

Preferential Tariff Formation: The Case of the European Union¹

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ABSTRACT:

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. The paper addresses this set of issues using a panel of highly disaggregated tariff data (1995-2007) for the European Union (EU), one of the most prolific signatories of PTAs, but also a long-time participant in MFN tariff liberalization. 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?

<http://www.graduateinstitute.ch/ctei>

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Preferential Tariff Formation: The Case of the European Union^{1,2}

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 develop 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 factors, 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.

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² This paper is still at the draft stage and does not include Annexure (but include the result Tables). It is an ongoing work and will ultimately be part of my phd thesis.

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To quantify reciprocity, we construct a variable that measures, for each good, at the six digit level, the reciprocal access provided to EU by the partner in preferential agreements. For constructing this variable, we codify eleven PTA legal agreements to construct a unique data-set for preferential tariffs applied by partners on the EU 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 finding is that reciprocity shown by partners to the EU matters, 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 matter.

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. 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 Members³, which account for some 36% of its merchandise trade⁴. 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.

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 definition⁵) 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 database⁶, 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.

³ These are: Australia; Canada; Chinese Taipei; Hong Kong, China; Japan; Republic of Korea; New Zealand; Singapore; and the United States.

⁴ 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 EU's preferential partners represents some 38% of its overall trade.

⁵ WTO Agreement on Agriculture, Annex I

⁶ <http://rtais.wto.org/UI/PublicMaintainRTAHome.aspx>

Baldwin and Wyplosz (2006)⁷ 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)⁸ 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, Bosnia 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) countries⁹ under the Lomé Convention, succeeded by the Cotonou Agreement¹⁰ and non-reciprocal GSP preferences¹¹ 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

⁷ For details, interested reader may refer Chapter 12, Baldwin and Wyplosz (2006), *The Economics of European Integration* (2nd edition).

⁸ Iceland, Liechtenstein and Norway (in 1994) ; Faroe Islands (in 1997), Switzerland (in 1972).

⁹ 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, 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).

¹⁰ The Cotonou Agreement expired on 31 December 2007. Negotiations for full Economic Partnership Agreement with reciprocity are ongoing.

¹¹ 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).

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

3.1 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.

3.2 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.

3.3 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 assess their impact on MTL by the members of PTA. For example, Limao (2006) uses the following linear

approximation¹² (equation *E4* in his paper) to estimate the stumbling block effects of the US PTAs

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

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 endogeneity of MTL and preferential trade liberalization in the above equation.

Baldwin and Seghezza (2008), use the following model¹³ (equation (1) in their paper)

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

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 endogeneity between MFN_{gpm} and PTA_{gpm} .

¹² 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 U.S.'s bargaining power relative to country k and a measure of product specific reciprocity, respectively.

¹³ 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 Relationship 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 tariffs as exogenous to the preferential tariffs of the EU. 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 2007¹⁴. The EU's bound and hence the applied rates since 1995 were well known¹⁵ to the world. The reductions in MFN tariffs in preferential agreements are generally based on base rate¹⁶ (or current applied MFN rate) as agreed in the PTA documents. This should help us to tackle endogeneity 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 endogeneity* in Section 6 in greater detail. Additionally, since the exchange of preferences by the EU with its partners is not on 'one to one' basis, we again *rule out endogeneity* on account of reciprocity variable in Section 6.

¹⁴ In 2006, 98.4 % products have the same applied rate as their bound rate.

¹⁵ 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 its bound rate commitments by 2002. By 2004, it implemented 100% of its bound rate commitments.

¹⁶ 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. Refer Annex (to be included) for base rates in various Agreements.

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 the tariff reduction schedules of EU and Annex V. *Second*, for products that already get preferential 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 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 EU's trade by aggregating all the preferential trade partners of EU into one region called 'PRF region' and all MFN partners as 'MFN region'. For a given MFN rates; 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) :

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

where, $PRF_{z,t}$ is *simple average*¹⁷ 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 affect on the EU negotiators' decision about the level of preferential tariffs. In addition,

¹⁷ 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.

we also want to test, if these two variables affect the preferential tariffs formation, therefore, we include them specifically in our simple model (3) to arrive at the following equation –

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

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 negotiator 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 preferential tariff. Drawing our motivation from Limao (2008)¹⁸ , we define market access or reciprocity

$Recp_{z,t}$ as $\left(\sum_{k=1}^q (-\Delta mop_{z,t}^k) * s_{z,t}^k \right)$, which is the sum of reciprocal preferences extended to EU by all q partners on product z at time t . Here $s_{z,t}^k$ is the ratio of imports of product z by country k (a PTA partner) from the EU, to total import of product z at time t i.e. $M_{z,t}^{k,EU} / M_{z,t}^{k,Total}$. $\Delta mop_{z,t}^k$ is defined as the difference between the preferential tariff on EU products and the MFN tariff applied by partner k on products z at time t i.e. $\Delta mop_{z,t}^k = MFN_{z,t}^k - PRF_{z,t}^{k,EU}$. 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 of the partners, etc are also not captured by equation (4) and are included in the terms $\Omega_{z,t}$. We take advantage

¹⁸ Limao (2008) defines reciprocity in the context of multilateral negotiations $\Delta ma_t^k = \sum_j (-\Delta \tau_{jt}^k) w_{jT}^k$

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 endogeneity, 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:

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

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) is α_1 . If higher (lower) MFN applied tariffs lead to higher (lower) preferential tariffs, we would expect α_1 to be less than one and significant. In case, the EU values reciprocity in PTAs, we would expect, β_1 to be negative 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 give less preferential access on highly protected products (e.g. in agriculture, fisheries and textiles sectors) with higher MFN tariff. *Second*, the EU may be giving more preferential access to ‘PRF region’ when it extends more reciprocal preferences for EU’s exports. To test these hypotheses we construct four indicator variables:

Dependent variable	Indicator variables	Remarks ^{19,20}
$MFN_{z,t}$	$i1_{z,t}^{0 < MFN_{z,t} < MFN_{[50,t]}}$	Equal to one, if the <i>MFN</i> tariff is <i>smaller</i> than the median <i>MFN</i> tariff applied by the EU on all products at time <i>t</i> , otherwise it is equal to zero.
	$i2_{z,t}^{MFN_{[50,t]} < MFN_{z,t} < MFN_{[100,t]}}$	Equal to one if the <i>MFN</i> tariff is <i>greater</i> than the median <i>MFN</i> tariff applied by the EU on all products at time <i>t</i> , otherwise it is equal to zero.
$Recp_{z,t}$	$i1_{z,t}^{0 < Recp_{z,t} < Recp_{[50,t]}}$	Equal to one, if the reciprocity that the EU gets is <i>lower</i> than the median reciprocity extend on all products by ‘PRF region’ at time <i>t</i> , otherwise it is equal to zero.
	$i2_{z,t}^{0 < Recp_{z,t} < Recp_{[50,t]}}$	Equal to one, if the reciprocity that the EU gets is <i>higher</i> than the median reciprocity extend on all products by ‘PRF region’ at time <i>t</i> , otherwise it is equal to zero.

