preferences extended to 76 African Caribbean and Pacific (ACP) countries[8] under the Lomé Convention,

[4] WTO Agreement on Agriculture, Annex I
[5] http://rtais.wto.org/UI/PublicMaintainRTAHome.aspx
[6] For details, interested reader may refer Chapter 12, Baldwin and Wyplosz (2006), The Economics of European Integration (2nd edition).
[7] Iceland, Liechtenstein and Norway (in 1994) ; Faroe Islands (in 1997), Switzerland (in 1972).
[8] Caribbean Forum of ACP States (Antigua and Barbuda, Bahamas, Barbados, Belize, Dominica, the Dominican Republic, Grenada, Guyana, Haiti, Jamaica, Saint Lucia, Saint Vincent and the Grenadines, Saint Christopher and Nevis, Suriname, Trinidad and Tobago) ; Central Africa (Cameroon, Central African Republic, Chad , Congo,

succeeded by the Cotonou Agreement[9] and non-reciprocal GSP preferences[10] to other developing countries.

The EU's PTAs have so far resulted in free trade in industrial goods, and limited liberalization of trade in agricultural goods; in some cases, these agreements also cover trade in services. Liberalization under its reciprocal preferential agreements is often undertaken asymmetrically (with the EU liberalizing at a faster pace) and over different transition periods. The agreements also cover, inter alia, the harmonization of technical requirements (including standards), intellectual property protection, investment, competition policy, government procurement, trade defense instruments, and dispute settlement mechanism.

3 Literature Review

The literature on classic question about the PTAs being 'stumbling or building' blocks as framed by Bhagwati in 1991 is fairly well developed. The existing literature addresses this important question by studying how the preferential trade liberalization affects the MTL. Levy (1997), Grossman and Helpman (1995), Krishna (1998), Limao (2007) are examples of some influential papers on theoretical side. Baldwin and Seghezza (2008), Limao (2006) and Estevaldeordal, Freund and Ornelas (2008) are excellent examples of empirical papers. Ethier (1998) and Freund (2000) address the *reverse question* by theoretically developing a model for the effect of MTL on the formation of PTAs. Fugazza and Nicoud (2008) empirically investigate the *reverse question*. In the next sub-sections, we first discuss some of the theoretical papers, then we look at the empirical papers relevant for our study.

Equatorial Guinea, Gabon, Sao Tome and Principe) ; East South Africa (Burundi, Comoros, Democratic Republic of the Congo , Djibouti, Eritrea , Ethiopia , Kenya, Malawi, Mauritius, Madagascar, Rwanda, Seychelles, Somalia, Sudan, Uganda , Zambia, Zimbabwe); Southern Africa (Angola, Botswana, Lesotho, Mozambique, Comoros, Namibia, Swaziland, Tanzania); Pacific (Cook Islands, Federation of Micronesia, Fiji, Kiribati, Marshall Islands, Nauru, Niue, Palau, Papua New Guinea, Western Samoa, Solomon Islands, Tonga, Tuvalu, Vanuatu); West Africa (Benin, Burkina Faso, Republic of Cape Verde, Gambia, Ghana, Côte d'Ivoire, Guinea, Guinea Bissau, Cote d'Ivoire, Liberia, Mali, Mauritania, Niger, Nigeria, Senegal, Sierra Leone, Togo).

[9] The Cotonou Agreement expired on 31 December 2007. Negotiations for full Economic Partnership Agreement with reciprocity are ongoing.

[10] In 1968, the UN Conference on Trade and Development (UNCTAD) recommended the creation of a 'Generalized System of Preferences' (GSP) under which industrialized countries would grant trade preferences to all developing countries on a non-reciprocal basis. A key principle was (and is) the idea that such "special and differential treatment" be granted on the basis of "non-reciprocity", reflecting the premise that "treating unequals equally simply exacerbated inequalities" (UNCTAD, 2004).

3.1 Theoretical Literature

Levy (1997) argues that in the absence of the PTA, the median voter would accept the MTL. But the voter may reject MTL in the event of a subsequent possibility of PTA, even though before the PTA the median voter would have agreed to the MTL. Grossman and Helpman (1995) show that trade diversion may occur in sectors in which the cost of production is higher (than the rest of the world) in the PTA member and for this reason the producers may lobby for the PTA. Krishna (1998) argues that when countries liberalise multilaterally, the export rents of the producers get depleted compared to the presence of a PTA that generates greater rents for such producers. Therefore, these producers have an incentive to lobby for PTA and this could reduce the incentive of the members of PTA for MTL. Limao (2007) focuses on cooperation in non-trade issues by small countries in PTAs with large countries. He argues that the PTAs create an incentive for large country to maintain higher MFN tariffs. The reason being, PTA is valuable to large because it allows it to extract cooperation from the small in non-trade issue by not eroding the preference of small country. Therefore, PTAs—currently allowed by WTO rules—are a stumbling block to multilateral liberalization.

On contrast addressing the *reverse question*, Ethier (1998) gives a model when the demand for final goods rises due to the MTL, and the rich country may source the production of intermediate goods to the developing countries. This encourages the formation of PTAs between rich country and the developing country. Freund (2000) explores how MTL affects the incentive of a country to join a PTA and the associated self-enforcement mechanism. Using the oligopolistic model of trade, she finds that as the multilateral tariff level falls, the forces pulling countries away from free trade and into bilateral agreements get strengthen.

3.2 Empirical Literature

Estevaldeordal, Freund and Ornelas (2008) examine the effect of regionalism on unilateral trade liberalization using industry-level data on applied MFN tariffs and bilateral preferences for ten Latin American countries from 1990 to 2001. They suggest that concerns about a negative effect of preferential liberalization on external trade liberalization are unfounded and support the building block argument about PTAs. On the other hand, addressing the *reverse question*, Fugazza and Nicoud (2008) show that products for which the US agreed to cut its MFN tariffs

substantially between the end of the Tokyo and Uruguay Rounds of GATT negotiations (1979-1994) are also the products for which subsequent tariff cuts on a preferential basis are boldest.

The importance of MFN and preferential tariffs in PTAs and their relationship has been well developed in Baldwin and Seghezza (2008), and Limao (2006). The focus of these studies has been on estimating building or stumbling block effects of PTAs on MTL. These papers take the preferential tariffs as exogenous and access their impact on MTL by the members of PTA. For example, Limao (2006) uses the following linear approximation[11] (equation *E4* in his paper) to estimate the stumbling block effects of the US PTAs

$$\Delta\tau_{it} = \phi G_i + a + a_I + \beta\sum_k s_{iT}^k \Delta(b_t - b_t^k) + \rho\sum_k s_{iT}^k \left(\sum_j \Delta\tau_{jt}^k w_{jT}^k\right) + u_i \qquad i = 1,....,N \qquad (1)$$

where, the dependent variable $\Delta\tau_{it}$ is a measure of the U.S. MFN bound ad-valorem tariff change during two consecutive multilateral negotiations. He uses detailed data on US tariff reductions during the most recent multilateral trade round to provide the systematic evidence that the US's PTAs were a stumbling block to its multilateral liberalization. Limao deals with the endogenity of MTL and preferential trade liberalization in the above equation.

Baldwin and Seghezza (2008), use the following model[12] (equation *(1)* in their paper)

$$MFN_{gpm} = \alpha + \beta PTA_{gpm} + \gamma_0 Dchapter_{gm} + v_{gm} \qquad (2)$$

where MFN_{gpm} and PTA_{gpm} denote the MFN and preferential tariffs respectively, applied by 23 countries indexed by g in the p^{th} PTA on product tariff line m. Using an impressive tariff line data-set at the most disaggregated level they find support for the building block argument. In this paper, again one important issue is endogenity between MFN_{gpm} and PTA_{gpm}.

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[11] The dependent variable $\Delta\tau_{it}$ is a measure of the U.S. MFN bound ad-valorem tariff change during two consecutive multilateral negotiations. in period $t= 1$ (final stages of Tokyo Round, 1977-78) and $t = 2$ (final stages of Uruguay Round, 1993-94) on the 8-digit product i. The indicator variable G_i denotes whether the good is exported to the U.S. under a preferential agreement. The coefficient a denotes an intercept that estimates the average MFN tariff change for the excluded industry (miscellaneous manufacturing); a_I represents the set of included industry dummies. The next two variables capture the US bargaining power relative to country k and a measure of product specific reciprocity, respectively.

[12] Where MFN_{gpm} and PTA_{gpm} denote the MFN and preferential tariffs respectively, applied by 23 countries indexed by g in the p^{th} PTA on m^{th} product tariff line. $Dchapter_{gm}$ are *14* dummies for the main HS chapter aggregations (animal, vegetables, foodstuffs, mineral products, chemicals, plastics, raw hides, skin and leather, wood, textile, footwear, stone and glass, metals, machinery and transportation equipment. The error term, v_{gm}, may contain a common group effect, c_g, that is $v_{gm}=c_g+u_{gm}$.

4 Theoretical Considerations

4.1 Relation with the previous empirical papers

Though we draw our motivation from Baldwin and Seghezza (2008), and Limao (2006) the present study addresses the *reverse question*, focusing on the formation of preferential tariffs applied by the EU, after its MTL program is known. So we can take the MFN tariff as exogenous to the preferential tariff. Given, that the EU's MTL program was known to the world by the end of Uruguay Round in 1994, we estimate the impact of MTL on preferential tariff negotiations of the EU during the period 1995 to 2007. To the best of our knowledge, there is no study that has tried to explain empirically the formation of preferential tariffs, once MTL of a country is known to the world.

Careful reading of legal PTA documents of the EU, reveal an important fact that has not been exploited by previous literature. In case of the EU, for most of the products, the bound rates and applied rates were the same during the period 1995 to 2007[13]. The EU's bound and hence the applied rates since 1995 were well known[14] to the world. The reductions in MFN tariffs in preferential agreements are generally based on base rate[15] (or current applied MFN rate) as agreed in the PTA documents. This should help us to tackle endogenity issues in our empirical work. As the preferential tariffs seem to depend on the applied MFN tariffs and not the other way round, we argue absence of endogenity in Section 6. Additionally, since the exchange of preferences is not on '*one to one'* basis, we again rule out endogenity on account of reciprocity variable in Section 6.

4.2 Econometric Model

Interviews with the EU trade negotiators reveal that when a country negotiates a PTA it takes into account three important factors. First, non-agricultural products are given more preferential access compared to the agriculture and fisheries products. This fact is also confirmed from tariff reduction schedules of the EU and Annex V. Second, for products that already get preferential

[13] In 2006, 98.4 % products have the same applied rate as their bound rate.
[14] The EU has negotiated its bound rates at Uruguay Round in 1994 and agreed at the WTO to implement the current concessions by 2004. For 77.74 % products on six digit HS 1996, EU implemented it bound rate commitments by 2002. By 2004, it implemented 100% of its bound rate commitments.
[15] For most of the EU's PTAs, the base rate (or basic duty) has been defined in the text of the Agreements .This is equal to the applied rate in a particular year , generally in the year immediately before the PTA.

access under the non-reciprocal GSP program, the EU seems to be more liberal in allowing the preferential access to its PTA partners. Third, in the case of reciprocal PTAs, the reciprocity in terms of market access matters to the EU. Although, the EU liberalizes at a faster pace than the PTA partners over different years, still the reciprocity matters may be to a limited extent.

Following, Anderson and Wincoop (2003) , we simplify the EU's trade by aggregating all preferential partners of the EU into one region called 'PRF region' and all the partners trading on MFN basis as 'MFN region'. For a given MFN rate; we model the preferential tariff formation with a simple linear functional form similar to the one used in Baldwin and Seghezza (2008), and Limao (2007) :

$$PRF_{z,t} = \alpha_1 MFN_{z,t} + \beta_1 \Psi_{z,t} + \varepsilon_{z,t} \tag{3}$$

where, $PRF_{z,t}$ is simple average[16] of ad-valorem preferential tariffs applied by EU on import of product *z* at time *t* from the 'PRF region' at the six digit HS 1996. Similarly, $MFN_{z,t}$ is simple average of MFN applied tariff by the EU on imports of product *z* from 'MFN region' at time *t* . $\Psi_{z,t}$ are the other variables that may affect the EU's decision to apply certain level of preferential tariffs on 'PRF region' products.

Reciprocity and GSP are two other important economic variables that may have an effect on the EU negotiators' decision about the level of preferential tariffs. In addition, we also want to test, if these two variables affect the preferential tariff formation, therefore, we include them specifically in our simple model (3) to arrive at the following equation:

$$PRF_{z,t} = \alpha_1 MFN_{z,t} + \beta_1 Recp_{z,t} + \gamma_1 GSP_{z,t} + \Omega_{z,t} + \varepsilon_{z,t} \tag{4}$$

This equation helps us to detangle the effects of reciprocity and GSP preferences. $Recp_{z,t}$ is defined in terms of the market access provided by all the partners to the EU, and therefore, if the EU negotiators follow reciprocity this would lead to lower preferential tariffs for the 'PRF region'. Since the 'PRF region' consists of 199 countries, we need to aggregate market access offered by the partners. In preferential tariff negotiations, the negotiators focus on market access concessions provided by the partner country, rather than the simple difference in the MFN and

[16] We could take the trade weighted average of the preferential averages, but it is not likely to change our estimation results. Moreover, we are likely to lose almost two third of the observations as most of the preferences are not used by the partners.

preferential tariff. Drawing our motivation from Limao (2008)[17] , we define market access or reciprocity $Recp_{z,t}$ as $\sum_{k=1}^{q}\frac{1}{k}(-\Delta mop_{z,t}^{k,EU} * s_{z,t}^{k,EU})$, which is the average of reciprocal preferences extended to the EU by all *q* partners on product *z* at time *t*. Here $s_{zt}^{k,EU}$ is the ratio of imports of product *z* from the EU by a PTA partner (say, country *k*) at time *t* to the total imports of product *z* at time *t* by the same partner i.e. $M_{z,t}^{k,EU} / M_{z,t}^{k,Total}$. $\Delta mop_{z,t}^{k,EU}$ is defined as the difference between the preferential tariff on the EU products and the MFN tariff applied by partner *k* on products *z* at time *t* i.e. $\Delta mop_{z,t}^{k,EU} = MFN_{z,t}^{k} - PRF_{z,t}^{k,EU}$. In equation (4), $GSP_{z,t}$ is a dummy variable that equals one, if the product *z* gets GSP at time *t*, otherwise it is zero.