Similarly, we can divide the $MFN_{z,t}$ and $Recp_{z,t}$ variables into four quartiles, each and generate eight indicator variables to further separate the values of $MFN_{z,t}$ and $Recp_{z,t}$ variables. A discussion on these indicator variables is postponed till Section 7 on Empirical Results.

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:

$$\begin{aligned}
 PRF_{z,t} = & \alpha_1 MFN_{z,t} * i1_{z,t}^{0 < MFN_{z,t} < MFN_{[50,t]}} + \alpha_2 MFN_{z,t} * i2_{z,t}^{MFN_{[50,t]} < MFN_{z,t} < MFN_{[100,t]}} \\
 & + \beta_1 Recp_{z,t} * i1_{z,t}^{0 < Recp_{z,t} < Recp_{[50,t]}} + \beta_2 Recp_{z,t} * i2_{z,t}^{Recp_{[50,t]} < Recp_{z,t} < Recp_{[100,t]}} \\
 & + \gamma_1 GSP_{z,t} + D_z + D_t + \varepsilon_{z,t}
 \end{aligned} \tag{6}$$

The equation (6) helps us to detangle the two effects in MFN and reciprocity variables. If the EU provides higher preferential access on the products with lower MFN tariff, and the lower preferential access on the higher MFN tariff products, then we should expect the sign of α_1 to be negative and significant and the sign of α_2 also negative and significant, but we should expect $|\alpha_1| > |\alpha_2|$. This would mean that the highly protected products at the MFN level do not get higher preferential access but on the other hand the lowly protected products at the MFN level get higher preferential access to EU. The

¹⁹ The interacted MFN variables are denoted as MFN_i1 and MFN_i2 in regression results. The average cut-off point for these variables is 5.7%. For year-wise cut-off please refer to Annex (to be attached).

²⁰ The interacted reciprocity variables are denoted as $Recp_i1$ and $Recp_i2$ in regression results. The average cut-off point for these variables is 34.92. For year-wise cut-off please refer to Annex (to be attached).

reason could be higher political economy forces in some sectors may force the EU government to continue providing higher protection, even in preferential agreements.

Similarly, we should expect the sign of β_1 to be negative and significant and β_2 to be negative and insignificant. This would confirm that the EU values reciprocity by the 'PRF region' only up to a limited extent. The reciprocity beyond a point does not really matter to get higher preferential access 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' to EU in that product may not guarantee a lower preferential tariff (i.e. higher preferential access) to the EU market. The expectation about the sign and significance of γ_1 remains the same as explained in case of equation (5).

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. EU notified 17 PTAs during this period. In addition, 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 type 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 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 classification²¹ 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)²².

5.2.1 EU Related Data

The EU’s preferential and MFN tariff data is electronically available for years 1995 to 2007 on different HS classifications²³ 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 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

²¹ 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.

²² 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.

²³ 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 all our regressions on HS 1996 products.

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 partners i.e. $MFN_{z,t}^k$. This data comes from TRAINS and IDB. The list of available data is attached at Annex VII²⁴. We take the *simple average* of partner k 's year-wise product-wise applied MFN tariff on six digit products to construct $MFN_{z,t}^k$.

Similarly, we need year-wise, product-wise data on preferential tariff $PRF_{z,t}^{k,EU}$, applied by k^{th} partner on EU products. For three partners²⁵, the data is available from TRAINS and IDB. For other eleven countries²⁶, 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 partners²⁷ to construct data on $PRF_{z,t}^{k,EU}$.

To construct $s_{z,t}^k = M_{z,t}^{k,EU} / M_{z,t}^{k,Total}$ we need product-wise, year-wise data on imports by partner k from EU, i.e. $M_{z,t}^{k,EU}$ and total imports of product z by partner k i.e. $M_{z,t}^{k,Total}$. We get country-wise, year-wise and product-wise import data from COMTRADE, TRAINS and IDB (Annex VIII). MFN imports data, for 12 PTA partners²⁸, is available on HS 1996 from COMTRADE. MFN import data is also available from TRAINS and

²⁴ 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.

²⁵ South Africa, Switzerland and Turkey.

²⁶ Albania, Algeria, Chile, Croatia, Egypt, Israel, Jordan, Lebanon, Mexico, Morocco and Tunisia.

²⁷ Refer WTO Regional Trade Agreements Information System (RTA-IS) for legal text of PTA Agreements. <http://rtais.wto.org/UI/PublicMaintainRTAHome.aspx>

²⁸ 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).

IDB for 9 partners²⁹. We complete MFN import data using both these sources. Preferential imports from EU by 12 PTA partners³⁰, is available from COMTRADE and for 4 partners³¹ the data is available from TRAINS or IDB. However, we do not have any data for preferential imports for 8 partners³² from either source. Using, COMTRADE we can take *exports from EU to partners* to get an approximation of *imports from 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 difference³³. After having data on $M_{z,t}^{k,EU}$, $M_{z,t}^{k,Total}$, it is simple to construct $s_{z,t}^k$. Using the data on $s_{z,t}^k$, $MFN_{z,t}^k$ and $PRF_{z,t}^{k,EU}$ we can construct the reciprocity offered by partner k to the EU i.e. $(-\Delta mop_{z,t}^k) * s_{z,t}^k$. 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 Endogeneity - 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 EU's preferential tariffs to EU's MFN tariffs. In the particular setting for the EU, we argue in the next two paragraphs absence of endogeneity on account of MFN variable.

²⁹ 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).

³⁰ 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).

³¹ Egypt (2005), Israel (2007), Switzerland (1996-2007), and Turkey (2007).

³² 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).

³³ 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)³⁴ .

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 Endogeneity - 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 endogeneity issue, let us refer to the standard text book³⁵ example of following equation:

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

$y_{1,it}$ 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 $i = 1, \dots, N$ and $t = 1, \dots, T$. If, the regression errors u_{it} are uncorrelated with $x_{1,it}$ but are

³⁴ 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. Refer Annex (to be attached) for base rates under various Agreements.

³⁵ Refer Microeconometrics by Cameron and Trivedi (2005) or any other standard text book on econometrics.

correlated with $y_{2,it}$, then OLS/FE estimators are inconsistent for β and there is a problem of endogeneity. In that case, we have to tackle endogeneity with proper instruments using instrument variables (IV) regression. 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 areas³⁶ 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 goods³⁷ *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 Agreements³⁸ and two Stabilization and Association Agreements³⁹, 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

³⁶ 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.

³⁷ Industrial goods are defined as products of HS chapters 25-97 not covered by definition of agricultural products.

³⁸ 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.

³⁹ EU’s Stabilization and Association Agreements are with Macedonia, Croatia, Albania, Montenegro, Bosnia 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.

negotiating parlance. Such asymmetrical liberalization is common in PTA involving a large and a smaller economy.

On the other hand, the agriculture and fisheries products⁴⁰, which are highly protected in most of the countries, there is limited liberalization of trade from both sides. But the principal of '*less 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 endogeneity gets further diluted.

In brief, we conclude that there is no problem of endogeneity 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.

⁴⁰ 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. EU's definition, in general, has fisheries products under the Agricultural products, whereas at WTO negotiations, fisheries are part of non-agricultural products.

7. Empirical Results

7.1 Estimation Results

The results of estimating equations (5) and (6) are reported in Table 1⁴¹. Each entry of the table reports the estimated coefficients and standard errors clustered at the product level. A natural way to start is a pooled OLS regression using data for all products in all years. The *column 1* estimates equation (6) using pooled OLS. The *column 2* estimates equation (5); *column 3* estimate equation (6) controlling for higher and lower (than median) values of MFN variable, higher and lower (than median) values of reciprocity variable; and GSP variable; while in *column 4*, we control for two categories of MFN tariffs, four quartiles of reciprocity in addition to the GSP variable. In *column 5*, we control for four quartiles of MFN tariff only. In *column 6*, we control for four quartiles of MFN tariff, two levels of reciprocity variable and GSP. Finally, in *column 7*, we estimate equation (6) by controlling for four quartiles of MFN tariff, four quartiles of reciprocity variable and GSP variable. In subsequent paragraphs, we discuss briefly about the estimates of *column 1 to 6*. Our main estimates controlling for all the variables are reported in *column 7*, and we discuss these results in greater detail in subsequent paragraphs.

In *column 1* specification, the data is available for 66,547 year-product observations. The number of dependent variables is 17 as we also control for the time dummies for 12 years. However, because of missing observations on MFN tariff data, the number of observations used in the regression is 65,148. The estimated coefficient for the MFN tariff is positive (less than one) and significant, a result that support the hypothesis that lower (higher) MFN tariffs would lead to lower (higher) preferential tariffs. The reciprocity coefficient is negative and significant supporting our initial hypothesis, but the estimated coefficient is almost close to zero. The estimated coefficient on GSP

⁴¹ *MFN_i1*, *MFN_i2*, *MFN_i3* and *MFN_i4* denote the four quartiles of MFN tariff in *column 5, 6* and *7*. *Recp_i1*, *Recp_i2*, *Recp_i3* and *Recp_i4* denote the four quartiles of reciprocity variable in *column 4* and *7*. In case of regressions (*column 1, 3* and *4*) with *MFN_i1* and *MFN_i2* dependent variables, *MFN_i1* denotes MFN tariffs below median and *MFN_i2* denotes MFN tariffs above the median value in year *t*. In *column 2* regression, *MFN_i1* denotes MFN variable. Similarly, the dependent variables *Recp_i1*, *Recp_i2* denote reciprocity below and above the mean reciprocity in *column 1, 3* and *6* regressions and *Recp_i1* denote reciprocity variable in *column 2* regression.

variable is negative and significant, supporting that the EU values non-reciprocal preferences while deciding preferential tariffs. Consistency of OLS requires that the composite error term is uncorrelated with the dependent variables. But such models ignore any heterogeneity over time and 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 inconsistent⁴² in the FE model and we estimate our model using the FE model in *column 2 to 7*.

Next, in *column 2*, we estimate the baseline model (5) taking advantage of panel structure of our data-set. Again, the data is available for 5119 products for 13 years (1995 to 2007). However, because of missing observations, the number of observations used in the regression is 65,148 and number of products are 5102. 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 (0.040), but not significant. The estimate of reciprocity coefficient is also not significant, although positive. However, the GSP coefficient remains negative and significant. This supports our initial hypothesis that GSP matters for the EU in deciding the preferential tariffs. The coefficient on MFN is non-significant, as we will observe in the subsequent estimates that EU protects the products with higher MFN tariffs in the PTAs also, which biases our estimates in *column 2*. The effect of lower MFN tariffs can only be identified when we separate higher and lower MFN tariffs in *columns 3 to 7*. Similarly, we will observe in subsequent estimations that higher reciprocity does not really matters for preferential tariffs. The present estimates get downward bias due the higher reciprocity offered to the EU on certain products. These effects get isolated only when we control for higher reciprocity in *column 3 to 7*.

⁴² The pooled OLS estimator are motivated from the individual-effects model by rewriting equation (5) as the pooled model $y_{zt} = D + x'_{zt} \beta + (D_z - D + \varepsilon_{zt})$. Any time-specific effects are assumed to be fixed and already included as time dummies in the regressors x'_{zt} . 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 $(D_z - D + \varepsilon_{zt})$ be uncorrelated with x'_{zt} . So the pooled OLS is inconsistent in FE model, as D_z is correlated with x'_{zt} (refer p703, Microeconometrics by Cameron and Trivedi (2005) for details).

In *column 3*, as expected the coefficients on the lower MFN tariff, i.e. *MFN_i1* is negative and significant, implying that for the products on which the MFN tariffs are lower, the EU is ready to reduce preferential tariffs. The estimated coefficient on higher MFN tariffs i.e. *MFN_i2*, is positive and insignificant, meaning thereby, that for the MFN tariffs above a certain level, the reduction in tariffs by the EU is insignificant. *This supports our hypothesis that the EU protects certain products at the preferential level that it protects at the MFN level.* Similarly, we observe that the coefficient for higher reciprocity is insignificant, whereas the coefficient for lower reciprocity is -0.015 and highly significant. The products on which reciprocity shown by ‘partner region’ is lower than the median value of reciprocity in a particular year get more reduction as compared to the products on which reciprocity shown is higher. *This again supports our initial hypothesis that reciprocity matters, but not beyond a level.* The intuition is simple to understand. The EU applies zero preferential tariffs on industrial products, but reduction on agricultural tariffs is limited. Further the access to the EU market is limited by tariff rate quota in most the agricultural products. A higher reciprocal market access by the partners in agricultural products may not lead to lower preferential tariff (i.e. higher preferential access) to the EU market on agricultural products⁴³. The coefficient on GSP variable is -0.992 and significant, which implies that if a product gets GSP, then its tariff is lesser by 0.992 percent points as compared to the products that do not get GSP. *This supports our initial hypothesis that GSP matters in deciding preferential tariffs by the EU.* The idea is again simple to comprehend. 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, it can easily reduce tariffs on the same products for its preferential partners without incurring any additional costs.