The above equation still disregards other factors that help the EU negotiators to decide preferential tariffs, such as political economy considerations, i.e. some products may have higher tariffs historically, some products may have stricter rules of origin, or some products may have higher transportation costs etc. The other time specific effects such as exchange rate movements affecting tariffs, growth in GDP, etc. are also not captured by equation (4) and are included in term $\Omega_{z,t}$. We take advantage of our panel data structure, and include these effects as the fixed product and time effects. This would help us, to estimate the equation without including specific variables and later dealing with the issues raised by these extra variables, such as endogenity, lack of sufficient and comparable product-wise, country-wise periodic data. At the same time, we are not particularly interested in estimating any of these components, so we will not lose any information, which is interesting for the present study. Writing the term $\Omega_{z,t}$ as $\Omega_{z,t} = D_z + D_t$, we obtain the following:

$$PRF_{z,t} = \alpha_1 MFN_{z,t} + \beta_1 Recp_{z,t} + \gamma_1 GSP_{z,t} + D_z + D_t + \varepsilon_{z,t} \qquad (5)$$

Here, D_z is the product fixed effect, D_t is a time fixed effect and $\varepsilon_{z,t}$ is error term, which is assumed to be *i.i.d* .

The main parameter of interest in equation (5) are α_1 and β_1. If higher (lower) MFN applied tariffs lead to higher (lower) preferential tariffs, we would expect α_1 to be positive and

[17] Limao (2008) defines reciprocity in the context of multilateral negotiations $\Delta ma_t^k = \sum_j (-\Delta \tau_{jt}^k) w_{jT}^k$

significant, but less than one. In case, the EU values reciprocity, we would expect, β_1 to be positive and significant. This would mean that more reciprocity by the 'PRF region' will lead to lower preferential tariffs. If the EU values non-reciprocal GSP preferences, then γ_1 should be significant and negative, implying that the products covered under GSP are given better preferential treatment.

4.3 Extensions

The model presented up to this point has not considered the two possibilities. First, the EU may impose higher preferential tariff on products having higher MFN tariff (e.g. in agriculture, fisheries and textiles sectors). Second, the EU may be giving better preferential access to the 'PRF region' when it extends more reciprocal preferences for the EU's exports.

To test these hypotheses we construct four indicator variables:

Dependent variable	**Indicator variables**	**Remarks**[18,19]
$MFN_{z,t}$	$i1_{z,t}$	Equal to one, if the MFN tariff on product *z* at time *t* is *smaller* than the cut-off value of 7.0%, otherwise it is equal to zero.
	$i2_{z,t}$	Equal to one if the MFN tariff on product *z* at time *t* is *greater* than the cut-off value of 7.0%, otherwise it is equal to zero.
$Recp_{z,t}$	$ir1_{z,t}$	Equal to one, if the reciprocity that the EU gets on product *z* at time *t* is *lower* than the cut-off value of 4.06, otherwise it is equal to zero.
	$ir2_{z,t}$	Equal to one, if the reciprocity that the EU gets on product *z* at time *t* is *higher* than the cut-off value of 4.06, otherwise it is equal to zero.

We interact the first two indicator variables with $MFN_{z,t}$ and the last two variables with $Recp_{z,t}$. Putting all these together, we estimate the following equation:

$$PRF_{z,t} = i2_{z,t} + ir2_{z,t} + \alpha_1 MFN_{z,t} * i1_{z,t} + \alpha_2 MFN_{z,t} * i2_{z,t} + \beta_1 Recp_{z,t} * ir1_{z,t} + \beta_2 Recp_{z,t} * ir2_{z,t} + \gamma_1 GSP_{z,t} + D_z + D_t + \varepsilon_{z,t} \quad (6)$$

[18] The choice of cut-off point is arbitrary. The reason for choosing 7.0% as cut-off for MFN variable is that the 75% of the products in our data-set have MFN tariff less than 7.0% and 99% of the products have tariff less than 44.86%. We could have chosen median of MFN variable as the cut-off , but this would not make any difference to our findings.

[19] The choice of cut-off point is again arbitrary. The reason for choosing 4.06 as cut-off is that the 75% of the observations have reciprocity value less than 4.06 and 99% of the observations have reciprocity variable less than 8.16. We could have chosen median of reciprocity variable as the cut-off, but this would not make any difference to our findings.

The equation (6) helps us to detangle the two effects in MFN and reciprocity variables. If the EU applies lower preferential tariff (i.e. provides higher preferential access) on the products with lower MFN applied tariff, and the higher preferential tariff (i.e. provides lower preferential access) on the higher MFN applied tariff products, then we should expect α_1 and α_2 to be positive and significant, and $\alpha_1 < \alpha_2$. This would mean that the highly protected products do not get higher preferential access but on the other hand the lowly protected products at the MFN level get higher preferential access. The reason could be higher political economy forces in some sectors may force the EU government to continue providing higher protection, even in preferential agreements. We should expect the sign of β_1 to be positive and significant and β_2 to be insignificant. This would confirm that the EU values reciprocity by the 'PRF region' only up to a limited extent. The reciprocity beyond a limit does not really matter to get lower preferential tariffs to the EU market. The idea is simple to understand. For example, if on some product *z* , the EU is not ready to reduce more due to political economy forces (e.g. agricultural products) , then a higher reciprocity by the 'PRF region' in that product may not guarantee a lower preferential tariff . The expectation about the sign and significance of γ_1 remains the same as explained in case of equation (5).

Similarly, we can divide the $MFN_{z,t}$ and $Recp_{z,t}$ variables into four quartiles each and generate eight indicator variables to further segment the values of $MFN_{z,t}$ and $Recp_{z,t}$ variables.

Dependent variable	**Indicator variables**	**Remarks**[20,21]
$MFN_{z,t}$	$i1_{z,t}$	Equal to one, if MFN tariff falls in the *first* quarter of MFN tariff applied by the EU on all products at time *t*, otherwise it is equal to zero.
	$i2_{z,t}$	Equal to one, if MFN tariff falls in the *second* quarter of MFN tariff applied by the EU on all products at time *t*, otherwise it is equal to zero.
	$i3_{z,t}$	Equal to one, if MFN tariff falls in the *third* quarter of MFN tariff applied by the EU on all products at time *t*, otherwise it is equal to zero.

[20] The interacted MFN variables are denoted as *MFN_i1, MFN_i2, MFN_i3* and *MFN_i4* in regression results. The upper cut-off points for variables *MFN_i1, MFN_i2* and *MFN_i3* are 3.8%, 7.0%, 14.0% respectively. The tariff above 14.0% is captured by *MFN_i4* .

[21] The interacted reciprocity variables are denoted as *Recp_i1*, *Recp_i2* , *Recp_i3* and *Recp_i4* in regression results. The upper cut-off points for *Recp_i1, Recp_i2,* and *Recp_i3* are 2.30, 4.06 and 8.16 respectively. The reciprocity above 8.16 is captured by *Recp_i4.*

Dependent variable	Indicator variables	Remarks[20,21]
	$i4_{z,t}$	Equal to one, if MFN tariff falls in the *fourth* quarter of MFN tariff applied by the EU on all products at time *t*, otherwise it is equal to zero.
$Recp_{z,t}$	$ir1_{z,t}$	Equal to one, if reciprocity that the EU gets, falls in the *first* quarter of reciprocity extended on all products by 'PRF region' at time *t*, otherwise it is equal to zero.
	$ir2_{z,t}$	Equal to one, if reciprocity that the EU gets, falls in the *second* quarter of reciprocity extended on all products by 'PRF region' at time *t* , otherwise it is equal to zero.
	$ir3_{z,t}$	Equal to one, if reciprocity that the EU gets, falls in the *third* quarter of reciprocity extended on all products by 'PRF region' at time *t*, otherwise it is equal to zero.
	$ir4_{z,t}$	Equal to one, if reciprocity that the EU gets, falls in the *fourth* quarter of reciprocity extended on all products by 'PRF region' at time *t* , otherwise it is equal to zero.

We interact the first four variables with $MFN_{z,t}$, to construct *MFN_i1, MFN_i2, MFN_i3* and *MFN_i4* . This helps us to detangle the effects of higher MFN tariffs from lower MFN tariffs in four quartiles. Similarly, we interact the last four indicator variables with $Recp_{z,t}$ to construct four quartiles of reciprocity *Recp_i1, Recp_i2, Recp_i3* and *Recp_i4* to detangle the effects of higher and lower reciprocity in our estimation. Finally, we will estimate the following:

$$\begin{aligned} PRF_{z,t} = {} & i2_{z,t} + i3_{z,t} + i4_{z,t} + ir2_{z,t} + ir3_{z,t} + ir4_{z,t} + \alpha_1 MFN_{z,t} * i1_{z,t} + \alpha_2 MFN_{z,t} * i2_{z,t} \\ & + \alpha_3 MFN_{z,t} * i3_{z,t} + \alpha_4 MFN_{z,t} * i4_{z,t} + \beta_1 Recp_{z,t} * ir1_{z,t} + \beta_2 Recp_{z,t} * ir2_{z,t} \\ & + \beta_3 Recp_{z,t} * ir3_{z,t} + \beta_4 Recp_{z,t} * ir4_{z,t} + \gamma_1 GSP_{z,t} + D_z + D_t + \varepsilon_{z,t} \end{aligned} \quad (7)$$

5 Data

We focus on the period 1995 to 2007 i.e. 13 years after the WTO Agreement came into being. The number of PTAs grew at exceptional pace during this period. The PTAs notified to the WTO in 1994 were 91. By the end of 2007, there were more than 200 notified PTAs. The EU notified 17 PTAs during this period. In addition, the EU has announced two GSP programs. Moreover, this period is large enough to study the preferential liberalization program of the EU. This also allows us to exploit the product-wise and year-wise variations in tariff preference.

5.1 Data Requirement

Basically, we need two types of year-wise product-wise data -- data on tariffs, data on imports. For the EU, we need partner-wise preferential tariffs, MFN tariffs and the list of GSP products. For partners, we have to construct the reciprocity variable. So, we need the preferential tariffs applied on the EU products and MFN tariff. We also need partner's import from the EU and rest of the world.

5.2 Data Sources

As the countries have harmonized their tariff codes under the World Customs Organization (WCO), we use 'Harmonized System' or HS classification[22] of products for our study. The major source of data for this study is World Bank's World Integrated Trade Solution (WITS) database and WTO's Regional Trade Agreement Information System (RTA-IS)[23].

5.2.1 The EU Related Data

The EU's preferential and MFN tariff data is electronically available for years 1995 to 2007 on different HS classifications[24] from TRAINS (Annex VI). We convert tariff data from different classifications to one common classification. For most of the years the data is on HS 1996 classification, so we choose HS 1996 as common classification to estimate our results.

Next, we discuss how we convert the data into variables of our interest to estimate equations (5) and (6). The dependent variable in equation (5) and (6) is $PRF_{z,t}$. We construct $PRF_{z,t}$ as the simple average of preferential tariffs applied by the EU on product *z* at time *t*. The independent

[22] Under the Harmonized Classification or HS, countries have to adopt common internationally accepted product classification. The first six digits of products classification are same for all the countries. Beyond six digits, countries are free to have further disaggregation of products as per their national requirements. Beyond six digits, there is no harmonization in the products and therefore, for cross country comparison of data, we need to restrict the product disaggregation in our study to HS six digits only.

[23] WITS provide access to three other important sources of data – TRAINS (by UNCTAD), COMTRADE (by UNSD) and IDB (by WTO). WTO's RTA-IS, provides access to the legal documents of all the PTAs.

[24] The EU's partner-wise, product-wise preferential tariff data is electronically available for years 1995 on HS 1988/1992 (H0), 1996 to 2001 on HS 1996 (H1), 2002 to 2006 on HS 2002 (H2) and 2007 on HS 2007 (H3) from TRAINS. The EU's product-wise MFN tariff data is also electronically available for the same years and on the same HS classification. Concordance tables are also available from WITS for converting one product classification to the other. We convert all the tariff data from HS 1988/1992, HS 2002 and HS 2007 classifications to HS 1996 classification, as we run regressions on HS 1996 products.

variables, we need to estimate equations (5) and (6) are $MFN_{z,t}$, $Recp_{z,t}$, and $GSP_{z,t}$. Data on $MFN_{z,t}$ and $GSP_{z,t}$ is taken directly from TRAINS. $MFN_{z,t}$ is the simple average of MFN applied tariff by the EU on product *z* at time *t*. $GSP_{z,t}$ is a dummy that is equal to one if the product *z* gets GSP benefit at time *t*. In the next sub-section we discuss how we constructed $Recp_{z,t}$ from our data-set.

5.2.2 Partner Related Data--Constructing the measure of Reciprocity ($Recp_{z,t}$)

The final variable we need, to estimate coefficients of interest in (5) and (6) is reciprocity. To construct this variable, we need year-wise, product-wise data on MFN applied tariff by the partner *k* i.e. $MFN^{k}_{z,t}$. This data comes from TRAINS and IDB. The list of available data is attached at Annex VII[25]. We take the simple average of partner *k*'s year-wise product-wise applied MFN tariff on six digit products to construct $MFN^{k}_{z,t}$.

Similarly, we need year-wise, product-wise data on preferential tariff $PRF^{k,EU}_{z,t}$, applied by k^{th} partner on EU products. For three partners[26], the data is available from TRAINS and IDB. For other eleven countries[27], we do not have sufficient data on preferential tariffs from TRAINS or IDB (Annex VII). Therefore, we calculate preferential tariff rates from careful reading of legal text of the PTA agreements and codifying the preferential tariff liberalization schedule of partners[28] to get data on $PRF^{k,EU}_{z,t}$.

To construct $s^{k,EU}_{zt} = M^{k,EU}_{z,t} / M^{k,Total}_{z,t}$ we need product-wise, year-wise data on imports by partner *k* from the EU, i.e. $M^{k,EU}_{z,t}$ and the total imports of product *z* by partner *k* i.e. $M^{k,Total}_{z,t}$. We get country-wise, year-wise and product-wise import data from COMTRADE , TRAINS and

[25] Similar to the EU data, the data for partners' MFN and preferential tariff is available under different HS classification for different years. Before we run our regressions, we use concordance tables from WITS to convert the data from different HS classifications to HS 1996 six digit classification.
[26] South Africa, Switzerland and Turkey.
[27] Albania, Algeria, Chile, Croatia, Egypt, Israel, Jordan, Lebanon, Mexico, Morocco and Tunisia.
[28] Refer WTO Regional Trade Agreements Information System (RTA-IS) for legal text of PTA Agreements. http://rtais.wto.org/UI/PublicMaintainRTAHome.aspx

IDB (Annex VII) . MFN imports data, for 12 PTA partners[29], is available on HS 1996 from COMTRADE. MFN import data is also available from TRAINS and IDB for nine partners[30]. We complete MFN import data using both these sources. Preferential imports from the EU by 12 PTA partners[31], is available from COMTRADE; for four partners[32] the data is available from TRAINS or IDB. However, we do not have any data for preferential imports for eight partners[33] form either source. Using, COMTRADE we take exports from the EU to partners to get an approximation of imports from the EU by these partners. But since the COMTRADE's exports data is on FOB (free on board) basis and imports data is on CIF (Cost insurance and freight) basis, we have to make adjustments for this difference[34]. After having data on $M_{z,t}^{k,EU}$, $M_{z,t}^{k,Total}$, it is simple to construct $s_{zt}^{k,EU}$. Using the data on $s_{zt}^{k,EU}$, $MFN_{z,t}^{k}$ and $PRF_{z,t}^{k,EU}$ we can construct the reciprocity offered by partner *k* i.e. $\left(-\Delta mop_{z,t}^{k,EU}\right)* s_{z,t}^{k,EU}$. It is now straightforward to construct the reciprocity variable of our interest i.e. $Recp_{z,t}$ for the 'PRF region'.