⁴³ For example, EU protects ‘060310: cut flowers’ for its domestic producers. It does not mean that higher preferential access by Tunisia to EU in Tunisian market on cut flowers will be lead to high preferential access by EU to Tunisia in EU’s cut flower market.

For column 4 to 7 regressions, we construct eight indicator variables:

Dependent variable	Indicator variables	Remarks ^{44,45}
$MFN_{z,t}$	$i1_{z,t}^{0 < MFN_{z,t} < MFN_{[25,t]}}$	Equal to one, if MFN tariff falls in the <i>first</i> quarter of MFN tariff applied by the EU on all products at time t , otherwise it is equal to zero.
	$i2_{z,t}^{MFN_{[25,t]} < MFN_{z,t} < MFN_{[50,t]}}$	Equal to one, if MFN tariff falls in the <i>second</i> quarter of MFN tariff applied by the EU on all products at time t , otherwise it is equal to zero.
	$i3_{z,t}^{MFN_{[50,t]} < MFN_{z,t} < MFN_{[75,t]}}$	Equal to one, if MFN tariff falls in the <i>third</i> quarter of MFN tariff applied by the EU on all products at time t , otherwise it is equal to zero.
	$i4_{z,t}^{MFN_{[75,t]} < MFN_{z,t} < MFN_{[100,t]}}$	Equal to one, if MFN tariff falls in the <i>fourth</i> quarter of MFN tariff applied by the EU on all products at time t , otherwise it is equal to zero.
$Recp_{z,t}$	$i1_{z,t}^{0 < Recp_{z,t} < Recp_{[25,t]}}$	Equal to one, if reciprocity that the EU gets falls in the <i>first</i> quarter of reciprocity extend on all products by 'PRF region' at time t , otherwise it is equal to zero.
	$i2_{z,t}^{Recp_{[25,t]} < Recp_{z,t} < Recp_{[50,t]}}$	Equal to one, if reciprocity that the EU gets falls in the <i>second</i> quarter of reciprocity extend on all products by 'PRF region' at time t , otherwise it is equal to zero.
	$i3_{z,t}^{Recp_{[50,t]} < Recp_{z,t} < Recp_{[75,t]}}$	Equal to one, if reciprocity that the EU gets falls in the <i>third</i> quarter of reciprocity extend on all products by 'PRF region' at time t , otherwise it is equal to zero.
	$i4_{z,t}^{Recp_{[75,t]} < Recp_{z,t} < Recp_{[100,t]}}$	Equal to one, if reciprocity that the EU gets falls in the <i>fourth</i> quarter of reciprocity extend 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 the 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.

⁴⁴ The interacted MFN variables are denoted as MFN_i1 , MFN_i2 , MFN_i3 and MFN_i4 in regression results. The average cut-off point for variables MFN_i1 , MFN_i2 , MFN_i3 and MFN_i4 are 3.4%, 5.7%, 9.4% and above 9.4% respectively. For year-wise cut-off please refer to Annex (to be attached).

⁴⁵ The interacted reciprocity variables are denoted as $Recp_i1$ and $Recp_i2$ in regression results. The average cut-off for $Recp_i1$, $Recp_i2$, $Recp_i3$ and $Recp_i4$ are 16.10, 34.92, 56.29 and above 56.29, respectively. For year-wise cut-off please refer to Annex (to be attached).

In *column 4*, we re-estimate equation (6) as in *column 3*, except that we divide the reciprocity variable into four quartiles. The sign and significance of coefficients remain almost the same as in *column 3*. The additional point we notice, that reciprocity up to the third quarter matters.

The coefficients in *column 5 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 quartiles of $MFN_{z,t}$ and $Recp_{z,t}$ variables for the purpose of the present study, so in the next paragraph, we discuss the results of *column 7* in greater detail.

In *column 7*, the estimated coefficients on MFN_i1 , MFN_i2 and MFN_i3 are negative and highly significant, whereas the coefficient on MFN_i4 is positive but insignificant *which is along the expected lines of our initial hypothesis*. To understand the implications of these coefficients, let us consider the cut-off for these four quarters. The cut off values for variables MFN_i1 , MFN_i2 , MFN_i3 and MFN_i4 are 3.4%, 5.7%, 9.4% and above 9.4% respectively. A coefficient of -1.00 on MFN_i1 implies that keeping other variables constant, if the MFN tariffs on the products (with MFN less than 3.4%) is increased by one percent point; the EU reduces preferential tariffs by same percent point. Coefficient of -0.469 on MFN_i2 , implies that for products with MFN tariff between 3.4% to 5.7%, the EU reduces preferential tariffs by 0.47 percent point for one percent point increase in MFN tariffs. Similarly, coefficient of -0.149 on MFN_i3 implies that for MFN tariffs between 5.7% and 9.4%, the EU reduces preferential tariffs by 0.15 percent point for one percent point increase in MFN tariffs. But when the MFN tariffs are higher than 9.4% (for MFN_i4), the reduction by the EU in preferential tariffs is not significant. We also notice a *decreasing trend*⁴⁶ on reduction in preferential tariffs as the MFN tariffs gets higher. In other words, *the estimated coefficients on four quarters of MFN tariff confirm our initial hypothesis that the products, that are highly protected at MFN level do not get much preferential treatment and for the most protected products there is almost no reduction in MFN tariffs*.

⁴⁶ In *column 7*, the coefficient on MFN_i1 is higher (in absolute value) than coefficients on MFN_i2 and MFN_i3 ; coefficient on MFN_i2 is higher (in absolute value) than coefficient on MFN_i3 but smaller (in absolute value) than coefficient on MFN_i1 ; coefficient on MFN_i3 is the smallest (in absolute value) among MFN_i1 , MFN_i2 and MFN_i3 . The coefficient on MFN_i4 is insignificant.

The estimated coefficients for *Recp_i1*, *Recp_i2* and *Recp_i3* are negative and significant, but the coefficient on *Recp_i4* is insignificant. *This again supports our initial hypothesis that reciprocity matters, but not beyond a level.* The cut-off points for *Recp_i1*, *Recp_i2*, *Recp_i3* and *Recp_i4* are 16.10, 34.92, 56.29 and above 56.29, respectively. A one percent point more reciprocity shown by the ‘PRF region’, when the reciprocity falls in the first quarter (i.e. less than 16.10 percent point), would lead to reduction in preferential tariff by 0.04 percent point. For reciprocity in the second quarter (i.e. between 16.10 to 34.92 percent point), one percent point more reciprocity by ‘PRF region’ will lead to reduction in preferential tariff by 0.03 percent point. Similarly, when the reciprocity offered by ‘PRF region’ is in the third quarter, (in the range 34.92 to 56.29 percent point), the preferential tariff is reduced by only 0.01 percent point. However, when the partner shows excessive reciprocity (i.e. in the fourth quarter *Recp_i4*) it does not affect the EU’s decision in preferential tariff offer to the ‘PRF region’. Here also we notice, a *decreasing trend*⁴⁷ on reduction in preferential tariffs as the *Recp_{z,t}* variable gets larger.

The estimated coefficient for *GSP* variable remains almost same as in *column 3* and supports *our initial hypothesis that GSP matters in deciding the preferential tariffs by the EU.* The implications and interpretation also remain the same, so we do not repeat them here.

7.2 Extensions and Additional Results

The average applied tariff on industrial products⁴⁸ is 4.0% and on agricultural products⁴⁹ is 18.6%. This has resulted in more liberalization in industrial sector than in agricultural sector. To further corroborate our results of Table 1, we do some additional

⁴⁷ In *column 7*, the coefficient on *Recp_i1* is higher (in absolute value) than coefficients on *Recp_i2* and *Recp_i3*; coefficient on *Recp_i2* is higher (in absolute value) than coefficient on *Recp_i3* but smaller (in absolute value) than coefficient on *Recp_i1*; coefficient on *Recp_i3* is the smallest (in absolute value) among *Recp_i1*, *Recp_i2* and *Recp_i3*. The coefficient on *Recp_i4* is insignificant.

⁴⁸ 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.

⁴⁹ Agricultural products are defined as products listed in Chapters 1 to 24 and in Annex I, § I, (ii) of the WTO Agreement on Agriculture and include fish and fisheries products in Chapter 3, Headings 1604 and 1605, and Sub-headings 0511 91, 2301 20 00 and 1902 20 10.

tests to confirm, if the EU allows more preferential access for industrial products than for the agricultural products. We separate the agricultural products from the industrial products in our regressions in Table 3. *Column 1 to 4* corresponds to our full sample. *Column 5 to 7* correspond to the developing country sample and we discuss them in sub-section 7.3. Each entry of Table 3 reports the estimated coefficients and standard errors clustered at the product level. In *column 1 to 4*, we control for four quartiles of MFN tariffs on agricultural and industrial products separately. We construct four indicator variables for agricultural products and four separate indicator variables for industrial products. The technique of creating the indicator variables is the same as in previous sub-section; the only difference is that we now take the quartiles for agricultural products and industrial products separately⁵⁰.

The result of regressing the dependent variable $PRF_{z,t}$ on four quartiles of MFN tariff on agricultural and industrial products (i.e. on MFN_af_i1 , MFN_af_i2 , MFN_af_i3 and MFN_af_i4 and MFN_na_i1 , MFN_na_i2 , MFN_na_i3 and MFN_na_i4)⁵¹ are given in *column 1* of Table 3.

In *column 2 to 4*, we also control for the other determinants of the preferential tariff formation that if omitted, may bias the estimated coefficients of our interest. The other dependent variables we include are reciprocity and GSP. In *column 2*, we add the GSP variable with other MFN variables. In *column 3*, we include separate reciprocity variables (below and above the median); and in *column 4* we also separate the effects of

⁵⁰ For example, we divide the year-wise MFN tariff on agricultural products into four quartiles, to generate four indicator variables af_i1 , af_i2 , af_i3 and af_i4 . The indicator variable af_i1 is equal to one, if $MFN_{z,t}^{AF}$ falls in the first quarter of MFN applied tariffs on agriculture sector in year t , otherwise af_i1 is zero. The indicator variable af_i2 is equal to one, if $MFN_{z,t}^{AF}$ falls in the second quarter of MFN applied tariffs on agricultural sector in year t , otherwise af_i2 is equal to zero. The other two indicator variables are defined accordingly. We interact these variables with $MFN_{z,t}^{AF}$ 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.

⁵¹ The cut off points for variables MFN_af_i1 , MFN_af_i2 , MFN_af_i3 and MFN_af_i4 are 2.5%, 12%, 29.78% and above 29.78% respectively. For MFN_na_i1 , MFN_na_i2 , MFN_na_i3 and MFN_na_i4 the cut-offs are 3.4%, 5.4%, 8.3% and above 8.3% respectively.

four quartiles of reciprocity variable. We get consistent estimates in all our regressions. So here, we discuss the results of *column 4*, which include all the variables of interest.

In *column 4*, for the agricultural sector, the coefficients on the first two quarters (*MFN_af_i1*, *MFN_af_i2*) are negative and significant. For the third and fourth quarters (*MFN_af_i3*, *MFN_af_i4*), the coefficients are insignificant, implying that the EU offers preferential access only in those agricultural products that have lower MFN tariff (upto 12% MFN tariff)⁵². For the agricultural products in the first quarter (*MFN_af_i1*), the EU is ready to reduce preferential tariff by 2.5 percent point for one percent increase in MFN tariff. For the agricultural products, in second quarter (*MFN_af_i2* i.e. those having MFN tariff between 2.5 to 12%), the EU reduces preferential tariff by only 0.20 percent points. The reduction on agricultural products with MFN tariff higher than 12% (i.e. in the third and forth quarter) is insignificant. On the other hand, the coefficients on all the four quartiles of industrial products are negative and significant. We also notice a *decreasing trend*⁵³ on reduction in preferential tariff as the MFN tariff gets higher and higher. For example, for the industrial products in the first quarter (*MFN_na_i1* i.e. the products with MFN tariff between zero and 3.4%), the coefficient is -1.00, implying that keeping other variables constant, the EU is ready to reduce the preferential tariff by one percent point for every one percent point increase in MFN tariff on those products. But for the industrial products in the second quarter (*MFN_af_i2* i.e. the products with MFN tariff between 3.4% and 5.4%) the estimated coefficient is -0.58, indicating that the EU reduces preferential tariffs by 0.58 percent point for one percent increase in MFN tariffs on those products.

This again corroborates the initial hypothesis that the EU gives more preferential access to its partners on products with lower MFN tariffs, which are mainly in industrial sector.

⁵² In practice, the preferential access in agricultural products is further reduced due to tariff rate quotas (TRQs) on some of the products.