6 Key Econometric Issues

6.1 Endogenity - MFN and preferential tariffs

Literature suggests, that we should be cautious in interpreting the OLS and FE estimates from equation (5) and (6) as causal because causality may also run from preferential tariffs to MFN tariffs; this may be due to the fact that the preferential rates are decided on the basis of the MFN tariffs. So, there may be a reverse causality from the EU's preferential tariffs to the EU's MFN tariffs. In the particular setting for the EU, we argue in the next two paragraphs absence of endogenity on account of MFN variable.

[29] Albania (1996-2007), Algeria (1996-2007), Chile (1997-2007), Croatia (1997-2007), Israel (1996-2006), Jordan (1998-2007), Lebanon (1997-2007), Mexico (1996-2007), Morocco (2002-2007), South Africa (1997-2006), Tunisia (2000-2007) and Turkey (1996-2006).

[30] Chile (1995, 1996), Egypt (1995, 1997-2005 and 2007), Israel (2007), Mexico (1995), Morocco (1997, 2001), South Africa (1996, 2007), Switzerland (1996-2007), Tunisia (1995, 1998) and Turkey (1995, 2007).

[31] Albania (1996-2007), Algeria (1996-2007), Chile (1997-2007), Croatia (1997-2007), Israel (1996-2006), Jordan(1998-2007), Lebanon (1997-2005, 2007), Mexico (1996-2007), Morocco (2002-2007), South Africa (1997-2007), Tunisia (2000-2007) and Turkey (1996-2006).

[32] Egypt (2005), Israel (2007), Switzerland (1996-2007), and Turkey (2007).

[33] Egypt (1995-2004, 2006, 2007), Jordan (1995-1997), Lebanon (1995, 1996), Morocco (1995-2001), South Africa (1995, 1996), Switzerland (1995), Tunisia (1995-1999) and Turkey (1995).

[34] As per WITS, the FOB figures are approximately 5% to 10 % lower than the corresponding CIF figures. We take a factor of 6% to convert FOB values to CIF values.

The bound rates commitments of the EU were known by the end of the Uruguay Round (1994) to all the member of the WTO. In addition, the EU's applied tariffs on most of the products (98.4% products) are equal to its bound tariffs. Therefore, the EU's applied MFN rates were known to the world by the end of 1994. As agreed in the tariff reduction schedule with the partners, the reduction on import tariffs is based on current applied rates (or base rate)[35] . For example, in *EU-Morocco Agreement*, the EU has agreed not to impose any tariffs on industrial products originating in Morocco from the date of implementation of the agreement (01.03.2000). For Agricultural and Fishery products, the EU has agreed to apply the tariff reduction schedule given in Protocol 1 and 2 respectively. Protocol 1 gives the reduced tariffs on Moroccan agricultural products as x% of applied MFN tariff of EU with tariff rate quota restrictions. Similarly, the reduction in tariffs in fishery products is again based MFN applied tariffs.

As the EU's bound rate commitments, hence applied MFN rates were known before the PTA was signed, it is clear that the MFN applied rates affect the EU's preferential tariff rates, but the reverse is not true. Therefore, we argue that there is no reverse causality from preferential tariffs to MFN tariffs in our estimation equations (5) and (6).

6.2 Endogenity - Reciprocity variable and preferential tariffs

Literature, suggests that second cause of reverse causality could be that the preferential tariffs ($PRF_{z,t}$) may affect the reciprocity variable ($Resp_{z,t}$) . To better understand the endogenity issue, let us refer to the standard text book[36] example of following equation:

$$y_{1,it} = y'_{2,it}\,\beta_1 + x'_{1,it}\,\beta_2 + u_{it} \qquad (7)$$

$y_{1,it}$ is a scalar dependent variable, which depends on *m* endogenous regressors, denoted by y_2 and K_1 exogenous regressors (including an intercept) denoted by x_1, with $i = 1, ..., N$ and $t = 1, ...T$. If, the regression errors u_{it} are uncorrelated with $x_{1,it}$ but are correlated with $y_{2,it}$, then OLS/FE estimators are inconsistent for β and there is a problem of endogenity. In that case, we have to tackle endogenity with proper instruments using instrument variables (IV) regression.

[35] For most of the EU's PTAs, the base rate (or basic duty) has been defined in the text of Agreements. This is equal to the applied rate in a particular year, generally in the year immediately before the PTA.
[36] Refer Microeconometrics by Cameron and Trivedi (2005) or any other standard text book on econometrics.

But if the error term u_{it} are uncorrelated with the regressors $y_{2,it}$ and $x_{1,it}$, we can estimate the equation (6) using the OLS or FE methods without using the instruments. If the regressors $y_{2,it}$ are exogenous and we treat them as endogenous, then the IV estimate is still consistent, but they can be much less efficient than the OLS or FE estimators. We argue in the following paragraphs the absence of reverse causality in our model.

A careful comparison of preferences extended by the EU and the reciprocal market access, shows that the exchange of concessions by the EU with its partners is not on *'one-to-one'* basis. The PTAs are agreed as a package, in which there are not only agreements on tariff elimination on goods, but commitments by both the partners in the other areas[37] as well. Even if, we restrict ourselves to the goods commitment schedule, we find that the EU being larger partner has agreed to zero import duties on industrial goods[38] *w.e.f.* from the date of implementation of the PTA, with the expectation from the other partners to reduce its tariffs in a yearly phased manner. For example, in all seven EU-Mediterranean Agreements[39] and two Stabilization and Association Agreements[40], the EU reduces its applied tariff to zero on all industrial goods from the date of implementation of PTA. The smaller partners are expected to reduce their import duties for EU products in a phased manner, sometimes extended upto 10 years. This kind asymmetrical liberalization is referred as '*less than full reciprocity*' in negotiating parlance. Such asymmetrical liberalization is common in PTA involving a large and a smaller economy.

On the other hand, the agriculture and fisheries products[41], which are highly protected in most of the countries, there is limited liberalization of trade from both sides. But the principal of '*less*

[37] In particular, there are commitments from both the PTA partners on rules of origin, sanitary and phytosanitary measures, commitments on services, financial services, commitments on government procurement, agreements on current payments and capital movement.

[38] Industrial goods are defined as products of HS chapters 25-97 not covered by definition of agricultural products.

[39] The nine partners are-- Algeria, Egypt, Israel, Jordan, Lebanon, Morocco, Palestinian Authority, Syria and Tunisia. But due to data constraints on Palestinian Authority and Syria, we include only other seven agreements in the present study.

[40] EU's Stabilization and Association Agreements are with Macedonia, Croatia, Albania, Montenegro, Bosina and Herzegovina. As the last two agreements are very recent (both finalized in 2008), we do not include them in the present study. Due to data constraints on Macedonia also, we leave it from the scope of present study.

[41] Agricultural and fisheries products are defined as products listed in chapters 1 to 24 of HS code, with the addition of any product listed in Annex I to the WTO Agreement on Agriculture. This definition also includes fish and fisheries products covered by chapter 3, headings 1604 and 1605, and sub-headings 051191, 230120 and ex 190220. There is a slight difference in the definition of Agricultural Goods in EU's agreements compared to the WTO Agreement on Agriculture. The EU's definition, in general, has fisheries products under the Agricultural products, whereas at WTO negotiations, fisheries are part of non-agricultural products.

than full reciprocity' is still observed with the EU liberalizing its tariffs at a faster pace than the partners. Nonetheless, the exchange of preferences is again complementary and not '*one-to-one*' product-basis. In other words, the EU exchanges preferences for the products that it can export to the partners. Similarly, the partners are interested in getting preferential treatment on the products that they can export to the EU i.e. the exchange of preferences is not *'apples with apples'*, but *'apples with oranges'*.

For example, under *EU- Morocco Agreement*, the EU gets preferential access in Morocco's market for Chapter 1 products '0102 10 : Live bovine animals; pure-breeding animals and 0105 11: Live fowls of the species *Gallus domesticus*, of a weight not exceeding 185g' , but Morocco does not get preference in the EU market on the same products. Instead, Morocco gets preference in '0101 19 10: Horses for slaughter, 0101 19 90: Other horses'. Similar exchange of preferences is observed in other PTAs as well. Moreover, since we are aggregating all the preferential partners into one 'PRF region', the scope for endogenity gets further diluted.

In brief, we conclude that there is no problem of endogenity on account $PRF_{z,t}$ variable vis-à-vis either $MFN_{z,t}$ or $Resp_{z,t}$ variable and we can estimate equations (5) and (6) using OLS and FE estimation methods.

7 Empirical Results

7.1 Estimation Results

The results of estimating equations (5), (6) and (7) are reported in Table 1[42]. Each entry of the table reports the estimated coefficients and standard errors clustered at the product level. The column 1 estimates equation (5) using pooled OLS. The column 2 estimates equation (5) using FE model; while column 3 estimates equation (6). In column 4 to 7, we control for four quarters of MFN tariff and reciprocity variable as well as the GSP variable. In subsequent paragraphs, we discuss the results of column 1 to 7.

[42] In *column 1* and *2*, *MFN_i1* denotes the MFN variable. In *column 3* dependent variables MFN_*i1* and *MFN_i2* denotes MFN tariffs below and above *7.0%* , respectively . *Recp_i1* denote reciprocity variable in *column 1* and *2* . In *column 3* and *6,* the dependent variables *Recp_i1, Recp_i2* denote reciprocity below and above the cut-off level of *4.06*. Similarly, *MFN_i1, MFN_i2, MFN_i3* and *MFN_i4* denote the four quarters of MFN tariff in *column 4 to 7* and *Recp_i1, Recp_i2, Recp_i3 and Recp_i4* denote the four quarters of reciprocity variable in *column 7*.

In column 1 specification, the data is available for 66,547 year-product observations. The number of dependent variables is 15 as we also control for time dummies for 12 years. However, because of missing observations the number of observations used in the regression is 65,023. The estimated coefficient for the MFN tariff is positive (less than one) and significant, a result that supports the hypothesis that lower (higher) MFN tariffs would lead to lower (higher) preferential tariffs. The reciprocity coefficient is negative and significant, which does not seem to support our hypothesis. The estimated coefficient for GSP variable is negative and significant, supporting that the EU values non-reciprocal preferences while deciding preferential tariffs. The consistency of OLS[43] requires that the composite error term is uncorrelated with the dependent variables, but it ignores any heterogeneity over products. For our data set, it is highly unlikely that the product specific effects D_z are uncorrelated with the $MFN_{z,t}$ and $Recp_{z,t}$ or $GSP_{z,t}$ variables. Therefore, pooled OLS is inconsistent in the fixed effects model and we re-estimate (5), (6) and (7) using the FE model in column 2 to 7.

In column 2, we estimate model (5) taking advantage of panel structure of our dataset. The data is available for 5119 products for 13 years (1995 to 2007), but due to missing observations, the number of observations used is 65,023. The number of dependent variables is 15, as we also control for the time dummies for 12 years. According to these estimates, the coefficient for MFN tariff is positive (0.037), but insignificant. The estimated coefficient of reciprocity is also insignificant, although negative. However, the GSP coefficient is significant and negative implying that GSP matters for the EU in deciding the preferential tariffs. The reason for coefficient of MFN variable being insignificant is that the EU protects the products with higher MFN tariffs in PTAs too. The insignificant preferential access on products with higher MFN tariffs biases our estimates. This will become clearer in subsequent estimations, when we segregate the MFN variable into more than one segment. We shall also observe that the higher reciprocity does not matter for preferential tariffs. The present estimates get downward bias due

[43] The pooled *OLS* estimator are motivated from the individual-effects model by rewriting equation (5) as the pooled model $y_{z,t} = D + x'_{z,t}\beta + (D_z - D + \varepsilon_{z,t})$. Any time-specific effects are assumed to be fixed and already included as time dummies in the regressors $x'_{z,t}$. The model explicitly includes a common intercept, and the individual effects $(D_z - D)$ are now centered on zero. Consistency of OLS requires that the error term $(D_z - D + \varepsilon_{z,t})$ be uncorrelated with $x'_{z,t}$. So the pooled *OLS* is inconsistent in FE model, as D_z is correlated with $x'_{z,t}$ (refer p703, Microeconometrics by Cameron and Trivedi (2005) for details).

the higher reciprocity offered on certain products. These effects get isolated, only when we control for lower and higher reciprocity in columns 3 to 7.

In column 3, both the MFN coefficients are insignificant, while the coefficient for the lower MFN tariff (*MFN_i1*) is negative, the coefficient for the higher MFN tariff (*MFN_i2*) is positive. This seems to imply that the MFN tariff does not matter in formation of preferential tariff, which however is not the case. Both the coefficients of reciprocity are insignificant, as was in case of the MFN variable. We shall observe in subsequent columns that the EU's response to the MFN tariff and the reciprocity are different in different quarter of values. The coefficient for GSP variable is -1.001 and is highly significant, which implies that if a product gets GSP, then its tariff is lesser by 1.001 percent point as compared to the product that does not get GSP benefit. This supports our initial hypothesis that GSP matters in deciding preferential tariffs. The idea is simple to understand. The GSP preferences are non-reciprocal by definition and the tariffs on GSP products are either zero or very close to zero. Since, the EU has already lowered its tariffs on GSP products for many developing countries; it can easily reduce tariffs on the same products without incurring any additional costs.

The coefficients in column 4 to 7 provide consistent estimates of coefficients of interest and are similar in sign and significance. The final estimates in Table1 control for all possible quarters of $MFN_{z,t}$ and $Recp_{z,t}$ variables, so in the next paragraph we discuss in detail the results of column 7.