⁵³ In *column 4*, the coefficient on *MFN_af_i1* is higher (in absolute value) than coefficients on *MFN_af_i2*, both are significant; coefficients on *MFN_af_i3* and *MFN_na_i4* are both smaller than coefficients on *MFN_na_i1*, and *MFN_na_i2*, and both are *insignificant*. The coefficient on *MFN_na_i1* is higher (in absolute value) than coefficients on *MFN_na_i2*, *MFN_na_i3* and *MFN_na_i4*; coefficient on *MFN_na_i2* is higher (in absolute value) than coefficient on *MFN_na_i3* and *MFN_na_i4* but smaller (in absolute value) than coefficient on *MFN_na_i1*; coefficient on *MFN_na_i3* is the smaller (in absolute value) than *MFN_na_i1*, and *MFN_na_i2*, but higher than coefficient on *MFN_na_i4*. The coefficient on *MFN_na_i4* is the lowest in numerical value.

It also confirms that *the highly protected products at the MFN level do not get preferential treatment and for the most protected agricultural products, there is almost no preferential treatment.*

The estimated coefficients on first three quartiles of reciprocity i.e. *Recp_i1*, *Recp_i2* and *Recp_i3* are -0.04, -0.03, and -0.01. As expected, all these coefficients are negative and significant, but the coefficient on fourth quarter i.e. *Recp_i4* is insignificant. The coefficient on *GSP* variable is again negative and highly significant. The magnitude and interpretation of reciprocity and *GSP* variables remain the same as in previous sub-section. The reader may refer discussion for *column 7* and *column 3* of sub-section 7.1 for interpretation of reciprocity and *GSP* coefficients, respectively. Estimates on both these variables, *again corroborate our initial hypothesis that reciprocity matters, but not beyond a level and GSP matters, when EU decides the level of preferential tariffs.*

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 equation (5) and (6) using data only for the EU's developing country partners. The time period for this data-set is 1998 to 2007⁵⁴. The results are reported in Table 2. Each entry of the table reports estimated coefficients and standard errors clustered at the product level. *Column 1* reports the OLS estimates with two different levels (below and above the median) of MFN and reciprocity variables. It also includes the *GSP* variable. *Column 2 to 7* estimate equations (5) and (6) using FE model, that takes advantage of the panel structure of our data-set. In *column 7*, we control for four quartiles of MFN and reciprocity to include all the variables of our interest. So we discuss below the results of *column 7* only.

As in Table 1, the coefficients on the first three quarters of MFN (*MFN_i1*, *MFN_i2* and *MFN_i3*) are negative and highly significant, however now the coefficient on

⁵⁴ In Table1, the time period is 1995-2007. 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 EU in industrial products, as developed country. Therefore, we drop Turkey and Switzerland to construct our sample of developing countries for sensitivity analysis in this sub-section.

fourth quarter (*MFN_i4*) of MFN tariff is also significant. The coefficients on last two quarters are much lower than coefficients on the first two quarters (compare -0.02 on *MFN_i4* and -0.03 on *MFN_i3* with -0.61 on *MFN_i1*, and -0.18 on *MFN_i2*). We still observe the decreasing trend in preferential tariff reduction with increase in MFN tariff. This implies that for the developing partners, the EU is ready to slightly reduce the tariff even on highly protected products. Main reason for this difference with our baseline regressions that include developed countries (in Table 1) is that the highly protected sectors such as agriculture, fisheries and textiles are subject to additional restrictions e.g. tariff rate quotas in agriculture and fish products, and strict rules of origin criteria in textiles sectors. For the developing countries, such restrictions are difficult to comply with. Also, since the tariffs are already very high in the fourth quarter (more than 9.4%) that notional cuts may not be enough to create market access for developing partners. Therefore, the market access in these sectors (with products having MFN tariff in the fourth quarter) remains elusive for the developing partners. *This again confirms our initial hypothesis that the highly protected products at the MFN level do not get preferential treatment.*

The coefficients on four quartiles of reciprocity have the same sign and significance as in Table 1, where the reciprocity up to the third quarter matters. The coefficient on high reciprocity in the fourth quarter (*Recp_i4*) remains insignificant. The hypothesis on limited reciprocity is again confirmed from Table 2.

However, the coefficient on *GSP* is not significant in *column 2 to 7*, which makes lot of practical sense. The reason is easy to understand. All the developing country partners are already beneficiaries of the EU's GSP program. So when EU negotiates with these countries, it does not take into account whether the product gets GSP or not. On the other hand, when we have developed partners in our sample (Table 1), GSP variable was highly significant throughout. The reason being, the sample in Table 1 contained all the partners and when EU negotiates with developed countries, it does not incur any additional cost by providing preferential access to developed partners on the products already covered under GSP.

In *column 5 to 7* of Table 3, we control for four quartiles of MFN tariffs on agricultural and industrial products separately. The results reported are for developing country sample for the period 1998 to 2007. Each entry of the table reports the estimated coefficients and standard errors clustered at the product level. We also control for reciprocity and GSP. We get consistent estimates of coefficients of interest, so here we discuss only the results of *column 7*.

In *column 7*, the coefficients on all the four quartiles for the agricultural sector, (*MFN_af_i1*, *MFN_af_i2*, *MFN_af_i3*, *MFN_af_i4*) are negative and significant. The coefficient on *MFN_af_i1* (-0.845) is numerically larger than the coefficient on *MFN_af_i2* (-0.062), *MFN_af_i3* (-0.047) and *MFN_af_i4* (-0.017). The coefficient on *MFN_af_i2* is numerically larger than the coefficient on *MFN_af_i3* and *MFN_af_i4*. The coefficient on *MFN_af_i4* is the lowest. This implies that for the developing country partners, the EU is willing to reduce on all agricultural products, but the preferences get reduced as the MFN tariffs increase. The preferential tariff on products with higher MFN tariff (higher than 29.78% i.e. *MFN_af_i4*) is still very high compared to the agricultural products with MFN tariffs below 12% (i.e. *MFN_af_i1*, *MFN_af_i2*). Coupled with the tariff rate quota and rules of origin on most of the highly protected agricultural products, the actual preference gets further lowered.

The coefficients on the first two quarters of industrial products *MFN_na_i1* (-0.484), *MFN_na_i2* (-0.142), are negative and significant, but for the third and fourth quarters *MFN_na_i3* (0.063), *MFN_na_i4* (0.105), the coefficients are positive and significant. This again means that, if the tariffs are lower on a product at MFN level, it is likely to get more preferential access (i.e. less preferential tariff) to the EU, whereas an industrial product with higher MFN tariff is likely to get less preferential access (i.e. higher preferential tariff) to the EU market.

The interpretation of coefficients on different MFN quartiles further strengthens our hypothesis that the EU extends better preferential access to its PTA partners on products with lower MFN tariffs.