The estimated coefficient for *MFN_i1* is negative and highly significant, whereas the coefficients for *MFN_i2* and *MFN_i3* are positive and significant, but coefficient for *MFN_i4* is insignificant which is along the expected lines of our initial hypothesis. To understand the implications, let us consider the upper cut-off for the first three quarters. The upper cut-off values for variables *MFN_i1, MFN_i2* and *MFN_i3* are 3.8%, 7.0% and 14.0% respectively. A coefficient of -0.117 for *MFN_i1* implies that for products with MFN tariff less than 3.8%, keeping other variables constant, if the MFN tariff is increased by one percent point; the EU reduces preferential tariffs by 0.117 percent point. Coefficient of 0.087 for *MFN_i2,* implies that for products with MFN tariff between 3.8% to 7.0%, the EU increases preferential tariff by 0.087 percent point for one percent point increase in MFN tariff. Similarly, the coefficient of 0.273 for *MFN_i3* implies that for MFN tariffs between 7.0% and 14.0%, the EU increases preferential tariff by 0.273

percent point for one percent point increase in MFN tariffs. But when the MFN tariffs are higher than 14.0% (for *MFN_i4*), the increase in preferential tariff is not significant. We also notice an increasing trend[44] in coefficients for MFN variables as the tariff gets higher in first three quarters. In nutshell, we note that the products with a higher preferential tariff are the products with a higher MFN tariff.

The estimated coefficients for *Recp_i1, Recp_i2* and *Recp_i4* are insignificant, whereas the coefficient for Recp*_i3* is highly significant. The upper cut-offs for *Recp_i1, Recp_i2,* and *Recp_i3* are 2.30, 4.06 and 8.16 respectively. The reciprocity in the first two quarters does not seem to influence the preferential tariff, but when the 'PRF region' shows somewhat higher reciprocity and its value is in the third quarter, a one percent increase in reciprocity will lead to reduction in preferential tariff by 0.131 percent. However, when excessive reciprocity (higher than 8.16) is shown, it does not seem to correspondingly affect the preferential tariffs. This supports our initial hypothesis that reciprocity matters, but not beyond a limit. The logic is simple to understand. For example, if the EU applies zero preferential tariffs on some industrial products, but reduction on agricultural tariffs is limited. Further, the access to the EU market is limited by tariff rate quota in most of the agricultural products. A higher reciprocal market access[45] by the 'PRF region' in agricultural products may not lead to lower preferential tariff to the EU market.

The estimated coefficient for *GSP* variable again supports the initial hypothesis that GSP matters in preferential tariff formation.

7.2 Extensions and Additional Results

To corroborate the results presented in the previous sub-section, we do additional tests to see if the EU allows more preferential access for industrial products than for the agricultural products[46,47,48]. In Table 2 regressions, we control for four quarters of MFN tariff on both the

[44] In column 7, the coefficient for *MFN_i1* is lower than coefficients for *MFN_i2 and MFN_i3;* coefficient for *MFN_i2* is lower than coefficient for *MFN_i3* but higher than the coefficient for *MFN_i1*; coefficient for *MFN_i3* is the highest among *MFN_i1, MFN_i2* and *MFN_i3*. The coefficient for *MFN_i4* is insignificant.

[45] For example, the EU protects '*060310:* cut flowers' for its domestic producers. It does not mean that higher preferential access *by* Tunisia *to* EU in Tunisian cut flower market will be lead to higher preferential access *by* the EU *to* Tunisia in the EU's cut flower market.

[46] The EU's average applied tariff on industrial products is *4.0%* and on agricultural products is *18.6%.*

agricultural and the industrial products. For doing this we construct eight indicator variables, four each for agricultural and industrial products. The technique of creating the indicator variables is the same as in the previous sub-section; the only difference is that here we take separate[49]quarters for agricultural and industrial products.

The result of regressing the dependent variable $PRF_{z,t}$ on four quarters of MFN tariff each for agricultural and industrial products are given in column 1 of Table 2. In next three columns, we also control for other determinants of preferential tariff. The other dependent variables we include are reciprocity and GSP. We get consistent estimates in all our regressions. Since, column 4 includes all variables of our interest; we discuss here only those results.

The coefficient for the first quarter of agricultural sector (*MFN_af_i1*) is insignificant although positive implying that keeping other variables constant for products with MFN tariff in the range 0% to 7.9%; the preferential tariff remains constant at 3.82%. For the second and third quarters (*MFN_af_i2, MFN_af_i3*), the coefficients are positive and highly significant. In the second quarter (i.e. 7.9%-15.16%), as the MFN tariff increases by one percent point, the preferential tariff increases by 0.247 percent point. In the third quarter (i.e. 15.16%-58.64%), the one percent point increase in MFN tariff leads to 0.241 percent point increase. However, the coefficient for the fourth quarter (*MFN_af_i4)*, is insignificant[50], implying that for MFN tariff above 58.64%, the preferential tariff remains constant at 35.65%, which is not sufficiently lower to give a meaningful preferential access. In short, we observe different response of the EU in four quarters of agriculture sector. This confirms that as the MFN tariff increases, the preferential tariff also

[47] Industrial products are defined as those listed in Chapter 25 to 97 with the exception of the products listed in Annex I, § 1 (ii) of the WTO Agreement on Agriculture.
[48] refer footnote 42.
[49] We divide the year-wise MFN tariff on agricultural products into four quarters (0%-7.9%, 7.9%-15.16%, 15.16%-58.64% and above 58.64%; the upper limits are included in the four ranges) , to generate four indicator variables $af\_i1_{z,t}, af\_i2_{z,t}, af\_i3_{z,t}, and\ af\_i4_{z,t}$. The indicator variable $af\_i1_{z,t}$ is equal to one, if $MFN_{z,t}$ falls in the first quarter of MFN tariffs on agriculture sector in year *t*, otherwise $af\_i1_{z,t}$ is zero. The indicator variable $af\_i2_{z,t}$ is equal to one, if $MFN_{z,t}$ falls in the second quarter of MFN applied tariffs on agricultural sector in year *t*, otherwise $af\_i2_{z,t}$ is equal to zero. The other two indicator variables are defined accordingly. We interact these variables with $MFN_{z,t}$ to construct *MFN_af_i1, MFN_af_i2, MFN_af_i3* and *MFN_af_i4* . Similarly, we construct *MFN_na_i1, MFN_na_i2, MFN_na_i3* and *MFN_na_i4* for the industrial sector. The four quarters for industrial tariffs are : 0%-3.7%, 3.7%-6.5%, 6.5%-12.0% and above 12.0%, upper limit in each quarter is again included in four ranges.
[50] The coefficient for *af_i4* is 31.27 and is highly significant. The common constant term is 4.38. So the constant term for the fourth quarter *MFN_af_i4* is 35.65.

increases and for the highly protected agricultural products, there is almost no preferential treatment.

On the other hand, we notice a slightly different trend for industrial products. The coefficient for the first quarter is -0.234 and highly significant, implying that in the tariff range 0% to 3.7%, as the MFN tariff becomes higher the EU reduces its preferential tariff. For the second (i.e. 3.7% - 6.5%) and the third quarter (i.e. 6.5% -12%), both the coefficients are insignificant, implying that the preferential tariff remains constant[51,52] at 2.66% and 2.51% respectively. For the fourth quarter, the coefficient is 0.101 and it is highly significant, implying that when the MFN tariff is above 12%, a one percent point increase causes an increase of 0.1% in preferential tariffs. In other words, the preferential tariff increases as the MFN tariff increases in this quarter.

The estimated coefficients for *Recp_i1, Recp_i2* and *Recp_i4* are insignificant, whereas the coefficient for *Recp_i3* is highly significant. This proves that reciprocity may not matter initially, but that it matters only up to a limited level. The extreme reciprocity shown does not seem to have any impact on preferential tariff formation. Again, the coefficient for GSP variable is negative and highly significant, implying that GSP matters, when the EU decides about the level of preferential tariffs.

Overall, we conclude from Table 2 that the EU gives better preferential access on products with lower MFN tariffs, which are mainly in industrial sector. The reciprocity shown by partner matters but not beyond a limit. In case a product is covered under the GSP, its preferential tariff is smaller compared to a similar product that does not get GSP benefit. In other words, the results support our two initial hypotheses -- first, the high MFN tariff products do not get better preferential treatment, even at the preferential level; second, the reciprocity matters, but not beyond a limit.

[51] The constant term for column 4 is 3.83, and the coefficient for na_i2 is -1.26. Both these coefficients are highly significant.
[52] The constant term for column 4 is 3.83, and the coefficient for na_i3 is -1.37. Both these coefficients are highly significant.

7.3 Sensitivity Analysis

We now test the sensitivity of our estimates and do additional robustness tests. We consider an alternative sample of data. We re-estimate equations (5), (6) and (7) using data only for the EU's developing partners. The time period for this data-set is 1998 to 2007[53] and the results are reported in Table 3 and 4. In the following paragraphs, we compare these results with the estimates in Table 1 and 2, respectively.

First, we compare the final column estimates in Table 3 with corresponding estimates in Table 1. The coefficients for the first three quarters of MFN tariff have the similar sign and significance as in earlier estimates. Unlike Table 1, now the coefficient for the fourth quarter (*MFN_i4*) is significant but negative. This implies that for the developing partners, the EU is ready to reduce the MFN tariffs even on the highly protected products (i.e. MFN above *13.2%*). Since the tariffs are already high in the fourth quarter, the notional cuts may not create market access for developing partners. Therefore, the market access for products with higher MFN tariffs remains elusive, confirming our initial hypothesis that the highly protected products do not get higher preferential access. With regard to the reciprocity variable, though the signs of four quarters are not the same in both the tables, yet the overall interpretation remain the same. In Table 3, the last quarter coefficient changes sign, implying thereby that the extreme reciprocity does not help in preferential tariff reduction. Another interesting difference from Table 1 is that the coefficient of GSP is insignificant. This can be explained easily as all the developing partners are already beneficiary of the GSP program.

Finally, we corroborate the results of Table 2 from Table 4 for developing country. Like Table 2, here also, we control for four quarters[54] of MFN tariff on agricultural and industrial products

[53] EU signed first PTA with any developing country in 1998 i.e. with Tunisia. Then EU signed PTAs with Israel (2000), Mexico (2000), Morocco (2000) , South Africa (2000), Jordan (2002), Chile (2003), Lebanon (2003), Egypt (2004), Algeria (2005), Croatia (2005) and Albania (2006). For our study we consider Turkey (1995), which is having Customs Union with the EU only in industrial products, as developed country. The other developed countries having PTA with the EU are Iceland, Norway and Switzerland. Therefore, we drop Turkey, Norway, Iceland and Switzerland to construct our sample of developing countries for sensitivity analysis in this sub-section. Recall, in Table1 the time period is 1995-2007.

[54] We divide the year-wise MFN tariff on agricultural products into four quarters (*0%-7.57%, 7.57%-14.44%, 14.44%-52.95%* and above *52.95%*; the upper limits are included in the four ranges). Four indicator variables are defined accordingly. We interact these variables with $MFN_{z,t}$ to construct *MFN_af_i1, MFN_af_i2, MFN_af_i3* and *MFN_af_i4* . Similarly, we construct *MFN_na_i1, MFN_na_i2, MFN_na_i3* and *MFN_na_i4* for the industrial

separately. Again we compare final columns of two tables, since it contains all the coefficients of our interest. For agricultural sector, the first quarter coefficient is highly significant and positive, showing that the preferential tariff increases with the MFN tariff. The next two quarters coefficients are insignificant showing that MFN tariff does not matter in this range while deciding the level of preferential tariff. In the last quarter one percent point increase in MFN tariff results in reduction in preferential tariff by 0.019%. Since, the tariffs are already very high in this quarter; a slight decrease does not make any difference so far as the partners' market access is concerned. For industrial products, the preferential tariff increases with the MFN tariff in the second and third quarters. However, for first and fourth quarters, the coefficients are negative although significant. In the first quarter the MFN tariffs are already less than 3%, so any reduction as the MFN tariff increases does not make much difference. Similarly, in the case of MFN tariff higher than 12 %, the decrease in preferential tariff of industrial products does not give real market access to the developing partner. Overall, we conclude that the higher MFN products do not get high preferential treatment in the EU market. This conclusion is again similar to the corresponding results in Table 2. So far as the reciprocity variable is concerned, the second and fourth quarter coefficients are significant. The coefficient for the second quarter is positive while the coefficient for the fourth quarter is negative; again showing that the reciprocity matters up to a certain level but the extreme reciprocity do not matter in getting better preferential access. The coefficient for *GSP* variable is insignificant as is the case in Table 3, confirming our finding that when the EU negotiates with developing countries, it does not take into account whether the product gets GSP or not.

8 Conclusion

We have tried to empirically address two important questions on EU's preferential tariff formation. First*,* does the EU liberalise more in preferential agreements on the products on which it has lower MFN tariff. In other words, does the EU protect more from its preferential partners the products that it protects at the MFN level? Second, whether reciprocity matters for the EU in deciding preferential tariff, and if the answer to this question is yes, to what extent?

sector. The four quarters for industrial tariffs are : *0%-3.13%, 3.13%-6.2%, 6.2%-12.0%* and above *12.0%,* upper limit in each quarter is again included in four ranges.

We have shown that the EU's preferential tariff depends significantly on three quantifiable variables – MFN applied tariff, reciprocity shown by the partners, and the GSP program. We draw three important conclusions from our results. First, the products that are less protected at the MFN level get better preferential access to the EU market; and highly protected products in agricultural, fisheries or textiles products do not get high preferential access. For most protected products the preference is almost close to zero, i.e. there is no reduction in high MFN tariffs in the PTAs. Second, the reciprocity matters in getting better preferential access, but it can play only a limited role. The higher reciprocity does not always imply a better preferential treatment by the EU. Third, non-reciprocal preferences extended under the GSP scheme matter when the EU decides preferential tariffs for the developed partners, but it does not matter when the EU negotiates with developing partners.

For this study, we have constructed a rich data-set using WITS and careful reading of legal documents of the EU's eleven preferential agreements. The data that we have constructed from the PTAs' legal documents is unique as even the international organizations (WTO, UNCTAD or ITC) do not have such a data-set at the time of writing this paper. In addition, to our knowledge, there is no such study that looks into the preferential tariff formation of the EU, which is the biggest traders and have the highest number of PTAs in the world.