The estimated coefficients on first three reciprocity quarters *Recp_i1*, *Recp_i2* and *Recp_i3* in column 7 are, -0.018, -0.010, and -0.004 . As expected, all these coefficients are negative and significant, but the coefficient on fourth quarter of reciprocity, *Recp_i4* is again insignificant. Here also we notice, a *decreasing trend*⁵⁵ on reduction in preferential tariff as the *Recp_{z,t}* variable gets higher. This again shows that higher reciprocity by the ‘PRF region’ does not matter, but certainly the reciprocity up to certain level matters in getting preferential access to the EU market. The coefficient on GSP variable becomes insignificant. The interpretation about the GSP variable being insignificant remains the same as mentioned in this sub-section while interpreting the results for Table 2. This result adds an additional dimension to our previous conclusion on GSP variable, that *non-reciprocal GSP preference matters when the EU negotiates with developed partners, but these preferences do not matter, when it negotiates preferential deal with the developing partners.*

8. Conclusions

In this paper, 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 shown by partners matters for the EU in deciding preferential tariff, and if the answer to this question is yes, to what extent? 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.

⁵⁵ In column 7, the coefficient on *Recp_i1* is higher (in absolute value) than coefficients on *Recp_i2* and *Recp_i3*; coefficient on *Recp_i2* is higher (in absolute value) than coefficient on *Recp_i3* but smaller (in absolute value) than coefficient on *Recp_i1*; coefficient on *Recp_i3* is the smallest (in absolute value) among *Recp_i1*, *Recp_i2* and *Recp_i3*. The coefficient on *Recp_i4* is insignificant.

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 shown by partner 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.

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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)
	OLS	FE	FE	FE	FE	FE	FE
PRF#	1	2	3	4	5	6	7
MFN_i1	-0.401*** (0.061)	0.040 (0.027)	-0.359*** (0.488)	-0.358*** (0.049)	-1.046*** (0.100)	-1.004*** (0.096)	-1.003*** (0.096)
MFN_i2	0.083*** (0.022)		0.040 (0.027)	0.040 (0.027)	-0.486*** (0.057)	-0.468*** (0.055)	-0.469*** (0.055)
MFN_i3					-0.156*** (0.033)	-0.148*** (0.032)	-0.149*** (0.032)
MFN_i4					0.040 (0.027)	0.039 (0.027)	0.040 (0.027)
Recp_i1	-0.008** (0.004)	0.001 (0.002)	-0.015*** (0.004)	-0.050*** (0.010)		-0.015*** (0.004)	-0.044*** (0.010)
Recp_i2	-0.0071*** (0.002)		-0.001 (0.002)	-0.027*** (0.005)		-0.001 (0.002)	-0.027*** (0.005)
Recp_i3				-0.014*** (0.003)			-0.014*** (0.003)
Recp_i4				-0.002 (0.002)			-0.002 (0.002)
GSP	-1.179*** (0.133)	-1.015*** (0.109)	-0.992*** (0.107)	-0.984*** (0.106)		-0.968*** (0.105)	-0.959*** (0.104)
Constant	4.720*** (0.469)	4.269*** (0.399)	4.843*** (0.441)	0.855*** (0.182)	1.084*** (0.144)	1.471*** (0.191)	1.160*** (0.187)
Product fixed effects	No	Yes	Yes	Yes	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time Period	1995 to 2007	1995 to 2007	1995 to 2007	1995 to 2007	1995 to 2007	1995 to 2007	1995 to 2007
Number of Observations N	65148	65148	65148	65148	65148	65148	65148
Number of products n	---	5102	5102	5102	5102	5102	5102
Number of dependent variables k	17	15	17	19	16	19	21
R-sq	0.130						
R-sq within		0.047	0.050	0.050	0.048	0.053	0.053
rho (variation due to D_z)		0.195	0.187	0.188	0.180	0.180	0.180
$F(n-I, N-n-k)$ F test that all $D_z = 0$		---	--	---	---	--	---
$F(k, N-n-k)$ significance of the model	219.32	193.47	178.39	161.49	208.11	167.34	153.56

*** shows coefficient is significant at 1% level.

** shows coefficient is significant at 5% level.

 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 EU on all of its preferential partners 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 EU on product z at time t on six digit HS 1996. 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) $Recp$: Total reciprocity extended to EU by q partners ($q=1$ to k) on product z at time t . $Recp_{i1}$ to $Recp_{i4}$ are year-wise quartiles of reciprocity variable. In case of regressions only with $Recp_i$, 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 at time t . $GSP=0$ otherwise.

iii) We use simple average of applied ad valorem tariffs for all products at 6 digit level. For the products with specific duties, we calculate the ad-valorem equivalents from WITS by using methodology adopted in NAMA negotiations at WTO.

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) : 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) ρ : Estimate that 18 to 19.5 % of variation in preferential tariff (i.e. dependent variable) 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_0 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 H_0 indicates that pooled OLS would produce inconsistent estimates.

ix) $F(k, N-n-k)$: F -statistics to test the null H_0 that the coefficients on the regressors (dependent variables) are jointly zero i.e. whether our model is overall significant. A rejection of H_0 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 EU.

Table 2

The Determinants of EU's Preferential Tariff

	Developing countries (1998-2007)	Developing countries (1998-2007)	Developing countries (1998-2007)	Developing countries (1998-2007)	Developing countries (1998-2007)	Developing countries (1998-2007)	Developing countries (1998-2007)
	OLS	FE	FE	FE	FE	FE	FE
PRF#	1	2	3	4	5	6	7
MFN_i1	-0.432*** (0.021)	-0.017** (0.007)	-0.180*** (0.014)	-0.180*** (0.014)	-0.616*** (0.030)	-0.610*** (0.030)	-0.611*** (0.030)
MFN_i2	0.019*** (0.006)		-0.017** (0.007)	-0.017** (0.006)	-0.178*** (0.015)	-0.179*** (0.015)	-0.180*** (0.015)
MFN_i3					-0.031*** (0.010)	-0.031*** (0.010)	-0.032*** (0.010)
MFN_i4					-0.017** (0.006)	-0.017** (0.006)	-0.017** (0.006)
Recp_i1	-0.005* (0.003)	0.002** (0.001)	-0.006*** (0.002)	-0.021*** (0.006)		-0.005** (0.002)	-0.020*** (0.006)
Recp_i2	-0.005*** (0.002)		0.001 (0.001)	-0.010*** (0.003)		0.001 (0.001)	-0.010*** (0.003)
Recp_i3				-0.004** (0.002)			-0.004** (0.002)
Recp_i4				0.001 (0.001)			0.001 (0.001)
GSP	-0.116*** (0.033)	-0.013 (0.028)	-0.011 (0.028)	-0.008 (0.028)		-0.008 (0.028)	-0.005 (0.028)
Constant	0.539*** (0.079)	0.756*** (0.044)	0.754*** (0.049)	0.643*** (0.062)	0.771*** (0.037)	0.772*** (0.050)	0.662*** (0.062)
Product fixed effects	No	Yes	Yes	Yes	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time Period	1998 to 2007	1998 to 2007	1998 to 2007	1998 to 2007	1998 to 2007	1998 to 2007	1998 to 2007
Number of Observations N	49904	49904	49904	49904	49904	49904	49904
Number of products n	---	5084	5084	5084	5084	5084	5084
Number of dependent variables k	14	12	14	16	13	16	18
R-sq	0.109						
R-sq within		0.094	0.095	0.096	0.097	0.097	0.097
rho (variation due to D_z)		0.445	0.435	0.436	0.430	0.432	0.432
$F(n-1, N-n-k)$ F test that all $D_z = 0$		---	--	---	---	--	---
$F(k, N-n-k)$ significance of the model	217.16	270.41	234.09	213.27	251.10	211.08	196.62