9 References

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Table 1

The Determinants of the EU's Preferential Tariff

	All Partners (1995-2007)	All Partners (1995-2007)	All Partners (1995-2007)	All Partners (1995-2007)	All Partners (1995-2007)	All Partners (1995-2007)	All Partners (1995-2007)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
PRF#	OLS	FE	FE	FE	FE	FE	FE
MFN_i1	0.084***	0.037	-0.030	-0.122***	-0.122***	-0.122***	-0.121***
	(0.022)	(0.027)	(0.029)	(0.024)	(0.024)	(0.024)	(0.025)
MFN_i2			0.037	0.061	0.088**	0.090**	0.087**
			(0.027)	(0.032)	(0.031)	(0.033)	(0.032)
MFN_i3				0.232***	0.258***	0.261***	0.273***
				(0.042)	(0.042)	(0.044)	(0.045)
MFN_i4				0.036	0.036	0.033	0.033
				(0.027)	(0.027)	(0.026)	(0.026)
Recp_i1	-0.062*	-0.009	0.000			-0.014	0.052
	(0.026)	(0.012)	(0.034)			(0.034)	(0.062)
Recp_i2			-0.010			-0.009	-0.026
			(0.013)			(0.013)	(0.040)
Recp_i3							0.131***
							(0.037)
Recp_i4							-0.011
							(0.014)
gsp	-1.223***	-1.005***	-1.001***		-1.023***	-1.012***	-1.008***
	(0.137)	(0.108)	(0.107)		(0.108)	(0.107)	(0.106)
_cons	3.797***	4.218***	4.392***	3.795***	4.701***	4.624***	4.670***
	(0.419)	(0.400)	(0.366)	(0.314)	(0.391)	(0.393)	(0.402)
N	65023	65023	65023	65148	65148	65023	65023
n		5102	5102	5102	5102	5102	5102
k	15	15	19	19	20	23	27
Product FE	No	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Period	1995 to 2007	1995 to 2007	1995 to 2007	1995 to 2007	1995 to 2007	1995 to 2007	1995 to 2007
F (*k, N-n-k*)	194.871	194.926	158.051	181.899	165.528	147.467	128.349
rho		0.214	0.211	0.171	0.169	0.187	0.187
r2_a	0.119						
r2_w		0.046	0.046	0.049	0.054	0.053	0.053

Standard errors in parentheses and are clustered at the product level.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

N= number of observations, *n*= number of groups, *k*= number of dependent variables.

Note:

i) # PRF (the dependent variable $PRF_{z,t}$): Simple average of preferential tariffs applied by the EU on all of its partners trading on preferential basis at six digit HS 1996 product *z* at time *t*.

ii) The dependent variable (PRF) is regressed on

(a) MFN: Simple average of MFN applied tariff by the EU on product *z* at time *t* on six digit HS 1996 classification. MFN_i1 to MFN_i4 are year-wise quartiles of MFN tariffs. In case of regressions only with MFN, MFN_i1 denotes MFN variable. Similarly, in case of regressions with MFN_i1

and MFN_i2 variables, MFN_i1 denotes MFN tariffs below median and MFN_i2 denotes MFN tariffs above the median value in year *t*.

(b) Recp : Sum of reciprocal preferences extended by partner *c* on all products except *z* at time *t*. Recp_i1 to Recp_i4 are year-wise quartiles of reciprocity variable. In case of regressions with reciprocity without any quarters, Recp_i1 denotes reciprocity variable. Similarly, in case of regressions with Recp_i1 and Recp_i2 variables, Recp_i1 denotes reciprocity below median and Recp_i2 denotes reciprocity above the median value in year *t*.

(c) GSP: is a dummy variable i.e. GSP = 1 if product *z* gets GSP benefit in the EU market at time *t* . GSP =0 if product *z* is not covered under the GSP program of the EU at time *t*.

iii) We use simple average of applied ad valorem tariffs for all products at six digit level. For the products with specific duties, we calculate ad-valorem equivalents as given in WITS by using the NAMA methodology.

iv) The figures reported in the top-panel of the table are estimated coefficients. The standard errors (se) are in the brackets and are clustered at product level. The significant *t*-values are marked by asterisks at acceptable level of significance.

v) *Constant*: Stata fits a model, in which the D_z (i.e. individual specific fixed effects) are taken as deviations from one constant term, displayed as _cons.

vi) R^2 (within) is reported in the fourth last row. Stata command *xtreg, fe* obtains its estimates by performing OLS on transformed model, so the R^2 reported do not have all the properties of the OLS R^2.

vii) *rho* values estimate that 16.9% to 21.4% of variation in preferential tariff (i.e. dependent variable , PRF) is due to the product specific differences D_z .

viii) F ($n-1$, $N-n-k$): F- test provides a test of the null hypothesis H_o that all $D_z = 0$. In other words, we wish to test whether the individual specific heterogeneity of D_z is necessary i.e. are there distinguishable intercept terms across units? A rejection of this H_o indicates that pooled OLS would produce inconsistent estimates.

ix) F (k, $N-n-k$): F-statistics to test the null H_o that the coefficients on the regressors (dependent variables) are jointly zero i.e. whether our model is overall significant. A rejection of H_o implies that our model is overall significant. The F-statistic in all the cases shows high significance level for our model as a tool to explain the important ingredients of preferential tariff formation of the EU.

Table 2

The Determinants of the EU's Preferential Tariff

	All Partners (1995-2007)	All Partners (1995-2007)	All Partners (1995-2007)	All Partners (1995-2007)
	(1)	(2)	(3)	(4)
PRF#	FE	FE	FE	FE
MFN_af_i1	0.182	0.170	0.179	0.180
	(0.103)	(0.103)	(0.103)	(0.103)
MFN_af_i2	0.247**	0.232**	0.247**	0.247**
	(0.079)	(0.078)	(0.080)	(0.080)
MFN_af_i3	0.243***	0.245***	0.241***	0.241***
	(0.061)	(0.061)	(0.060)	(0.060)
MFN_af_i4	-0.008	-0.008	-0.009	-0.009
	(0.018)	(0.018)	(0.018)	(0.018)
MFN_na_i1	-0.240***	-0.236***	-0.235***	-0.234***
	(0.026)	(0.025)	(0.025)	(0.025)
MFN_na_i2	-0.001	0.024	0.025	0.019
	(0.034)	(0.031)	(0.031)	(0.032)
MFN_na_i3	-0.068*	-0.038	-0.039	-0.026
	(0.031)	(0.029)	(0.029)	(0.028)
MFN_na_i4	0.108**	0.103**	0.102**	0.101**
	(0.033)	(0.031)	(0.031)	(0.031)
Recp_i1			-0.012	0.060
			(0.033)	(0.060)
Recp_i2			-0.003	-0.039
			(0.009)	(0.038)
Recp_i3				0.133***
				(0.038)
Recp_i4				-0.008
				(0.011)
gsp		-0.920***	-0.908***	-0.904***
		(0.098)	(0.096)	(0.096)
_cons	3.828***	4.628***	4.557***	4.620***
	(0.324)	(0.397)	(0.404)	(0.416)
N	65148	65148	65023	65023
n	5102	5102	5102	5102
k	26	27	30	34
Product FE	No	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes
Period	1998 to 2007	1998 to 2007	1998 to 2007	1998 to 2007
F (*k, N-n-k*)	171.315	162.171	148.654	133.449
rho	0.174	0.172	0.187	0.187
r2_w	0.131	0.135	0.134	0.134

Standard errors in parentheses and are clustered at the product level.
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$, *N*= number of observations, *n*= number of groups, *k*= number of dependent variables.

Note:

i) # PRF (the dependent variable $PRF_{z,t}$): Simple average of preferential tariffs applied by the EU on all of its partners trading on preferential basis at six digit HS 1996 product *z* at time *t* .

ii) The dependent variable (*PRF*) is regressed on

(a) *MFN*: Simple average of MFN applied tariff by the EU on product *z* at time *t* on six digit HS 1996 classification. MFN_af_i1 to MFN_af_i4 are year-wise quartiles of MFN tariffs on agricultural products. MFN_na_i1 to MFN_na_i4 are year-wise quartiles of MFN tariffs on industrial products.

(b) *Recp*: Sum of reciprocal preferences extended by partner *c* on all products except *z* at time *t*. Recp_i1 to Recp_i4 are year-wise quartiles of reciprocity variable. In case of regressions with reciprocity without any quarters, Recp_i1 denotes reciprocity variable. Similarly, in case of regressions with Recp_i1 and Recp_i2 variables, Recp_i1 denotes reciprocity below the median and Recp_i2 denotes reciprocity above the median value in year *t*.

(c) GSP: is a dummy variable i.e. GSP =1 if product *z* gets GSP benefit given by EU to any partner at time *t* . GSP =0 if product *z* is not covered under the GSP program of EU at time *t*.

iii) We use simple average of applied ad valorem tariffs for all products at six digit level. For the products with specific duties, we calculate ad-valorem equivalents as given in WITS by using the NAMA methodology.

iv) The figures reported in the top-panel of the table are estimated coefficients. The standard errors (se) are in the brackets and are clustered at product level. The significant *t*-values are marked by asterisks at acceptable level of significance.

v) *Constant*: Stata fits a model, in which the D_z (i.e. individual specific fixed effects) are taken as deviations from one constant term, displayed as _cons.

vi) R^2 (within) is reported in the fourth last row. Stata command *xtreg, fe* obtains its estimates by performing OLS on transformed model, so the R^2 reported do not have all the properties of the OLS R^2.

vii) *rho* values estimate that 17.2% to 18.7% of variation in preferential tariff (i.e. dependent variable , PRF) is due to the product specific differences D_z .

viii) *F* (*n-1, N-n-k*): *F*- test provides a test of the null hypothesis H_o that all $D_z = 0$. In other words, we wish to test whether the individual specific heterogeneity of D_z is necessary i.e. are there distinguishable intercept terms across units? A rejection of this H_o indicates that pooled OLS would produce inconsistent estimates.

ix) *F* (*k, N-n-k*): *F*-statistics to test the null H_o that the coefficients on the regressors (dependent variables) are jointly zero i.e. whether our model is overall significant. A rejection of H_o implies that our model is overall significant. The *F*-statistic in all the cases shows high significance level for our model as a tool to explain the important ingredients of preferential tariff formation of the EU.

Table 3

The Determinants of EU's Preferential Tariff (DCs 1998-2007)

	Developing Partners (1998-2007)	Developing Partners (1998-2007)	Developing Partners (1998-2007)	Developing Partners (1998-2007)	Developing Partners (1998-2007)	Developing Partners (1998-2007)	Developing Partners (1998-2007)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
PRF#	OLS	FE	FE	FE	FE	FE	FE
MFN_i1	0.019**	-0.017*	0.064***	-0.145***	-0.145***	-0.132***	-0.129***
	(0.006)	(0.007)	(0.011)	(0.016)	(0.016)	(0.015)	(0.015)
MFN_i2			-0.017*	0.304***	0.305***	0.313***	0.311***
			(0.007)	(0.023)	(0.023)	(0.022)	(0.022)
MFN_i3				0.382***	0.383***	0.409***	0.410***
				(0.036)	(0.036)	(0.031)	(0.031)
MFN_i4				-0.018**	-0.018**	-0.018*	-0.018*
				(0.007)	(0.007)	(0.007)	(0.007)
Recp_i1	-0.032***	-0.002	0.037***			0.030**	0.017
	(0.007)	(0.005)	(0.011)			(0.011)	(0.020)
Recp_i2			-0.019*			-0.020*	0.063***
			(0.008)			(0.008)	(0.017)
Recp_i3							0.021*
							(0.010)
Recp_i4							-0.028*
							(0.011)
gsp	-0.070*	-0.018	-0.006		-0.028	-0.024	-0.023
	(0.032)	(0.025)	(0.026)		(0.028)	(0.025)	(0.026)
_cons	1.415***	1.661***	1.284***	1.451***	1.476***	1.363***	1.347***
	(0.091)	(0.075)	(0.083)	(0.089)	(0.095)	(0.091)	(0.088)
N	48474	48474	48474	49904	49904	48474	48474
n		5080	5080	5084	5084	5080	5080
k	12	12	16	16	17	20	24
Product FE	No	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Period	1998 to 2007	1998 to 2007	1998 to 2007	1998 to 2007	1998 to 2007	1998 to 2007	1998 to 2007
F (*k, N-n-k*)	246.487	268.301	206.787	222.666	214.718	197.431	164.969
rho		0.473	0.415	0.332	0.332	0.354	0.354
r2_a	0.081						
r2_w		0.105	0.109	0.101	0.101	0.116	0.116

Standard errors in parentheses and are clustered at the product level.
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$
N= number of observations, *n*= number of groups, *k*= number of dependent variables.

Note:

i) # PRF (the dependent variable $PRF_{z,t}$): Simple average of preferential tariffs applied by the EU on all of its partners trading on preferential basis at six digit HS 1996 product *z* at time *t*.

ii) The dependent variable (PRF) is regressed on

(d) MFN: Simple average of MFN applied tariff by the EU on product *z* at time *t* on six digit HS 1996 classification. MFN_i1 to MFN_i4 are year-wise quartiles of MFN tariffs. In case of regressions only with MFN, MFN_i1 denotes MFN variable. Similarly, in case of regressions with MFN_i1

and MFN_i2 variables, MFN_i1 denotes MFN tariffs below median and MFN_i2 denotes MFN tariffs above the median value in year *t*.

(e) Recp : Sum of reciprocal preferences extended by partner *c* on all products except *z* at time *t*. Recp_i1 to Recp_i4 are year-wise quartiles of reciprocity variable. In case of regressions with reciprocity without any quarters, Recp_i1 denotes reciprocity variable. Similarly, in case of regressions with Recp_i1 and Recp_i2 variables, Recp_i1 denotes reciprocity below median and Recp_i2 denotes reciprocity above the median value in year *t*.

(f) GSP: is a dummy variable i.e. GSP = 1 if product *z* gets GSP benefit in the EU market at time *t* . GSP =0 if product *z* is not covered under the GSP program of the EU at time *t*.

iii) We use simple average of applied ad valorem tariffs for all products at six digit level. For the products with specific duties, we calculate ad-valorem equivalents as given in WITS by using the NAMA methodology.

iv) The figures reported in the top-panel of the table are estimated coefficients. The standard errors (se) are in the brackets and are clustered at product level. The significant *t*-values are marked by asterisks at acceptable level of significance.

v) *Constant*: Stata fits a model, in which the D_z (i.e. individual specific fixed effects) are taken as deviations from one constant term, displayed as _cons.

vi) R^2 (within) is reported in the fourth last row. Stata command *xtreg, fe* obtains its estimates by performing OLS on transformed model, so the R^2 reported do not have all the properties of the OLS R^2.

vii) *rho* values estimate that 33.2% to 47.3% of variation in preferential tariff (i.e. dependent variable , PRF) is due to the product specific differences D_z .

viii) F ($n-1$, $N-n-k$): F- test provides a test of the null hypothesis H_o that all $D_z = 0$. In other words, we wish to test whether the individual specific heterogeneity of D_z is necessary i.e. are there distinguishable intercept terms across units? A rejection of this H_o indicates that pooled OLS would produce inconsistent estimates.

ix) F (k, $N-n-k$): F-statistics to test the null H_o that the coefficients on the regressors (dependent variables) are jointly zero i.e. whether our model is overall significant. A rejection of H_o implies that our model is overall significant. The F-statistic in all the cases shows high significance level for our model as a tool to explain the important ingredients of preferential tariff formation of the EU.

Table 4

The Determinants of EU's Preferential Tariff (DCs 1998-2007)

	Developing Partners (1998-2007)	Developing Partners (1998-2007)	Developing Partners (1998-2007)	Developing Partners (1998-2007)
	(1)	(2)	(3)	(4)
PRF#	FE	FE	FE	FE
MFN_af_i1	0.142**	0.142**	0.136**	0.138**
	(0.043)	(0.043)	(0.046)	(0.046)
MFN_af_i2	0.177*	0.176*	0.158	0.158
	(0.082)	(0.082)	(0.085)	(0.085)
MFN_af_i3	-0.059	-0.059	-0.057	-0.058
	(0.043)	(0.043)	(0.037)	(0.037)
MFN_af_i4	-0.019**	-0.019**	-0.019**	-0.019**
	(0.007)	(0.007)	(0.007)	(0.007)
MFN_na_i1	-0.139***	-0.140***	-0.118***	-0.124***
	(0.015)	(0.015)	(0.014)	(0.014)
MFN_na_i2	0.206***	0.207***	0.205***	0.210***
	(0.023)	(0.023)	(0.023)	(0.023)
MFN_na_i3	0.225***	0.226***	0.248***	0.252***
	(0.027)	(0.026)	(0.027)	(0.026)
MFN_na_i4	-0.037	-0.038	-0.054**	-0.053**
	(0.019)	(0.019)	(0.019)	(0.019)
Recp_i1			0.009	0.019
			(0.006)	(0.019)
Recp_i2			0.024	0.057***
			(0.014)	(0.016)
Recp_i3				0.018
				(0.010)
Recp_i4				-0.028*
				(0.011)
gsp		-0.031	-0.029	-0.027
		(0.027)	(0.025)	(0.025)
_cons	1.410***	1.438***	1.285***	1.315***
	(0.091)	(0.098)	(0.098)	(0.091)
N	49904	49904	48474	48474
n	5084	5084	5080	5080
k	23	24	27	31
Product FE	No	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes
Period	1998 to 2007	1998 to 2007	1998 to 2007	1998 to 2007
F (*k, N-n-k*)	540.049	520.786	439.314	388.854
rho	0.332	0.331	0.357	0.356
r2_w	0.106	0.106	0.124	0.124

Standard errors in parentheses and are clustered at the product level. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

N= number of observations, *n*= number of groups, *k*= number of dependent variables.

Note:

i) # PRF (the dependent variable $PRF_{z,t}$): Simple average of preferential tariffs applied by the EU on all of its partners trading on preferential basis at six digit HS 1996 product *z* at time *t* .

ii) The dependent variable (*PRF*) is regressed on

(d) *MFN*: Simple average of MFN applied tariff by the EU on product *z* at time *t* on six digit HS 1996 classification. MFN_af_i1 to MFN_af_i4 are year-wise quartiles of MFN tariffs on agricultural products. MFN_na_i1 to MFN_na_i4 are year-wise quartiles of MFN tariffs on industrial products.

(e) *Recp*: Sum of reciprocal preferences extended by partner *c* on all products except *z* at time *t*. Recp_i1 to Recp_i4 are year-wise quartiles of reciprocity variable. In case of regressions with reciprocity without any quarters, Recp_i1 denotes reciprocity variable. Similarly, in case of regressions with Recp_i1 and Recp_i2 variables, Recp_i1 denotes reciprocity below the median and Recp_i2 denotes reciprocity above the median value in year *t*.

(f) GSP: is a dummy variable i.e. GSP =1 if product *z* gets GSP benefit given by EU to any partner at time *t* . GSP =0 if product *z* is not covered under the GSP program of EU at time *t*.

iii) We use simple average of applied ad valorem tariffs for all products at six digit level. For the products with specific duties, we calculate ad-valorem equivalents as given in WITS by using the NAMA methodology.

iv) The figures reported in the top-panel of the table are estimated coefficients. The standard errors (se) are in the brackets and are clustered at product level. The significant *t*-values are marked by asterisks at acceptable level of significance.

v) *Constant*: Stata fits a model, in which the D_z (i.e. individual specific fixed effects) are taken as deviations from one constant term, displayed as _cons.

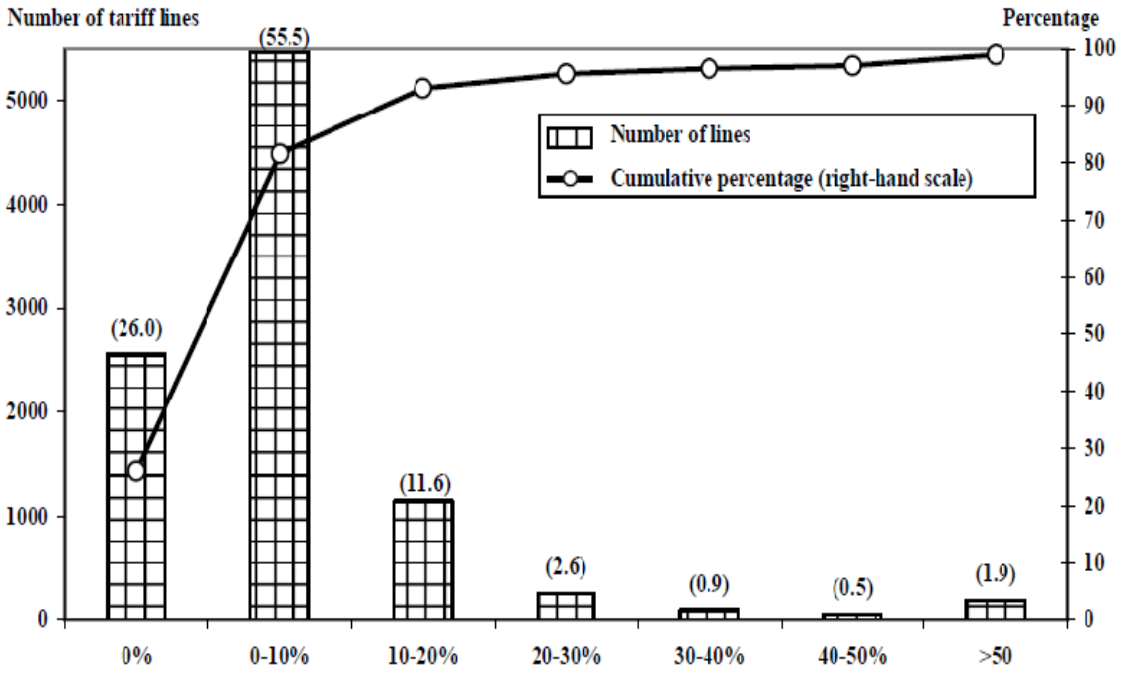
vi) R^2 (within) is reported in the fourth last row. Stata command *xtreg, fe* obtains its estimates by performing OLS on transformed model, so the R^2 reported do not have all the properties of the OLS R^2.

vii) *rho* values estimate that 33.1 to 35.7% of variation in preferential tariff (i.e. dependent variable , PRF) is due to the product specific differences D_z .

viii) *F* (*n-1, N-n-k*): *F*- test provides a test of the null hypothesis H_o that all $D_z = 0$. In other words, we wish to test whether the individual specific heterogeneity of D_z is necessary i.e. are there distinguishable intercept terms across units? A rejection of this H_o indicates that pooled OLS would produce inconsistent estimates.

ix) *F* (*k, N-n-k*): *F*-statistics to test the null H_o that the coefficients on the regressors (dependent variables) are jointly zero i.e. whether our model is overall significant. A rejection of H_o implies that our model is overall significant. The *F*-statistic in all the cases shows high significance level for our model as a tool to explain the important ingredients of preferential tariff formation of the EU.

Figure 1: Breakdown of EU's Applied MFN Tariffs, 2006



Note: The figures in brackets correspond to the percentage of total lines. They do not add to 100% since AVEs are not estimated for 102 lines.

Source : The EU's TPR, 2007 , WTO Secretariat Report

Annex I

Typology of the EU's regional agreements, May 2004

Type of trade regime	Name of agreement	Countries involved
Single market	European Economic Area (EEA)	Iceland, Liechtenstein, Norway
Customs union		Turkey, Andorra, San Marino
Free-trade area		Bulgaria, Chile, Croatia, Faroe Islands, FYROM, Israel, Jordan, Lebanon, Malta, Mexico, Morocco, Palestinian Authority, Romania, South Africa, Switzerland, Tunisia
Partnership and cooperation agreements (MFN treatment)		Russia and other former Community of Independent States countries
Non-reciprocal: contractual preferences	Mediterranean Agreements, Cotonou Agreements	African, Caribbean and Pacific countries, Algeria, Egypt, Syria
Non-reciprocal: autonomous preferences	Generalized System of Preferences (GSP), and Stabilization and Association Agreements.	Other developing countries and members of the Commonwealth of Independent States Albania, Bosnia and Herzegovina, and Serbia and Montenegro (including Kosovo)
Purely MFN treatment		Australia; Canada; Chinese Taipei; Hong Kong, China; Japan; Republic of Korea; New Zealand; Singapore; and the United States.

Source: WTO Secretariat based on Lamy, P. (2002), Stepping stones or stumbling blocks? The EC's approach towards the problem of multilateralism and regionalism in trade policy. The World Economy, November 2002, vol. 25, No. 10, pp. 1399-1413(15).

Annex II

Structure of the EU's MFN tariff, 2004 and 2006

(per cent)

	2004	2006	2006 bound rate	U.R.
1. Bound tariff lines (% of all tariff lines)	100.0	100.0	100.0	100.0
2. Duty-free tariff lines (% of all tariff lines)	26.9	26.0	25.2	25.2
3. Non-*ad valorem* tariffs (% of all tariff lines)	9.9	10.0	10.0	10.0
4. Tariff quotas (% of all tariff lines)	3.3	3.4	3.4	3.4
5. Non-*ad valorem* tariffs with no AVEs (% of all tariff lines)	2.7	2.1	2.1	2.1
6. Simple average tariff rate	6.5	6.9	7.0	7.0
Agricultural products (WTO definition)[a]	16.5	18.6	18.6	18.6
Non-agricultural products (WTO definition)[b]	4.1	4.0	4.1	4.1
7 Domestic tariff "spikes" (% of all tariff lines)[c]	5.8	5.6	5.8	5.8
8. International tariff "peaks" (% of all tariff lines)[d]	8.6	9.0	9.3	9.3
9. Overall standard deviation of applied rates	11.5	14.0	14.0	14.0
10. "Nuisance" applied rates (% of all tariff lines)[e]	6.8	9.4	9.4	9.4

a WTO Agreement on Agriculture definitions.
b Excluding petroleum.
c Domestic tariff spikes are defined as those exceeding three times the overall simple average applied rate (indicator 6).
d International tariff peaks are defined as those exceeding 15%.
e Nuisance rates are those greater than zero, but less than or equal to 2%.
Note: The 2006 bound tariff rate is the "conventional" rate given by the EU, while the UR rate is the final bound rate extracted from the WTO database.

Source: The EU's TPR, 2007 , WTO Secretariat Report.

Annex III

Structure of the EU MFN tariff by WTO sector, 2006

	All products: HS 01-97		WTO Agriculture		WTO non-agriculture*	
	Number of lines	%	Number of lines	%	Number of lines	%
Total	9,843	100.0	2,059	100.0	7,784	100.0
Ad valorem	8,854	90.0	1,107	53.8	7,747	99.5
Duty free	2,559	26.0	389	18.9	2,170	27.9
Dutiable	6,295	64.0	718	34.9	5,577	71.6
Non-ad valorem	989	10.0	952	46.2	37	0.5
Spécific	633	6.4	628	30.5	5	0.1
Mixed	73	0.7	42	2.0	31	0.4
Compound	197	2.0	197	9.6	0	0.0
Other	86	0.9	85	4.1	1	0.0

* Includes petroleum.

Source: EU's TPR, 2007 , WTO Secretariat Report .

Annex IV

Summary Analysis of the EU Applied MFN tariffs, 2006

			Applied 2006 rates			
Analysis	**No. of lines[a]**	**No. of lines used**	**Simple avg. tariff (%)**	**Tariff range (%)**	**Std-dev (%)**	**CV**
Total	9,843	9,741	6.9	0-427.9	14.0	2.0
By WTO definition[b]						
Agriculture	2,059	1,957	18.6	0-427.9	27.1	1.5
Live animals and products thereof	331	295	27.3	0-427.9	39.9	1.5
Dairy products	155	123	42.4	1.6-134.4	28.8	0.7
Coffee and tea, cocoa, sugar, etc.	300	294	18.8	0-163.8	19.7	1.0
Cut flowers and plants	62	62	4.3	0-19.2	4.4	1.0
Fruit and vegetables	437	437	16.2	0-300.8	22.1	1.4
Grains	55	55	55.2	0-116.6	33.4	0.6
Oil seeds, fats, oils and their products	164	162	7.4	0-137.2	16.3	2.2
Beverages and spirits	272	253	15.2	0-209.8	22.7	1.5
Tobacco	30	30	19.7	5.2-74.9	20.8	1.1
Other agricultural products	253	246	6.1	0-122	14.7	2.4
Non-agriculture (excl. petroleum)	7,743	7,743	4.0	0-35.6	4.1	1.0
Fish and fishery products	381	381	10.5	0-26	6.6	0.6
Mineral products, precious stones and precious metals	513	513	2.4	0-13.8	2.9	1.2
Metals	1,024	1,024	1.8	0-10	2.3	1.3
Chemicals and photographic supplies	1,389	1,389	4.4	0-35.6	2.8	0.6
Leather, rubber, footwear and travel goods	283	283	4.8	0-17	4.7	1.0
Wood, pulp, paper and furniture	444	444	1.2	0-10	2.3	2.0
Textiles and clothing	1,269	1,269	8.0	0-12	3.2	0.4
Transport equipment	262	262	4.8	0-22	5.1	1.1
Non-electric machinery	952	952	1.7	0-9.7	1.4	0.8
Electric machinery	544	544	2.8	0-14	3.4	1.2
Non agricultural articles n.e.s.	682	682	2.4	0-14	1.9	0.8

a Tariff rates are based on a lower frequency (number of lines) since lines with no *ad valorem* equivalents are excluded.

b Some 41 tariff lines are excluded from both WTO agriculture and non-agriculture definitions (petroleum products).

Note: CV = coefficient of variation.

Source: EU's TPR , 2007 , WTO Secretariat Report.