*** shows coefficient is significant at 1% level.

** shows coefficient is significant at 5% level.

 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 EU on all of its preferential partners 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 EU on product z at time t on six digit HS 1996. 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* : Total reciprocity extended to EU by q partners ($q = 1$ to k) on product z at time t . *Recp_i1* to *Recp_i4* are year-wise quartiles of reciprocity variable. In case of regressions only with *Recp_i*, 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 at time t . $GSP = 0$ otherwise.

iii) We use simple average of applied ad valorem tariffs for all products at 6 digit level. For the products with specific duties, we calculate the ad-valorem equivalents from WITS by using methodology adopted in NAMA negotiations at WTO.

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) : 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) ρ : Estimate that 43 to 44.5 % of variation in preferential tariff (i.e. dependent variable) 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_0 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 H_0 indicates that pooled OLS would produce inconsistent estimates.

ix) $F(k, N-n-k)$: F -statistics to test the null H_0 that the coefficients on the regressors (dependent variables) are jointly zero i.e. whether our model is overall significant. A rejection of H_0 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 EU.

Table3

The Determinants of EU's Preferential Tariff

	All Partners (1995-2007)	All Partners (1995-2007)	All Partners (1995-2007)	All Partners (1995-2007)	Developing countries (1998-2007)	Developing countries (1998-2007)	Developing countries (1998-2007)
	FE	FE	FE	FE	FE	FE	FE
PRF#	1	2	3	4	5	6	7
MFN_af_i1	-2.562*** (0.417)	-2.497*** (0.411)	-2.506*** (0.412)	-2.527*** (0.414)	-0.828** (0.333)	-0.840** (0.335)	-0.845** (0.339)
MFN_af_i2	-0.212*** (0.065)	-0.200*** (0.064)	-0.200*** (0.064)	-0.201 *** (0.064)	-0.064*** (0.021)	-0.063*** (0.021)	-0.062*** (0.021)
MFN_af_i3	-0.066 (0.043)	-0.065 (0.043)	-0.064 (0.043)	-0.064 (0.043)	-0.049*** (0.016)	-0.048*** (0.016)	-0.047*** (0.016)
MFN_af_i4	0.040 (0.028)	0.040 (0.027)	0.040 (0.027)	0.040 (0.027)	-0.017*** (0.006)	-0.017*** (0.006)	-0.017*** (0.006)
MFN_na_i1	-1.064*** (0.091)	-1.018*** (0.086)	-1.007*** (0.085)	-1.000*** (0.085)	-0.494*** (0.034)	-0.486*** (0.034)	-0.484*** (0.034)
MFN_na_i2	-0.613*** (0.062)	-0.588*** (0.059)	-0.584*** (0.059)	-0.582*** (0.059)	-0.143*** (0.019)	-0.142*** (0.019)	-0.142*** (0.019)
MFN_na_i3	-0.232*** (0.032)	-0.221*** (0.031)	-0.220*** (0.031)	-0.221*** (0.031)	0.065*** (0.009)	0.064*** (0.009)	0.063*** (0.009)
MFN_na_i4	-0.090*** (0.023)	-0.082*** (0.022)	-0.081*** (0.022)	-0.080*** (0.022)	0.105*** (0.005)	0.105*** (0.005)	0.105*** (0.005)
Recp_i1			-0.014*** (0.004)	-0.044*** (0.010)		-0.006*** (0.002)	-0.018*** (0.006)
Recp_i2			-0.001 (0.002)	-0.026*** (0.005)		0.001 (0.001)	-0.010*** (0.003)
Recp_i3				-0.014*** (0.003)			-0.004** (0.002)
Recp_i4				-0.002 (0.002)			0.001 (0.001)
GSP		-0.958*** (0.104)	-0.954*** (0.103)	-0.946*** (0.102)	-0.012 (0.028)	-0.007 (0.028)	-0.005 (0.027)
Constant	1.377*** (0.120)	1.891*** (0.162)	1.737*** (0.177)	1.433*** (0.170)	0.464*** (0.032)	0.451*** (0.044)	0.351 (0.054)
Product fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time Period	1995 to 2007	1995 to 2007	1995 to 2007	1995 to 2007	1998 to 2007	1998 to 2007	1998 to 2007
Number of Observations N	65148	65148	65148	65148	49904	49904	49904
Number of products n	5102	5102	5102	5102	5084	5084	5084
Number of dependent variables k	20	21	23	25	18	20	22
R-sq							
R-sq within	0.049	0.053	0.054	0.054	0.101	0.101	0.101
rho (variation due to D_z)	0.196	0.195	0.195	0.196	0.406	0.408	0.409
$F(n-1, N-n-k)$ F test that all $D_z = 0$	--	--	---	--	--	---	--
$F(k, N-n-k)$ significance of the model	167.20	153.85	141.62	132.03	296.66	268.84	249.17

*** shows coefficient is significant at 1% level.

** shows coefficient is significant at 5% level.

 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 EU on all of its preferential partners 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 EU on product z at time t on six digit HS 1996. *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* : Total reciprocity extended to EU by q partners ($q= 1$ to k) on product z at time t *Recp_i1* to *Recp_i4* are year-wise quartiles of reciprocity variable.
 - (c) *GSP*: is a dummy variable i.e. $GSP = 1$ if product z gets GSP at time t . $GSP = 0$ otherwise.
- iii) We use simple average of applied ad valorem tariffs for all products at 6 digit level. For the products with specific duties, we calculate the ad-valorem equivalents form WITS by using methodology adopted in NAMA negotiations at WTO.
- 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) : 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) ρ : Estimate that percentage of variation in preferential tariff (i.e. dependent variable) that 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_0 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 H_0 indicates that pooled OLS would produce inconsistent estimates.
- ix) $F(k, N-n-k)$: F -statistics to test the null H_0 that the coefficients on the regressors (dependent variables) are jointly zero i.e. whether our model is overall significant. A rejection of H_0 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 EU.