Annex V

MFN and Preferential Tariff Averages[a], 2006

	All products	HS 01-24	HS 25-97	WTO product groups Agriculture	WTO product groups Non-agriculture
MFN	6.9	18.0	3.7	18.5	4.0
GSP[a]	4.8	15.8	1.6	16.7	1.8
Syria	3.9	17.3	0.1	17.6	0.5
Gaza Strip	3.9	17.2	0.0	17.5	0.5
Faeroe Islands	3.9	17.2	0.0	18.0	0.4
Egypt	3.9	17.0	0.1	17.3	0.5
Israel	3.8	16.9	0.0	17.2	0.5
Liechtenstein	3.8	16.6	0.1	18.0	0.2
Norway	3.7	16.0	0.1	17.5	0.2
Iceland	3.7	16.0	0.1	17.5	0.2
Switzerland	3.5	15.4	0.1	15.4	0.5
Algeria	3.3	14.4	0.1	16.4	0.0
Tunisia	3.3	14.3	0.0	16.2	0.0
Chile	3.2	13.9	0.1	15.1	0.2
Morocco	3.2	14.0	0.0	15.8	0.0
Mexico	3.1	13.5	0.1	14.9	0.2
South Africa	3.1	13.2	0.1	13.0	0.6
GSP+[b]	2.6	11.4	0.1	13.0	0.0
Turkey	2.4	10.7	0.0	12.1	0.0
ACP[c]	2.2	9.7	0.0	11.1	0.0
Romania	1.9	8.2	0.0	8.8	0.1
Bulgaria	1.8	7.7	0.0	8.8	0.0
Albania	0.5	2.0	0.0	1.8	0.1
Bosnia Herzegovina	0.5	2.0	0.0	1.8	0.1
Serbia	0.5	2.0	0.0	1.8	0.1
Montenegro	0.5	2.0	0.0	1.8	0.1
FYR of Macedonia	0.3	1.5	0.0	1.6	0.0
Lebanon	0.3	1.3	0.0	1.6	0.0
LDCs[d]	0.3	1.2	0.0	1.3	0.0
Croatia	0.3	1.2	0.0	1.1	0.1
OCT[e]	0.3	1.1	0.0	1.3	0.0
Jordan	0.1	0.4	0.0	0.4	0.0
Andorra	0.1	0.1	0.0	0.3	0.0
San Marino	0.0	0.1	0.0	0.1	0.0

a The table shows the simple average applied tariff rates, calculated across all tariff lines, for each arrangement (reciprocal and non-reciprocal) of the EU; thus, if a particular arrangement has a mix of both preferential and MFN rates, the average across all applicable rates is taken. In the case of tariff quotas, out-of-quota tariff rates are used. Certain countries fall under several groupings depending on the number of schemes they are eligible for under the EU's preferential regime.

b Algeria, Antigua and Barbuda, Anguilla, Argentina, Armenia, Netherlands Antilles, Antarctica, American Samoa, Aruba, Azerbaijan, Bahamas, Bahrain, Bermuda, Barbados, Belarus, Belize, Bouvet Island, Botswana,

Brazil, Brunei Darussalam, Cameroon, Chile, China, Christmas Islands, Cocos Islands (or Keeling Islands), Cook Islands, Congo, Cuba, Dominica, Dominican Republic, Egypt, Federated States of Micronesia, Falkland Islands, Fiji, Gabon, Ghana, Gibraltar, Greenland, Grenada, South Georgia and South Sandwich Islands, Guam, Guyana, Heard Island and McDonald Islands, India, Indonesia, British Indian Ocean Territory, Iran, Iraq, Côte d'Ivoire, Jamaica, Jordan, Cayman Islands, Kazakhstan, Kenya, Kuwait, Kyrgyzstan, Lebanon, Libya, Macao, Northern Mariana Islands, Malaysia, Mauritius, Mexico, Montserrat, Morocco, Namibia, Nauru, New Caledonia, Norfolk Island, Nigeria, Niue Island, Oman, French Polynesia, Pakistan, St Pierre and Miquelon, Pitcairn, Palau, Papua New Guinea, Paraguay, Philippines, Qatar, Republic of Marshall Islands, Russia, St Kitts and Nevis, St Lucia, St Vincent, Saudi Arabia, Seychelles, Senegal, Saint Helena, South Africa, Surinam, Swaziland, Turks and Caicos Islands, French Southern Territories, Syria, Tajikistan, Thailand, Tokelau, Tonga, Trinidad and Tobago, Tunisia, Turkmenistan, Ukraine, United States Minor Outlying Islands, United Arab Emirates, Uruguay, Uzbekistan, Virgin Islands (British), Virgin Islands (USA), Vietnam, Wallis and Futuna,, Mayotte, and Zimbabwe.

c Bolivia, Colombia, Costa Rica, Ecuador, El Salvador, Georgia, Guatemala, Honduras, Moldova, Mongolia, Nicaragua, Panama, Peru, Sri Lanka, and Venezuela.

d Antigua and Barbuda, Angola, Bahamas, Barbados, Belize, Benin, Botswana, Burkina Faso, Burundi, Cameroon, Central African Republic, Chad, Comoros, Congo, Cook Islands, Côte d'Ivoire, Democratic Republic of the Congo, Djibouti, Dominica, Dominican Republic, Equatorial Guinea, Ethiopia, Eritrea, Federation of Micronesia, Fiji, Gabon, Gambia, Ghana, Grenada, Guinea, Guinea Bissau, Guyana, Haiti, Jamaica, Kenya, Kiribati, Lesotho, Liberia, Madagascar, Malawi, Mali, Marshall Islands, Mauritania, Mauritius, Mozambique, Namibia, Nauru, Niger, Nigeria, Niue, Palau, Papua New Guinea, Republic of Cape Verde, Rwanda, Sao Tome and Principe, Senegal, Seychelles, Sierra Leone, Solomon Islands, Somalia, St Christopher and Nevis, St Lucia, St Vincent and the Grenadines, Sudan, Surinam, Swaziland, Tanzania, Togo, Tonga, Trinidad and Tobago, Tuvalu, Uganda, Vanuatu, Western Samoa, Zambia, and Zimbabwe.

e Afghanistan, Angola, Bangladesh, Benin, Bhutan, Burkina Faso, Burundi, Cambodia, Central African Republic, Chad, Comoros, Democratic Republic of the Congo, Djibouti, Equatorial Guinea, Ethiopia, Eritrea, Gambia, Guinea, Guinea Bissau, Haiti, Kiribati, Laos, Lesotho, Liberia, Madagascar, Malawi, Maldives, Mali, Mauritania, Mozambique, Niger, Nepal, Republic of Cape Verde, Rwanda, Sao Tome and Principe, Solomon Islands, Sierra Leone, Somalia, Sudan, Tanzania, Togo, Timor-Leste, Tuvalu, Uganda, Vanuatu, Western Samoa, Yemen, and Zambia.

f Overseas Countries and Territories: Aruba, The Netherlands Antilles (Bonaire, Curacao, St Martin, Saba, St Eustatius), New Caledonia and dependencies, Wallis and Futuna Islands, French Polynesia, French Southern and Arctic Territories, Mayotte, St Pierre and Miquelon, Anguilla, Cayman Islands, Falkland Islands and dependencies, Turks and Caicos Islands, Montserrat, Pitcairn, St Helena and dependencies, British Antarctic Territories, British Indian Ocean Territories, Greenland, South Geórgia, South Sandwich Islands, and British Virgin Islands.

Source: WTO Secretariat calculations.

Annex VI

The EU's Preferential Tariff Regime
Data on WITS (TRAINS)

Partner Code	Partner Name	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
		Trains	Trains	Trains	Trains	Trains	Trains	Trains	Trains	Trains	Trains	Trains	Trains	Trains
		H0	H1	H1	H1	H1	H1	H1	H2	H2	H2	H2	H2	H3
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
000	World	5019	5113	5113	5113	5113	5113	5113	5224	5224	5224	5224	5224	5052
4	Afghanistan	76	4498	4461	4449	4873	4802	4177	4240	4239	3900	3909	3925	3725
8	Albania	591	4246	4233	3814	4819	4619	3804	4246	4245	3853	3904	3913	3716
12	Algeria	452	4764	4819	4803	4885	4866	3804	4126	4127	3781	3788	3805	3602
16	American Samoa		4311	4233	3814	4819	4619	3804	3986	3986	3638	3646	3697	3499
20	Andorra		652	5111			5113		4249	4263	3879	3933	3949	3740
24	Angola	178	4916	4892	4949	5003	5010	4177	4257	4256	3916	3926	3942	3740
660	Anguila	11	4311	4233	3814	4819	4619	3804	4264	4263	3917	3933	3945	3736
28	Antigua and Barbuda	80	4911	4888	4945	5003	4970	3804	4209	4173	3861	3845	3890	3683
32	Argentina	1278	4311	4233	3814	4819	4619	3804	3822	3950	3638	3646	3697	3499
51	Armenia	49	4208	4233	3814	4819	4619	3804	3859	3867	3638	3588	3697	3499
533	Aruba	67	4311	4233	3814	4819	4619	3804	4264	4263	3917	3933	3945	3736
31	Azerbaijan	80	4208	4233	3814	4819	4619	3804	3859	3867	3638	3588	3697	3499
44	Bahamas, The	226	4911	4888	4945	5003	4970	3804	4209	4173	3861	3845	3890	3683
48	Bahrain	531	4311	4233	3814	4819	4619	3804	3986	3986	3638	3646	3697	3499
50	Bangladesh	560	4498	4461	4449	4873	4802	4177	4240	4239	3900	3909	3925	3725
52	Barbados	173	4911	4890	4945	5003	4970	3804	4209	4173	3861	3845	3890	3683
112	Belarus	893	4208	4233	3814	4819	4619	3804	3840	3848	3638	3588	3697	3499
84	Belize	70	4911	4890	4945	5003	4970	3804	4209	4173	3861	3845	3890	3683
…	…	…	…	…	…	…	…	…	…	…	…	…	…	…
…	…	…	…	…	…	…	…	…	…	…	…	…	…	…

Partner Code	Partner Name	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
		Trains	Trains	Trains	Trains	Trains	Trains	Trains	Trains	Trains	Trains	Trains	Trains	Trains
		H0	H1	H1	H1	H1	H1	H1	H2	H2	H2	H2	H2	H3
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
…	…	…	…	…	…	…	…	…	…	…	…	…	…	…
862	Venezuela	643	4311	4233	3814	4819	4710	3804	4049	4182	3706	3720	3726	3526
704	Vietnam	817	4311	4233	3814	4819	4619	3804	3986	3986	3638	3646	3697	3499
872	Wake Island		4311	4233	3814	4819	4619	3804	3986	3986		3646		
876	Wallis and Futura Isl.	14	4311	4233	3814	4819	4619	3804	4264	4263	3917	3933	3945	3736
732	Western Sahara		652	70			685							
887	Yemen	137	4498	4461	4449	4873	4802	4177	4240	4239	3900	3909	3925	3725
891	Yugoslavia		652	70			690		4236					
894	Zambia	158	4916	4894	4949	5003	5010	4177	4257	4256	3916	3926	3942	3740
716	Zimbabwe	604	4911	4890	4945	5003	4970	3804	4209	4173	3861	3845	3890	3683

Notes:

1. The total preferential trading partners of the EU are 218, but here we are illustrating only few partners to keep the Annexure short, otherwise this information runs into 15 pages. For transparency, the complete list can be obtained on request by sending an email to me at vivek.joshi@gradutateinstite.ch
2. The numbers mentioned in column 3 to column 15 are the year-wise number of products on six digit HS, getting preferential access to the EU market for the country listed in column 2.
3. The HS classification on which the raw data is available is mentioned on the top row of the table header. H0, H1, H2 and H3 denote HS1988/1992, HS2002 and HS2007 respectively.
4. The number of products on which MFN tariff is applied is mentioned in the first row of the table, with the row heading 'World'.
5. We have year-wise excel-sheets for each country for preferential tariff and one excel-sheet for the EU's MFN applied tariff.

Annex VII

The EU's Partners' Tariff and Imports Data Availability on WITS

S.N.	PTA Partner	Date of PTA	Data	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
1	Albania*	01 12 2006	MFN			Trains			IDB	Trains	Trains	IDB		Trains	IDB	Trains
			PRF													
			World Imp		CMT	CMT	CMT	CMT	CMT	CMT	CMT	CMT	CMT	CMT	CMT	CMT
			EU Imp		CMT	CMT	CMT	CMT	CMT	CMT	CMT	CMT	CMT	CMT	CMT	CMT
2	Algeria*	01 09 2005	MFN			Trains	Trains			Trains	Trains	Trains		Trains	Trains	Trains
			PRF											Trains	Trains	Trains
			World Imp		CMT	CMT	CMT	CMT	CMT	CMT	CMT	CMT	CMT	CMT	CMT	CMT
			EU Imp		CMT	CMT	CMT	CMT	CMT	CMT	CMT	CMT	CMT	CMT	CMT	CMT
3	Norway	01 01 1994	MFN	Trains	Trains	IDB	Trains	IDB	Trains	Trains	Trains	Trains	IDB	IDB	Trains	Trains
			PRF	Trains	Trains		Trains	IDB (8d)	Trains(8d)	Trains (8d)	Trains	Trains	Trains(France)		Trains	Trains
			World Imp	Trains	CMT	CMT	CMT	CMT	CMT	CMT	CMT	CMT	CMT	=2006	CMT	CMT
			EU Imp	CMT[#]	CMT	CMT	CMT	CMT	CMT	CMT	CMT	CMT	CMT	=2006	CMT	CMT
4	Iceland	01 01 1994	MFN	=1996	Trains	=1998	IDB	IDB	IDB	Trains	=2003	Trains	IDB	IDB	Trains	Trains
			PRF	=1998	=1998	=1998	IDB (8d)	IDB (8d)	IDB (8d)	Trains (8d)	=2001	Trains (8d)	IDB (8d)	IDB (8d)	Trains	Trains
			World Imp	Trains (8d)	Trains	CMT	CMT	CMT	CMT	CMT	CMT	CMT	CMT	CMT	CMT	CMT
			EU Imp	Trains (8d)	IDB (8d)	CMT	CMT	CMT	CMT	CMT	CMT	CMT	CMT	CMT	CMT	CMT
5	Chile*	01 02 2003	MFN	Trains	IDB	Trains	Trains	Trains	Trains	Trains	Trains	IDB	Trains	Trains	Trains	Trains
			PRF												Trains	Trains
			World Imp	Trains	IDB	CMT	CMT	CMT	CMT	CMT	CMT	CMT	CMT	CMT	CMT	CMT
			EU Imp			CMT	CMT	CMT	CMT	CMT	CMT	CMT	CMT	CMT	CMT	CMT
6	Croatia*	01 02 2005	MFN							Trains	IDB	IDB	Trains	Trains	Trains	Trains
			PRF							Trains			Trains	Trains	Trains	Trains
			World Imp			CMT	CMT	CMT	CMT	CMT	CMT	CMT	CMT	CMT	CMT	CMT
			EU Imp			CMT	CMT	CMT	CMT	CMT	CMT	CMT	CMT	CMT	CMT	CMT
7	Egypt*	01 06 2004	MFN	Trains		IDB	Trains	IDB	IDB	IDB	Trains	IDB	Trains	Trains		Trains
			PRF											Trains		

S.N.	PTA Partner	Date of PTA	Data	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
			World Imp	Trains		IDB	Trains	IDB	IDB	IDB	Trains	IDB	Trains	Trains		Trains
			EU Imp			CMT#	CMT#	CMT#	CMT#	CMT#	CMT#	CMT#	CMT#	CMT#	CMT#	CMT#
8	Israel*	01 06 2000	MFN					IDB	IDB	IDB	IDB	IDB	Trains	Trains	Trains	Trains
			PRF					IDB					Trains	Trains	Trains	Trains
			World Imp		CMT	CMT	CMT	CMT	CMT	CMT	CMT	CMT	CMT	CMT	CMT	Trains
			EU Imp		CMT	CMT	CMT	CMT	CMT	CMT	CMT	CMT	CMT	CMT	CMT	Trains
9	Jordan*	01 05 2002	MFN						Trains	Trains	Trains	Trains	IDB	Trains	Trains	Trains
			PRF											Trains		
			World Imp				CMT	CMT	CMT	CMT	CMT	CMT	CMT	CMT	CMT	CMT
			EU Imp				CMT	CMT	CMT	CMT	CMT	CMT	CMT	CMT	CMT	CMT
10	Lebanon*	01 03 2003	MFN						Trains	Trains	Trains		Trains	Trains	Trains	Trains
			PRF													
			World Imp			CMT	CMT	CMT	CMT	CMT	CMT	CMT	CMT	CMT	CMT	CMT
			EU Imp			CMT	CMT	CMT	CMT	CMT	CMT	CMT	CMT	CMT		CMT
11	Mexico*	01 07 2000	MFN	Trains		Trains	Trains	Trains	Trains	Trains	Trains	Trains	Trains	Trains	Trains	
			PRF										Trains	Trains	Trains	
			World Imp	Trains	CMT	CMT	CMT	CMT	CMT	CMT	CMT	CMT	CMT	CMT	CMT	CMT
			EU Imp		CMT	CMT	CMT	CMT	CMT	CMT	CMT	CMT	CMT	CMT	CMT	CMT
12	Morocco*	01 03 2000	MFN			Trains			Trains	Trains	Trains	Trains		Trains	Trains	Trains
			PRF											Trains	Trains	Trains
			World Imp			Trains			Trains	Trains	CMT	CMT	CMT	CMT	CMT	CMT
			EU Imp						CMT#	CMT#	CMT	CMT	CMT	CMT	CMT	CMT
13	South Africa	01 01 2000	MFN		Trains	Trains		Trains	IDB	Trains	IDB	IDB	Trains	Trains	Trains	Trains
			PRF						IDB	Trains	IDB	IDB	Trains	Trains	Trains	Trains
			World Imp		Trains	CMT	CMT	CMT	CMT	CMT	CMT	CMT	CMT	CMT	CMT	Trains
			EU Imp			CMT	CMT	CMT	CMT	CMT	CMT	CMT	CMT	CMT	CMT	CMT
14	Switzerland	01 01 1973	MFN		Trains	Trains	Trains	Trains	Trains	Trains	Trains	Trains	Trains	Trains	Trains	Trains
			PRF		Trains	Trains	Trains	Trains	Trains	Trains	Trains	Trains	Trains	Trains	Trains	Trains
			World Imp		Trains	Trains	Trains	Trains	Trains	Trains	Trains	Trains	Trains	Trains	Trains	Trains
			EU		Trains	Trains	Trains	Trains	Trains	Trains	Trains	Trains	Trains	Trains	Trains	Trains

S.N.	PTA Partner	Date of PTA	Data	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
			Imp													
15	Tunisia*	01 03 1998	MFN	Trains			Trains		IDB		Trains	Trains	Trains	Trains	Trains	
			PRF											Trains		
			World Imp	Trains			Trains		CMT	CMT	CMT	CMT	CMT	CMT	CMT	CMT
			EU Imp				CMT#	CMT#	CMT	CMT	CMT	CMT	CMT	CMT	CMT	CMT
16	Turkey (CU)	31 12 1995	MFN	Trains	IDB	Trains	IDB	Trains	IDB	IDB	IDB	Trains	IDB	Trains	Trains	Trains
			PRF		IDB		IDB		IDB	IDB	IDB	Trains		Trains	Trains	Trains
			World Imp	Trains	IDB	Trains	IDB	Trains	IDB	IDB	IDB	Trains	IDB	Trains	Trains	Trains
			EU Imp		CMT	CMT	CMT	CMT	CMT	CMT	CMT	CMT	CMT	CMT	CMT	Trains

Notes :

1. *: We get preferential tariff data by codifying the legal text of the EU- partner Agreement. Source: WTO Regional Trade Agreements Information System (RTA-IS) http://rtais.wto.org/UI/PublicMaintainRTAHome.aspx (*Eleven partners*)
2. # : We get Imports from EU by Norway (1995), Egypt (1996-2007), Morocco(2000-2001), South Africa (1995, 1996), Tunisia(1998-1999) and Turkey(1995), using the mirror exports by EU to these country-years. Exports data is on FOB (free on board) basis and imports data is on CIF (Cost insurance and freight) basis, so we have to make adjustments for this difference. FOB figures are approximately 5% to 10 % lower than the corresponding CIF figures. We take 6% to adjust the FOB values to CIF values. (*Six partners*).
3. PTAs with Andorra (CU), Bosina Herzegovina, Overseas Countries and Territories (OCT), Faroe Islands, Macedonia, Montenegro, Palestinian Authority, San Marino, Syria : We do not have even the basic minimum data to codify the text of these agreements, moreover, these PTAs are too small to make an impact on our estimations. We **drop** these countries from our analysis. (*Nine partners*)
4. Cotonou Partners: The Lome IV Agreement (1990-2000) and Cotonou Agreement (2000-2007) are non-reciprocal; hence we do not require data on the preferential tariffs extended by ACP countries to EU products. Hence, we **drop** the following ACP countries from our analysis:
Antigua and Barbuda, Bahamas, Barbados, Belize, Bosina Herzegovina, Botswana, Burundi, Cameroon, Comoros, Cote d'Ivoire, Dominica, Dominican Republic, Fiji, Ghana, Grenada, Guyana, Haiti, Jamaica, Kenya, Lesotho, Madagascar, Mauritius, Mozambique, Namibia, Papua New Guinea, Rwanda, Saint Christopher and Nevis, Saint Lucia, Saint Vincent and the Grenadines, San Marino, Seychelles, Suriname, Swaziland, Tanzaina, Trinidad and Tobago, Uganda, Zimbabwe. (*Thirty five partners*)
5. For *three* partners namely, South Africa, Switzerland and Turkey; the full data on MFN and preferential tariff is available on WITS.
6. For Switzerland only, the full data on World Imports and Imports from EU is available on WITS for 1996 to 2007.

Annex VIII

Data description

Variable	Model	Data/description	Source	Remarks
$PRF_{z,t}$	Equation (5) to (7)	*Simple average* of ad-valorem preferential tariffs applied by the EU on import of six digit HS 1996 product *z* from 'PRF region' at time *t*.	Trains	Refer **Annex VI** for details on EU's preferential tariff data availability.
$MFN_{z,t}$	Equation (5) to (7)	*Simple average* of MFN applied tariff by the EU on imports of six digit HS 1996 product *z* from rest of the world at time *t*.	Trains	
$M_{z,t}^{k,EU}$		Imports of product *z* from the EU by partner *k* at time *t*	Trains / Com -trade	Refer **Annex VII** for available data on preferential imports.
$M_{z,t}^{k,total}$		Total imports of product *z* by partner *k* at time *t*.	Trains / Com -trade	Refer **Annex VII** for available data on total imports.
$s_{z,t}^{k}$		Ratio of $M_{z,t}^{k,EU}$ and $M_{z,t}^{k,total}$.		$= M_{z,t}^{k,EU} / M_{z,t}^{k,total}$
$MFN_{z,t}^{k}$		MFN tariff applied by partner *k* on HS 1996 product *z* at time *t*.	Trains / IDB	Refer **Annex VII** for data availability on MFN tariff.
$PRF_{z,t}^{k,EU}$		Preferential tariff applied by partner *k* on EU HS 1996 product *z* at time *t*.	Trains/ IDB	Refer **Annex VII** for details on partners' preferential tariff data availability.
$\Delta mop_{z,t}^{k,EU}$		Margin of preference or *mop*		$= MFN_{z,t}^{k} - PRF_{z,t}^{k,EU}$
$-\Delta mop_{z,t}^{k,EU} * s_{z,t}^{k,EU}$		Reciprocity offered by partner *k* to the EU on product *z* at time *t*.		
q		Number of partners that are extending preferential access to the EU on product *z* at time *t*.		
$Recp_{z,t}$	Equation (5) to (7)	The sum of reciprocal preferences extended by partner *k* on all products except *z* at time *t*.		$\sum_{k=1}^{q} \frac{1}{k}(-mop_{z,t}^{k,EU} * s_{z,t}^{k,EU})$
$GSP_{z,t}$	Equation (5) to (7)	A dummy variable that is equal to one if the product *z* gets GSP benefit in EU market at time *t* otherwise it is equal to zero.	Trains	
$i1_{z,t}$	Equation (6), (7)	An indicator variable that is equal to one, if *MFN* tariff falls in the *first* quarter of MFN tariff applied by the EU on all products at time *t*, otherwise it is equal to zero.		For equation (6), we have one cut-off point. Hence, $i1_{z,t}$ is equal to one, if $MFN_{z,t}$ is *smaller* than the cut-off value of *7.0%*, otherwise it is equal to zero.
$i2_{z,t}$	Equation (6), (7)	An indicator variable that is equal to one, if *MFN* tariff falls in the *second* quarter of MFN tariff applied by the EU on all products at time *t*, otherwise it is equal to zero.		For equation (6), we have one cut-off point. Hence, $i2_{z,t}$ is equal to one if $MFN_{z,t}$ is *greater* than the cut-off value of *7.0%,* otherwise it is equal to zero.

Variable	Model	Data/description	Source	Remarks
$i3_{z,t}$	Equation (7)	An indicator variable that is equal to one, if *MFN* tariff falls in the *third* quarter of MFN tariff applied by the EU on all products at time *t*, otherwise it is equal to zero.		
$i4_{z,t}$	Equation (7)	An indicator variable that is equal to one, if *MFN* tariff falls in the *fourth* quarter of MFN tariff applied by the EU on all products at time *t*, otherwise it is equal to zero.		
$ir1_{z,t}$	Equation (6), (7)	An indicator variable that is equal to one, if reciprocity by the 'PRF region' on product *z* at time *t* is in the *first* quarter of reciprocity on the same product at time *t*, otherwise it is equal to zero.		For equation (6), we have one cut-off point. Hence, $ir1_{z,t}$ is equal to one, if $Recp_{z,t}$ is *lower* than the cut-off *4.06*, otherwise it is equal to zero.
$ir2_{z,t}$	Equation (6), (7)	An indicator variable that is equal to one, if reciprocity by the 'PRF region' on product *z* at time *t* is in the *second* quarter of reciprocity on the same product at time *t*, otherwise it is equal to zero.		For equation (6), we have one cut-off point. Hence, $ir2_{z,t}$ is equal to one, is $Recp_{z,t}$ is *higher* than the cut-off value of *4.06*, otherwise it is equal to zero.
$ir3_{z,t}$	Equation (7)	An indicator variable that is equal to one, if reciprocity by the 'PRF region' on product *z* at time *t* is in the *third* quarter of reciprocity on the same product at time *t*, otherwise it is equal to zero.		
$ir4_{z,t}$	Equation (7)	An indicator variable that is equal to one, if reciprocity by the 'PRF region' on product *z* at time *t* is in the *fourth* quarter of reciprocity on the same product at time *t*, otherwise it is equal to zero.		

Notes:

World Integrated Trade Solution (WITS) has been developed by the World Bank, in collaboration with the United Nations Conference on Trade and Development (UNCTAD). It accesses and retrieves information on trade and tariffs which is compiled by the following international organizations:

Trains : The United Nations Conference on Trade and Development (UNCTAD) **Trade Analysis Information System** (TRAINS) that contains information on Imports, Tariffs, Para-Tariffs and Non-Tariff Measures for 119 countries. The data on tariffs, para-tariffs and non-tariff measures are available at the most detailed commodity level of the national tariffs (i.e., at the tariff line level). The data are recorded according to three internationally recognized trade and tariff classifications.

Comtrade: The United Nation Statistical Division (UNSD) **Commodity Trade** (COMTRADE) Data Base that contains Exports and Imports by Commodity and Partner

Country. Values are recorded in US Dollars along with a variety of quantity measures. The Data Base includes information for over 130 countries, some of which have been reporting these types of statistics to the United Nations since 1962.The data are recorded according to six internationally recognized trade and tariff classifications.

IDB/CTS, WTO : **The World Trade Organization** (WTO) **Integrated Data Base** (IDB) that contain Imports by Commodity and Partner Country and MFN Applied Tariffs for over 80 countries at the most detailed commodity level of the national tariffs; and, the **Consolidated Tariff Schedule** Data Base (CTS) that contains WTO Bound Tariffs, Initial Negotiating Rights (INR) and other indicators.

Annex IX

Summary Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
year	66547	2001	3.74	1995	2007
hs1	66547	549263.60	272681.30	010111	980600
$PRF_{z,t}$	65699	1.29	5.84	0	466.12
$MFN_{z,t}$	65148	6.10	20.01	0	1570.51
MFN_i1	65148	0.75	1.20	0	3.8
MFN_i2	65148	1.37	2.41	0	7
MFN_i3	65148	2.00	4.12	0	14
MFN_i4	65148	1.97	20.08	0	1570.51
MFN_i1_m	65148	2.12	2.27	0	7
MFN_i2_m	65148	3.98	20.30	0	1570.51
$Recp_{z,t}$	65982	-3.07	4.78	-706.29	0
Recp_i1	65982	-0.50	0.72	-2.30	0
Recp_i2	65982	-0.78	1.37	-4.06	0
Recp_i3	65982	-1.10	2.24	-8.16	0
Recp_i4	65982	-0.70	4.72	-706.29	0
Recp_i1_m	65982	-1.27	1.27	-4.06	0
Recp_i2_m	65982	-1.79	5.08	-706.29	0
$GSP_{z,t}$	66547	0.82	0.39	0	1